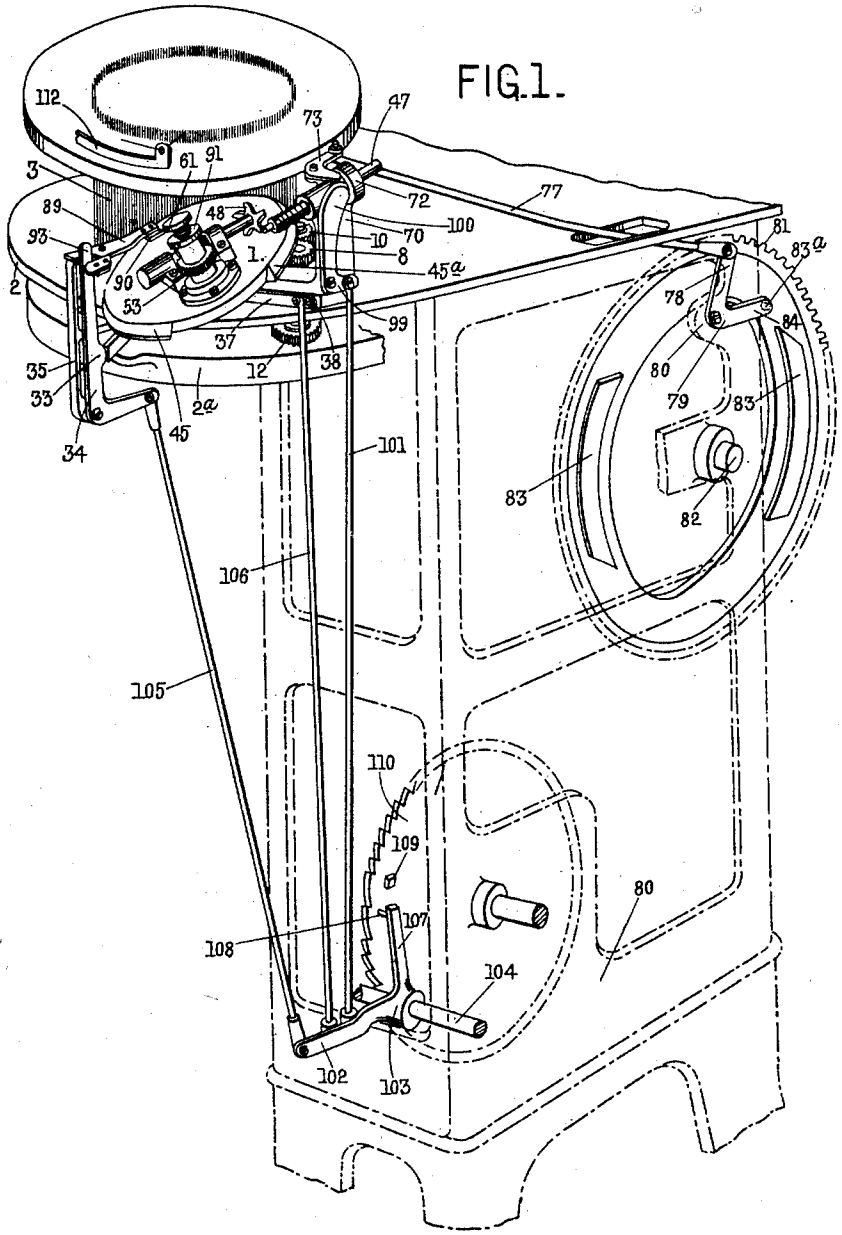
March 17, 1931. T. ASHBY ET AL 1,796,642

KNITTING MACHINE

Filed May 31, 1928 4 Sheets-Sheet 1

FIG.1.



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March 17, 1931. T. ASHBY ET AL 1,796,642

KNITTING MACHINE

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FIG. 2.

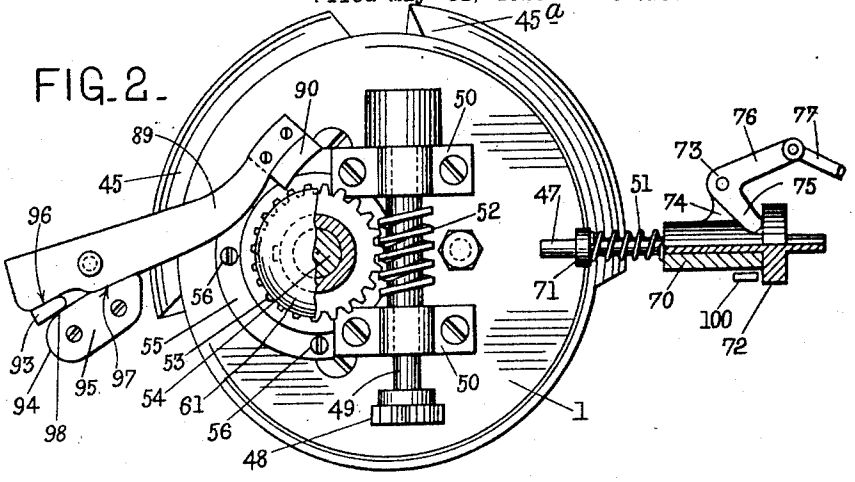


FIG. 3.

