Dec. 2, 1941. H. E. HOUSEMAN 2,264,977

KNITTING METHOD AND MACHINE

Filed Sept. 14, 1940 4 Sheets-Sheet 1

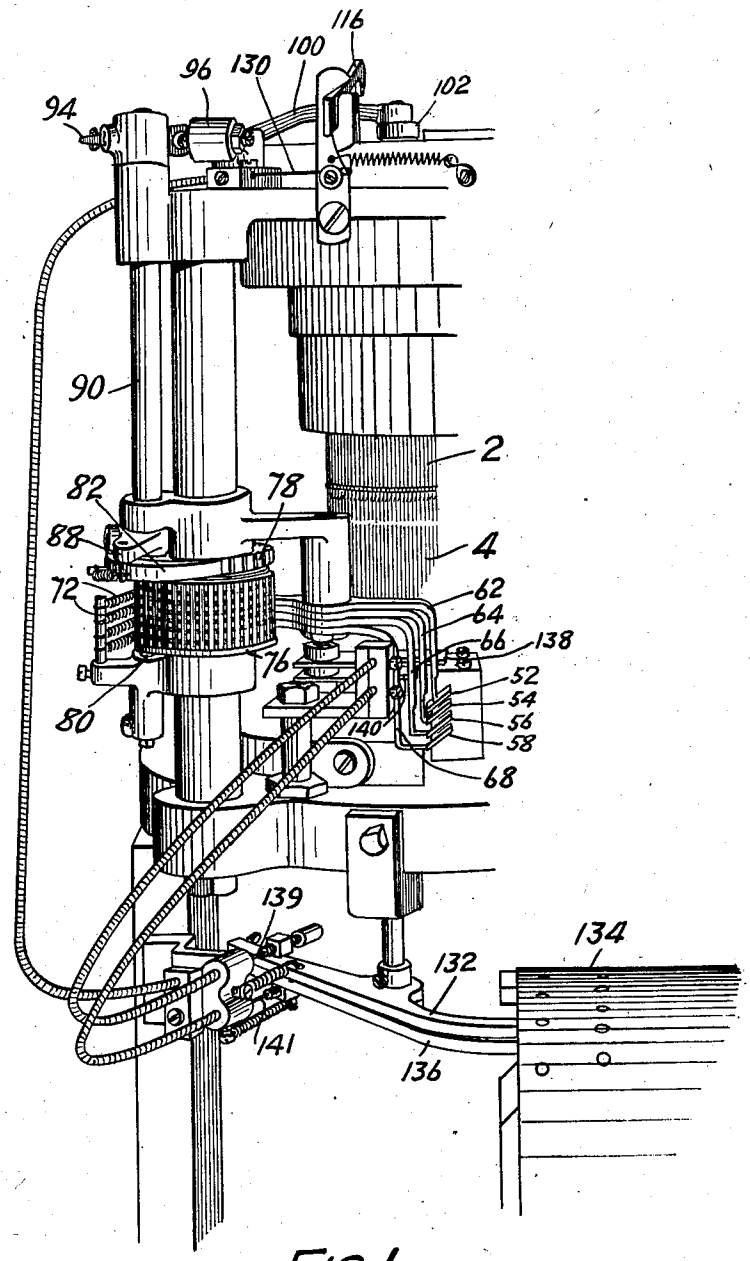


FIG. 1.

INVENTOR

Harold E. Houseman

BY

Burson & Harding

ATTORNEYS.

WITNESS:

Robt. R. Kitchel.