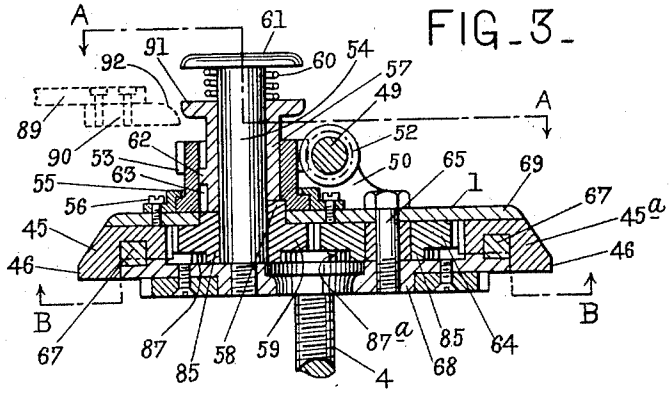
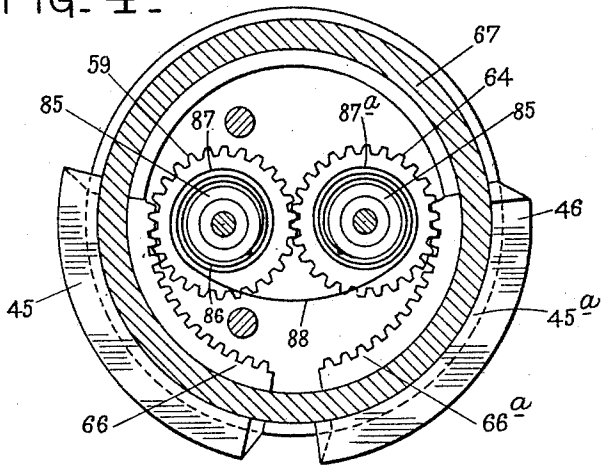


FIG. 4.



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March 17, 1931. T. ASHBY ET AL 1,796,642

KNITTING MACHINE

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FIG-5-

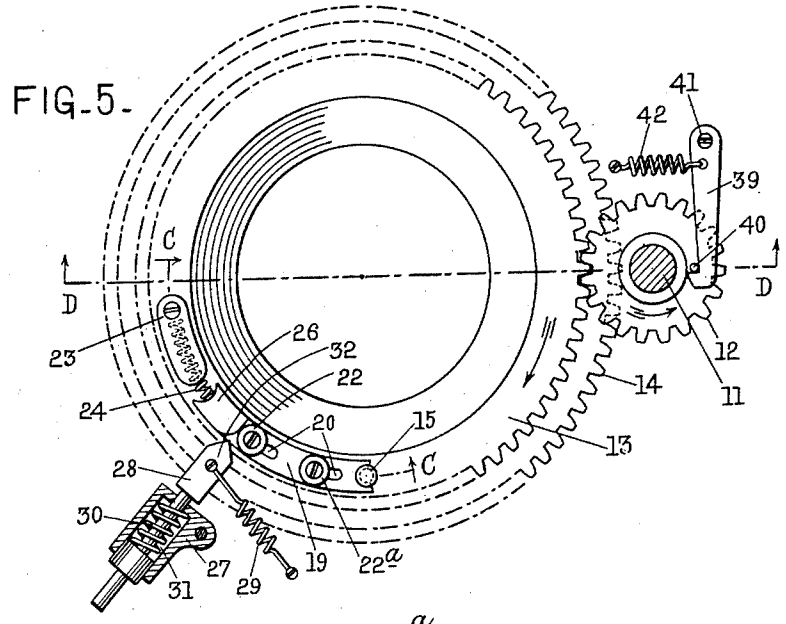


FIG-6-

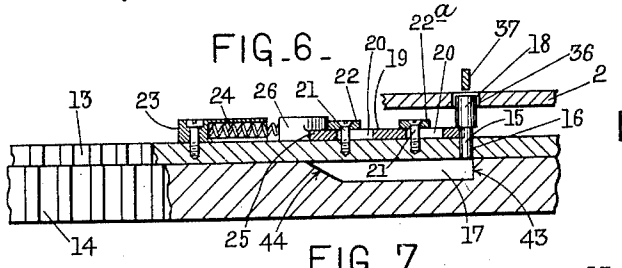


FIG-7-

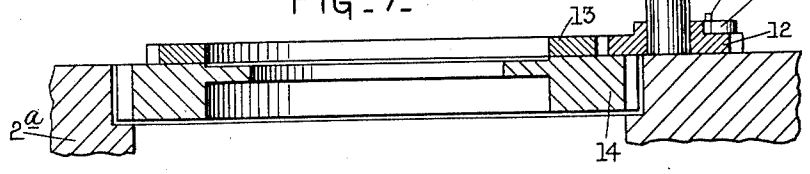
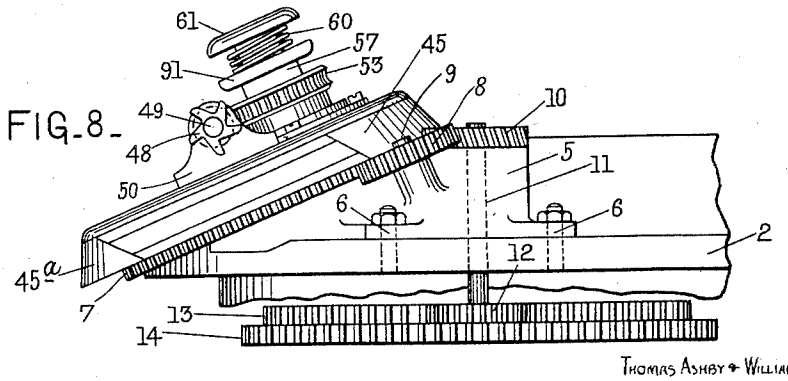


FIG-8-



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KNITTING MACHINE

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FIG. 9.

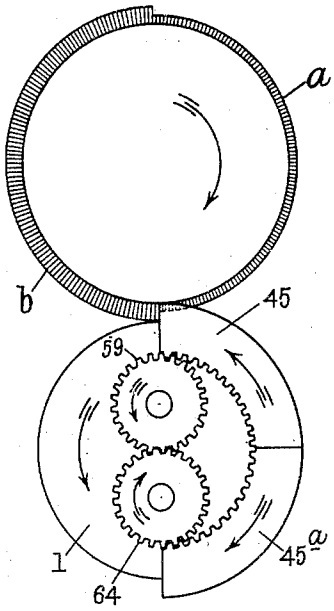


FIG. 10.

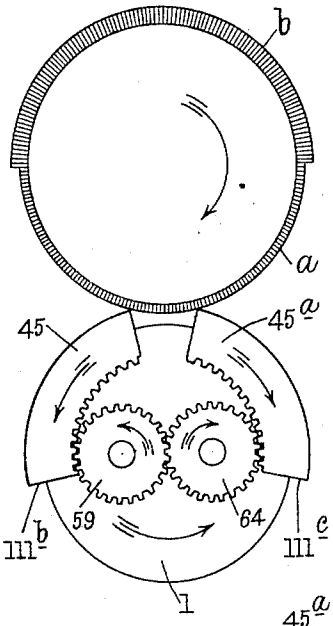


FIG. 11.

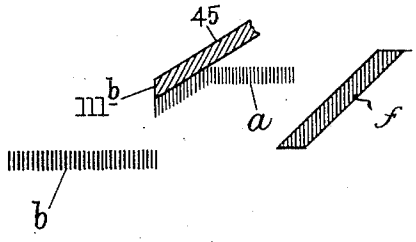


FIG. 12.

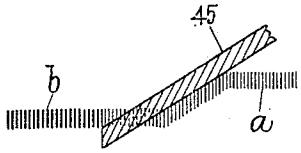


FIG. 13.

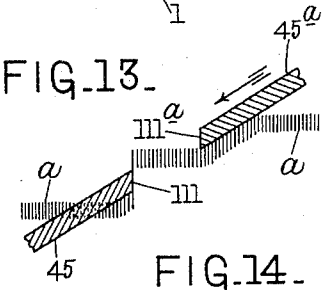
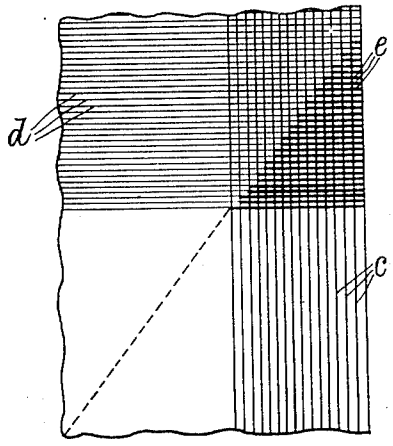


FIG. 14.



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1,796,642

UNITED STATES PATENT OFFICE

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KNITTING MACHINE

Application filed May 31, 1928, Serial No. 282,013, and in Great Britain June 16, 1927.

This invention relates to selective patterning devices for bearded needle or latch needle circular knitting machines i. e. to devices for raising or lowering selected needles to enable plated designs, tuck designs or other pattern effects to be produced.

According to the invention we employ as the selective patterning device, mechanism comprising in combination one or more needle or needle lifter selecting cams (i. e. cams for selecting the needles or needle lifters) carried by a platform, shaft or other rotary member which is rotated positively at the desired speed in relation to that of the needle cylinder, and the mechanism for producing controlled or selected angular displacement of the cam or cams relatively to, and about the axis of, the platform, shaft or other carrier member. For convenience the needle or needle lifter selecting cam or cams are hereinafter referred to as the "selecting" cam or cams.