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KNITTING METHOD AND MACHINE

Filed Sept. 14, 1940 4 Sheets-Sheet 2

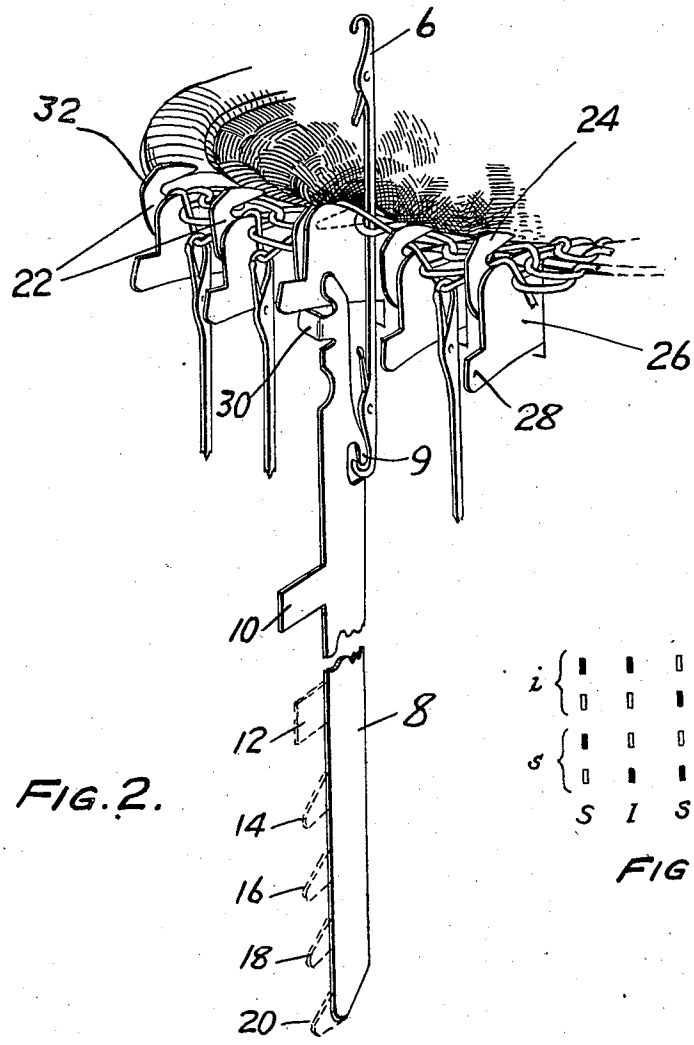


FIG. 2.

FIG. 7.

INVENTOR

Harold E. Houseman

BY

Russell & Harding

ATTORNEYS.

WITNESS:

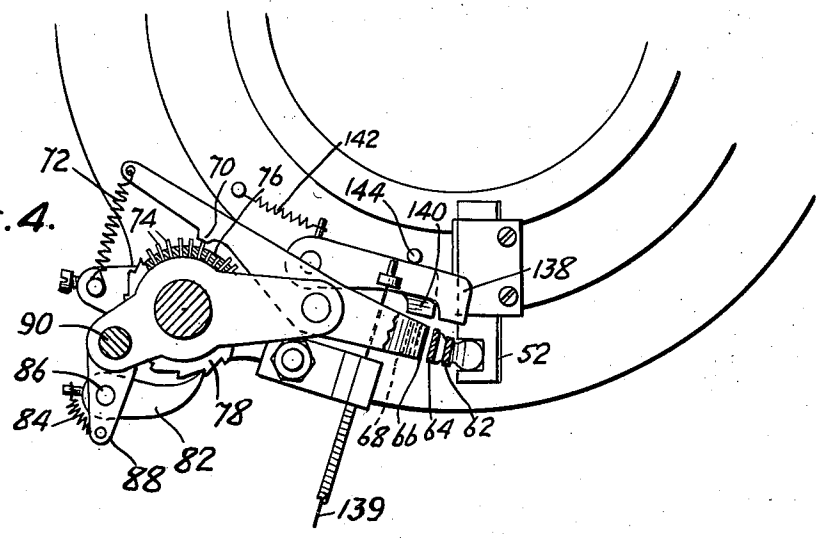
Robt R. Mitchell

Dec. 2, 1941. H. E. HOUSEMAN 2,264,977

KNITTING METHOD AND MACHINE

Filed Sept. 14, 1940 4 Sheets-Sheet 3

FIG. 4.



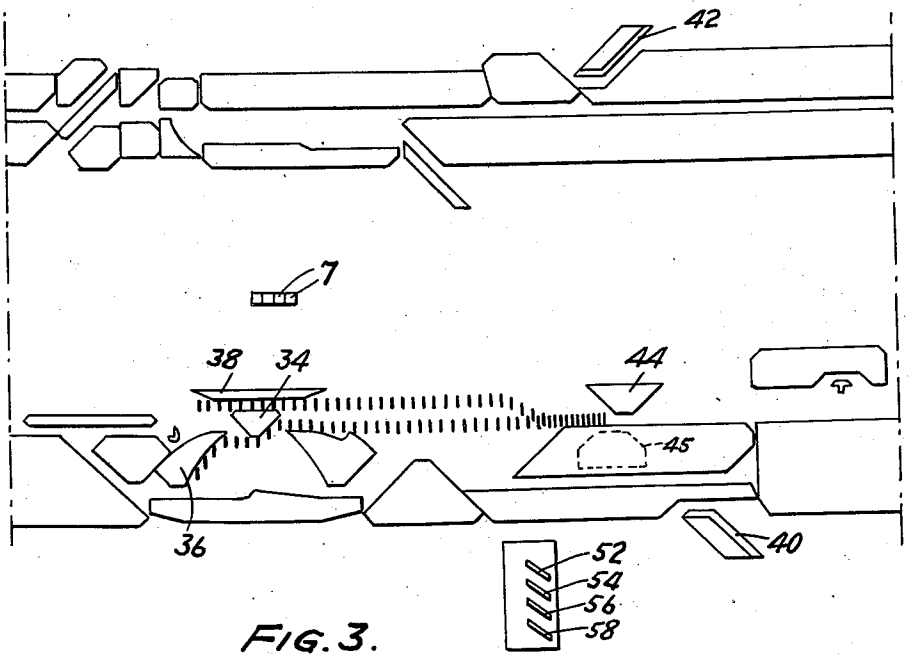


FIG. 3.

INVENTOR

Harold E. Houseman

BY

Brasser & Harding

ATTORNEYS.