The platform, shaft or other carrier member may be driven positively in any desired manner, for instance, by gearing from the needle cylinder.

The platform or other carrier may be arranged to run during the knitting of the whole or of any desired portion or portions of the article or fabric to be knitted; in cases where it is desired to rotate it only during a portion or portions of the knitting of the article or fabric, clutch mechanism or other mechanism operated preferably automatically by the knitting machine may be provided enabling the platform or other carrier to be thrown into and out of rotation.

Any suitable means may be employed for producing the angular displacement of the selecting cam or cams and for returning the cam or cams to its or their initial positions; and for starting and stopping the rotation of the carrier member.

When two cams are employed and adapted to be moved apart by their angular displacement about the axis of the carrier member, a successively varying number of needles can be selected for the purpose of producing a patterned or other effect. This arrangement may be applied to the production of a pointed high heel splice in the knitting of stockings by selecting needles to receive a splicing thread at the commencement of the heel-splicing operation and gradually increasing the number of needles which receive the thread by the selective action of the two cams.

Further objects of the invention will appear from the following description and the annexed claims.

The accompanying drawings serve to illustrate one form of the invention especially suitable for the production of women's stockings having a high spliced ankle, but it is to be understood that the following description in no way limits the invention, since many variations may be made therein without departing from the spirit of the invention.

Figure 1 is a perspective view of a circular knitting machine provided with the patterning device according to the invention, only so much of the machine being shown as is necessary for an understanding of the operation of the patterning device, and some parts being shown in diagrammatic form.

Figure 2 is a part sectional view taken on the line A—A of Figure 3 of a rotatable platform or carrier together with part of the co-acting mechanism.

Figure 3 is a vertical section of the rotatable platform.

Figure 4 is an inverted sectional plan of the rotatable platform taken on the line B—B of Figure 3.

Figure 5 is a diagrammatic plan view of part of the gearing for driving the rotatable platform.

Figure 6 is a developed section of a clutch mechanism for the platform drive, taken on the line C—C of Figure 5.

Figure 7 is a part section on the line D—D of Figure 5.

Figure 8 is a side elevation of the rotatable platform showing further parts of the driving mechanism.

Figure 9 is a diagrammatic plan of the needle cylinder and rotatable platform.

Figure 10 is a similar view to Figure 9 showing the operation of the selecting cams.

Figures 11, 12 and 13 are diagrammatic sections showing the operation of the selecting cams, and

Figure 14 is a diagrammatic view of part of a stocking showing the formation of the heel-splice.

A circular platform generally designated as 1 obliquely disposed to the bed-plate 2 and to the revolving needle cylinder 3 is rotated positively at the desired speed relatively to the needle cylinder. The platform is carried by an inclined spindle 4 pivoted in a casting 5 that is secured to the bed-plate of the machine by bolts 6. A gear 7 carried by the underside of the platform 1 meshes with a pinion 8 pivotally mounted on an inclined stud 9 secured to the casting 5, and the pinion 8 is in gear with a pinion 10 secured to a vertical spindle 11 pivotally mounted in the casting 5 and carrying at its lower end a further pinion 12, which pinion meshes with an annular gear 13 loosely mounted concentrically with the needle cylinder 3 and resting on the gear 14 that drives the cylinder. Rotation of the platform is effected by clutching together the gears 13, 14 by the following means:—

A pin 15 fits in a hole 16 in the gear 13 so that when the pin is allowed to drop through the hole into an arcuate slot 17 in the gear 14, and come into contact with the end of the slot, the gear 13 is driven together with the cylinder. When the platform is not desired to rotate, the pin, which is formed with a head 18, is prevented from entering the slot by a slide or catch 19 that passes under the head. The slide 19 is formed with arcuate slots 20 taking over studs 21 secured to the gear 13, the enlarged heads of the studs or washers 22, 22*a* holding the slide against the gear while allowing it to move circumferentially. A hollow abutment 23 is fixed to the gear 13 and a spring 24 arranged in the abutment presses against the end 25 of the slide 19 remote from the pin 15. This end of the slide is formed with an upwardly extending portion arranged to form an abutment 26 by which the slide is operated.

On the bed-plate 2 is pivoted a bracket 27 bored to receive the stem of a plunger 28. A spring 29 connected to the end of the plunger 28 and to the bed-plate 2 tends to keep the plunger in a position normal to the gear 13, and a second spring 30 arranged in a recess 31 in the bore of the bracket 27 tends to keep the pointed end 32 of the plunger out of the path of the slide 19. The plunger is operated by a swell 33 on a bell-crank 34 pivoted to a bracket 35 carried by the lower bed-plate 2*a* and actuated as will be hereafter described and its pointed end enters between the washer 22 and the abutment 26 of the slide 19, thereby moving the slide to the left (Fig. 5) and allowing the pin 15 to enter the slot 17 in the cylinder gear 14. The plunger is turned, together with the bracket 27 in a counter-clockwise direction against the action of the spring 29 until it is freed from the recess between the washer 22 and the abutment 26, and it is then retracted by the spring 29 after the swell 33 has been withdrawn.

The head 18 of the pin 15 when in its declutched (raised) position lies in a slot 36 in the bed-plate 2, and to ensure that the pin when released by the slide 19 falls into the slot 17, a lever 37 pivoted to a bracket 38 on the bed-plate and operated as will be described later, enters the slot and presses the pin into engagement.

Rotation of gear 13 and, hence, of the platform 1 continues for the desired period until the cylinder begins to reciprocate. The gear 13 may then tend, under the influence of friction, to rotate in the reverse direction, but such rotation is prevented by a pawl 39 which either acts on a stop or pin carried by the gear 13, or as shown in Fig. 5, on a pin 40 carried by the intermediate pinion 12. The pawl 39 is pivoted at 41 to the bed-plate and is pulled towards the pin 40 by a spring 42 connected at one end to the bed-plate. The end of the slot 17 remote from the end 43 that normally engages the pin 15 is inclined, as shown at 44, and on reversal of the cylinder gear, the pin rides up this incline, thus allowing the slide to return, and the pin is again retained by the slide. When the gear 13 is held stationary by a pawl 39 as above described, the pin 15 is immediately below the slot 36 in the bed-plate and as the pin is raised by the incline 44 it enters the slot and secures the gear against rotation.

Two needle or needle lifter selecting cams 45, 45*a* are carried by the platform 1 and are capable of rotation about the axis of the platform. The outer edges 46 of the cams form segments of a circle concentric with the platform and project beyond its outer edge to form a cam surface or surfaces for raising or lowering the butts of the needles or needle lifters to be selected.

The cams are arranged in a common plane and are provided with selecting mechanism to rotate them about the axis of the platform. Such selecting mechanism comprises a plunger 47 that engages at the desired intervals of time a star-wheel 48 carried by a spindle 49 mounted in bearings 50 secured to the circular platform. As shown, the plunger is normally held in the track of the star-wheel by means of a spring 51, being removed as desired from the path by means to be afterwards described, but it is to be understood that it may normally remain out of the track, when positive means may be employed to bring it to operative position. On the spindle 49 is mounted a worm 52 meshing with a worm wheel 53 rotatable relative to a spindle 54 carried by the rotating platform. The wheel 53 is held against axial movement by a flanged

ring 55 secured by screws 56 to the platform 1. Rotatable on the spindle 54 and slidable in the bore of the worm-wheel is a clutch member 57 normally kept in engagement with a co-operating clutch member 58 on a pinion 59 loose on the spindle by a spring 60 arranged between the member 57 and the head 61 of the spindle. The clutch member 57 is caused to rotate with the worm wheel 53 by a key 62 sliding in a key-way 63. Thus when the plunger 47 is in the path of the star-wheel 48 and the clutch members 57, 58 are in engagement, the pinion 59 is rotated step by step in accordance with the movement imparted to the star-wheel. A pinion 64 is rotatably mounted on a stud or pin 65 carried by the platform 1 and meshes with the pinion 59, while the two pinions 59, 64 mesh with segmental gears 66, 66*a* carried by the two cams 45, 45*a* respectively. The cams themselves are carried by and slide on a ring 67 secured to the base-plate 68 of the platform, and move in opposite directions towards or away from each other as the pinion 59 is rotated as previously described. A cover plate 69 retains the cams in position on the ring 67.

In the machine illustrated, only one plunger, acting on the star-wheel 48 below the axis of the spindle 49, is provided, and this plunger operates to move the cams farther apart, but, of course, the cams may be caused to move nearer together by the addition of a further plunger acting on the star-wheel above the axis of the spindle. Thus, if it is desired to take an extra thread by a successively increasing number of needles whilst moving the two needle selecting cams successively further apart, the needles of which some are to be selected may, after leaving the knitting cam of the machine, all be raised by any known means into such a position as to take the extra thread, but before they reach the extra thread supply feeder or arm 112 some may be selected by the cams carried by the circular platform. In such case when the two cams are adjacent, all the needles to be selected are taken down out of the track of the extra thread supply feeder or arm. As the two cams are moved successively further apart, by the action of the plunger on the star-wheel, the butts of a successively increasing number of the needles will pass between the gap between the two cams and keep in the level to take the extra thread. Similarly in the converse case where it is desired to take the extra thread by a successively decreasing number of needles, the needle selecting cams are moved successively nearer together by the action of the second plunger on the star-wheel, the needles may all be raised as described above and some are then selected by the cams before reaching the extra thread supply feeder or arm. In such case the butts of a successively decreasing number of needles will pass between the gap between the two cams and keep in the level to take the extra thread.

The plunger 47 is slidably mounted in a bracket 70 carried by the bed-plate 2 and is provided with a shoulder 71, against which the spring 51 presses to keep the plunger in the path of the star-wheel. At the farther end is a collar 72 which serves to limit the extending movement of the plunger and also provides an abutment for the plunger operating means. These means comprise a bell-crank 73 pivoted on a lug 74 carried by the bracket 70, one arm 75 of the lever engaging the collar 72 and the other 76 being pivoted to a link 77 that is connected to one arm 78 of a bell-crank 79 pivoted on the machine frame 80 in proximity to a gear wheel 81 mounted on the usual back-shaft 82 from which the motion of the machine is derived. One or more bluffs 83 are mounted on the side of the gear 81 and arranged to engage a pin 83*a* carried by the second arm 84 of the bell-crank 79, thereby rocking the bell-crank. It will be obvious that the picking action of the cams can be varied as desired by varying the arrangement of the bluffs 83 on the gear.

It may be necessary to arrange that the cams are returned to completely closed position after they have reached their most extended position, and it may also be necessary to cause them to close completely either after they have moved through only a part of their travel, either in an opening or closing direction. This closing may be effected automatically from the motion of the machine. Referring to Figs. 3 and 4, it will be seen that the pinions 59, 64 are each formed with an annular boss 85 and to these bosses the ends of a clock-spring 86 are attached, the spring being wound spirally in opposite directions from the points of attachment respectively and the two spirals 87, 87*a* being connected by the central portion 88 of the spring. As the pinions are rotated, they cause the two ends of the spring to be wound up, and therefore, when the pinion 59 is de-clutched from the worm-wheel 53, as will hereafter be described, the cams are caused to return to starting position by the unwinding of the spring. An initial tension may be imparted to the spring to ensure that the cams completely close when the pinion 59 is released. It will also be understood that in place of the single spring operating in connection with both pinions, a separate spring may be used on each pinion.

Declutching of the member 57 is effected by a lever 89 bearing a projecting cam member 90 and adapted to be given a slight rotation so that the cam member 90 moves into the path of the annular head 91 of the member 57. The cam is formed with an inclined surface 92 up which the head rides to declutch the worm wheel 53. The lever 89 is pivoted on the bracket 35, and is actuated by an upwardly extending arm 93 of the bell-crank 34. The

arm 93 is guided by the edge 94 of a plate 95 fixed to the bracket 35 and engages an inclined edge 96 of the declutching lever 89, thereby rotating the lever in a clockwise direction (Figure 2). The operative and inoperative positions of the lever 89 are limited by the guide plate which is engaged by the lever at the points 97, 98 in the two positions respectively.

The provision of a worm drive will, of course, ensure that the cams do not return to starting position under the action of the spring until the worm wheel is declutched, but where worm gear is not employed in the gear train, ratchet or similar means are employed to prevent such return. In this case the declutching means may operate in a similar manner to that described above by disconnecting a part of the gear train or it may effect a release of the ratchet or similar mechanism.

It is sometimes necessary to prevent operation of the selecting cams while the platform is rotating, and for this purpose a bell-crank lever 99 is pivoted on the bracket 70 and arranged to engage with one arm 100 the collar 72 on the plunger 47. The lever 99 is operated by a link 101 actuated by a suitable part of the machine. Conveniently, the link may be pivoted to one arm 102 of a bell-crank lever 103 which also serves as the actuating means for the bell-crank 34 and the lever 37. This lever is pivoted to a shaft 104 carried by the machine frame 80 and while its arm 102 is pivoted to links 101, 105, 106, its other arm 107 carries a pin 108 projecting into the path of a stud 109 mounted on the usual pattern control wheel 110 of the machine.

The operation of the machine with respect to the knitting of a pointed high-spliced ankle in a woman's stocking will now be described.

When the device is arranged for this purpose, the platform makes one complete revolution for each complete revolution of the needle cylinder, and the combined circumferential length of the cams is such that the cams can act if desired on all the needles provided with short butts, only such needles being used in the actual heel formation and therefore being the only ones required to take the splicing thread, as will be well understood. The platform begins to rotate at or before the points at which the splicing is to be applied, but if it is rotated before this point is reached, the plunger 47 must be held out of the path of the star-wheel 48 and the lever 103 is actuated for this purpose by the stud 109, the stud acting for the required interval of time by the intermittent motion of the pattern wheel 110. When splicing is to begin, the lever 34 releases the plunger 28, and the cams 45, 45*a* are separated to an extent sufficient to pass two of the short-butted needles *a* (Figs. 9–13). It is here necessary to explain that the long-butted needles *b* have previously been brought down to a height where they are not in the path of the selecting cams. The cam *f* projects into the path of the needle butts only so far as to engage the butts *b* without engaging the butts *a*. The short-butted needles however are engaged by the cam but two are allowed to pass through the gap between the cams, the two selected needles remaining at a height where they will receive thread from the splicing thread feeder arm.

If on the next revolution of the platform the cams were again to separate to the extent of two additional needles, the point of the splicing would form too large an angle, and it is therefore necessary to arrange that the plunger does not operate the plunger 47 at every course. To this end, in the machine illustrated where the back-shaft 82 rotates once for four revolutions of the needle cylinder, as is usual in hosiery machines, two bluffs 83 are employed, each extending through approximately 90°, and the bluffs allow the plunger to come into operation at every other course. Thus at every other course, the number of short-butted needles allowed by the cams to receive the splicing thread is increased by two.

The separation of the cams continues until all the needles are receiving the thread, when the machine proceeds, in the usual way, to reciprocate to knit the heel. At reciprocation, the gear is held stationary, the pin is raised by the incline to engage the slot, and the platform ceased to rotate. It will be noticed that the cams are left in extended position, and they remain so until the platform again rotates when the heel of the succeeding stocking is to be spliced, the lever 89 then declutching the worm-wheel 53 and allowing the spring 86 to return the cams to starting position.

Referring to Fig. 9, it will be seen that the long-butted needles comprise about half the total number of needles and that the cams have a circumferential length equal to the length of the circumference of the needle cylinder occupied by the short-butted needles. In this figure, the cams are shown forming a continuous cam surface and in a position where they are about to engage the short butts. As previously stated, the long butted needles *b* have already been lowered to the normal knitting height, i. e. to the normal level where they will pass through the knitting cam of the machine and will also miss the splicing thread which is only to be taken by the short-butted needles selected by the cams. The needles *b* are therefore removed from the field of influence of the selecting cams, while the short-butted needles remain at the height to which they had been raised, together with the long-butted needles, after their passage through the knit-

ting cam. With the selecting cams in the position shown in Fig. 9, all the short-butted needles will be lowered to the normal knitting height, as will be clearly seen from Figs. 11 and 12, which show the relative positions of the cams and needle butts at the commencement and at an intermediate stage of the operation respectively.

When the heel splicing is to begin, the cams 45, 45*a* move apart, as has been described, by an amount sufficient to allow two short-butted needles to pass through the aperture and remain at a height where they will receive the splicing thread, while the remainder of the needles are taken down as before. The selected needles are the central pair of the short-butted needles, i. e. the splice commences at the centre of the back of the stocking. The two raised needles will, after receiving the splicing thread, be lowered in the usual manner to the normal knitting height to receive the main thread in addition. On the succeeding course, the cams remain open to the same extent, and the same two needles receive the splicing thread, but at the next course, the cams move apart to the extent of two more needles, such widening continuing at every other course until all the needles *a* receive the splicing thread. Fig. 13 shows the cams allowing a number of selected short butts to pass through and shows how the remainder of the short-butted needles are brought down to normal knitting level. It will be noticed that the meeting edges 111, 111*a* of the cams i. e. those edges which abut when the cams are in closed position, are inclined to the plane of the cams. This inclination is such that when the cams engage the butts, the meeting edges are vertical, thereby enabling the selection of the butts to be accurately made. The other edges 111*b*, 111*c* are similarly inclined.

In Fig. 14, the positions of the needles are diagrammatically shown at *c*, the main knitting threads at *d*, and the spliced threads at *e*, and this diagram clearly shows how the length of splice is increased at every other course only and indicates the resultant angle produced in the heel. It will be appreciated that the splicing thread forms loops extending from the last needle receiving it to the next to receive it. Such loops are cut away in the usual way when the stocking is completed.

The means employed for raising both the long- and short-butted needles after they have passed the knitting cams, for lowering the long-butted needles before they reach the selecting cams, and for lowering the short-butted needles after they have received the splicing thread have not been shown on the drawings as such means are well known in the art and per se do not form part of the present invention.

What we claim and desire to secure by Letters Patent is:—

1. A selective patterning device for a circular knitting machine having a needle cylinder, said device comprising a carrier member, means for rotating the carrier member positively in relation to the needle cylinder of the machine, individually operable needles, butts for actuating said needles, a cam for selectively engaging said butts mounted on said carrier member, means for angularly displacing the selecting cam about the axis of the carrier member, and means for feeding yarn to the needles selected by the cam.

2. A selective patterning device for a circular knitting machine having a needle cylinder, said device comprising a carrier member, means for causing the carrier member to be rotated positively in relation to the needle cylinder at a predetermined point in the operation of the machine, individually operable needles, butts for actuating said needles, a cam for selectively engaging said butts mounted on said carrier member, means for angularly displacing the selecting cam about the axis of the carrier member, and means for feeding yarn to the needles selected by the cam.

3. A selective patterning device according to claim 2 comprising a gear for driving the carrier member by the rotation of the needle cylinder, and a clutch for engaging said gear to the needle cylinder at the predetermined point in the operation of the machine.

4. A selective patterning device for a circular knitting machine having a needle cylinder, said device comprising a carrier member, means for rotating the carrier member positively in relation to the needle cylinder of the machine, individually operable needles, butts for actuating said needles, two cams for selectively engaging said butts mounted for rotation on said carrier member, means for angularly displacing the cams in opposite directions about the axis of the carrier member, and means for feeding yarn to the needles selected by the cams.

5. A selective patterning device according to claim 4 comprising spring means opposing the displacement of the cams, and means for releasing the cams, whereby the cams are returned by the spring means to their initial position at a predetermined point in the operation of the machine.

6. A heeling-splicing device for circular stocking knitting machines having a needle cylinder, said device comprising a carrier member, means for rotating the carrier member positively in relation to the needle cylinder of the machine, individually operable needles adapted to receive a heel-splicing thread, butts for actuating said needles, two cams for selectively engaging said butts mounted for rotation on said carrier member, said cams being capable of angular dis-

placement about the axis of the carrier member, means for causing the cams to move apart during the heel-splicing operation, thereby selecting a successively increasing number of needles, and means for feeding a splicing thread to the selected needles.

7. A heeling-splicing device according to claim 6, comprising means for causing the carrier member to rotate just prior to the commencement of the heel-splicing operation, and means to stop the rotation of the carrier on the completion of the heel-splicing operation.

8. A heeling-splicing device according to claim 6, comprising means for returning the cams to their initial position prior to the next heel-splicing operation performed by the machine.

9. A heeling-splicing device according to claim 6, comprising spring means opposing the movement apart of the cams, and means for releasing the cams, whereby the cams are returned by the spring means to their initial position.

10. A heeling-splicing device according to claim 6, comprising a member mounted for rotation on the carrier member and adapted to be carried round by the rotation of the carrier member, a movable abutment adapted to be moved into the path of said member to rotate said member, and gear means connecting said member to the selecting cams, whereby the cams are angularly displaced when the member is rotated by its engagement with the abutment.

11. A heeling-splicing device according to claim 6, comprising a member mounted for rotation on the carrier member and adapted to be carried round by the rotation of the carrier member, a movable abutment adapted to be moved into the path of said member to rotate said member at every alternate course during the knitting of the heel-splice, and gear means connecting said member to the selecting cams, whereby the cams are angularly displaced when the member is rotated by its engagement with the abutment.

12. A heeling-splicing device according to claim 6, comprising means for causing the needle cylinder to reciprocate for the knitting of the heel, means for causing the positive rotation of the carrier member to be started at a predetermined point in the knitting of the stocking, and means actuated by the reciprocation of the cylinder for discontinuing the rotation of the carrier member.

13. A heeling-splicing device for circular stocking knitting machines having a needle cylinder, said device comprising a carrier member, means for rotating the carrier member positively in relation to the needle cylinder of the machine, short-butted needles, long-butted needles, two cams for selectively engaging the short-butted needles only, means for withdrawing the long-butted needles from the action of the cams, said cams being mounted for rotation on said carrier member and capable of angular displacement about the axis of the carrier member, means for causing the cams to move apart during the heel-splicing operation, thereby selecting a successively increasing number of short-butted needles, and means for feeding a splicing thread to the selected short-butted needles.

14. A heeling-splicing device according to claim 13, comprising means for causing the carrier member to rotate just prior to the commencement of the heel-splicing operation, and means to stop the rotation of the carrier on the completion of the heel-splicing operation.

15. A heeling-splicing device according to claim 13, comprising means for returning the cams to their initial position prior to the next heel-splicing operation performed by the machine.

16. A heeling-splicing device according to claim 13, comprising spring means opposing the movement apart of the cams, and means for releasing the cams, whereby the cams are returned by the spring means to their initial position.

17. A heeling-splicing device according to claim 13, comprising a member mounted for rotation on the carrier member and adapted to be carried round by the rotation of the carrier member, a movable abutment adapted to be moved into the path of said member to rotate said member, and gear means connecting said member to the selecting cams, whereby the cams are angularly displaced when the member is rotated by its engagement with the abutment.

18. A heeling-splicing device according to claim 13, comprising a member mounted for rotation on the carrier member and adapted to be carried round by the rotation of the carrier member, a movable abutment adapted to be moved into the path of said member to rotate said member at every alternate course during the knitting of the heel-splice, and gear means connecting said member to the selecting cams, whereby the cams are angularly displaced when the member is rotated by its engagement with the abutment.

19. A heeling-splicing device according to claim 13, comprising means for causing the needle cylinder to reciprocate for the knitting of the heel, means for causing the positive rotation of the carrier member to be started at a predetermined point in the knitting of the stocking, and means actuated by the reciprocation of the cylinder for discontinuing the rotation of the carrier member.

In testimony whereof we have hereunto subscribed our names.

THOMAS ASHBY.
WILLIAM HENRY BOALER.