WITNESS:

Ruth A. Mitchell

Dec. 2, 1941. H. E. HOUSEMAN 2,264,977

KNITTING METHOD AND MACHINE

Filed Sept. 14, 1940 4 Sheets-Sheet 4

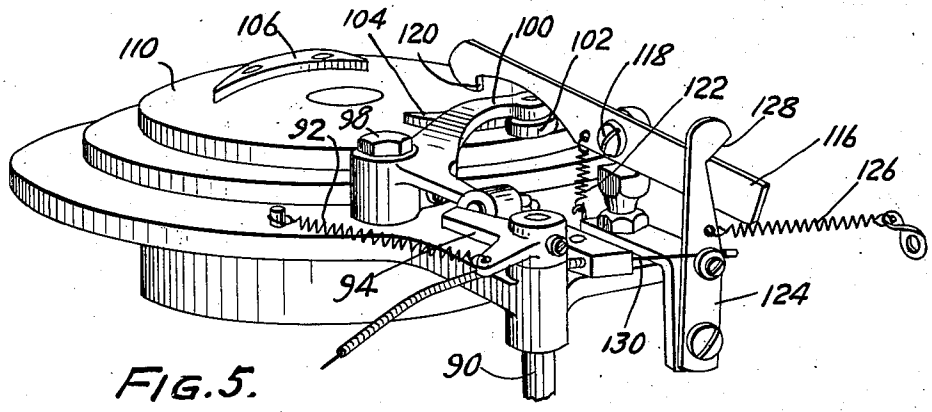


FIG. 5.

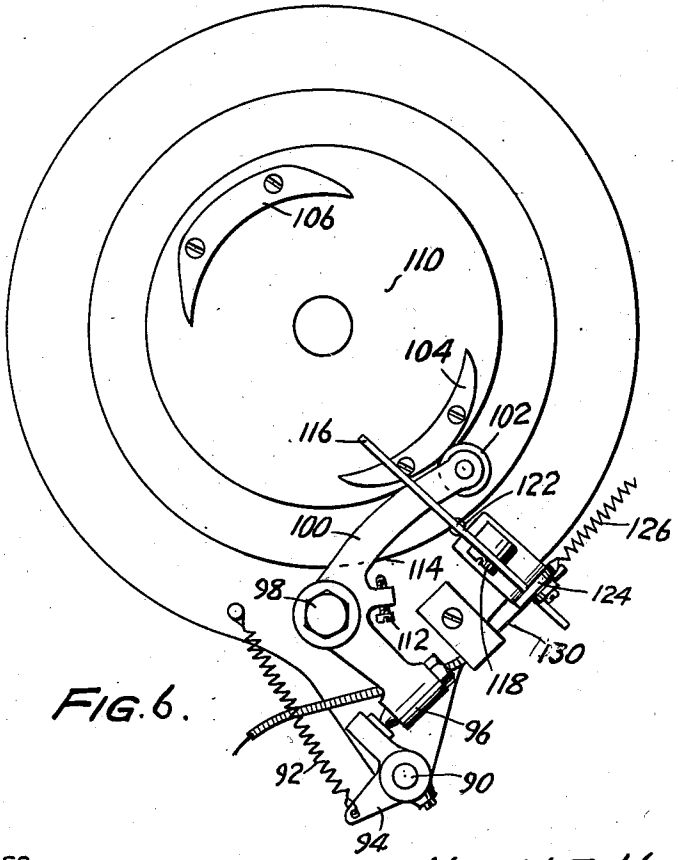


FIG. 6.

INVENTOR

Harold E. Houseman

BY

Burson & Harding

ATTORNEYS.

WITNESS:

Patented Dec. 2, 1941 2,264,977

UNITED STATES PATENT OFFICE

2,264,977

KNITTING METHOD AND MACHINE

Harold E. Houseman, Laconia, N. H., assignor to Scott and Williams, Incorporated, Laconia, N. H., a corporation of Massachusetts

Application September 14, 1940, Serial No. 356,771

16 Claims. (Cl. 66—14)

This invention relates to a knitting method and machine and particularly to the production of designs by tucking.

The usual method of producing tuck stitches involves the selective clearing of the latches of latch needles in various fashions. In these methods, however, the raising of instep needles to inactive position during heel knitting necessarily effects the clearing of the latches of all such needles by the loops which they hold. If the tuck design occurs in every course, this means that there is a break in the pattern occurring through the instep in the course knit in coming out of the heel.

An alternative method of producing tuck stitches comprises the selective raising of needles to an inactive level, for example, that attained by instep needles during the knitting of a heel, so that the yarn is laid across certain selected needles below their latches thereby resting with the loops already on the needles. This method of producing tuck stitches has not been usable, however, since these selected needles do not draw loops of yarn in the formation of the course in which the yarns are laid below their latches, and the gathered loops when cast are, therefore, very tight, and the resulting fabric has an undesirable appearance. The tight gathered loops, furthermore, are frequently cut because of the tension thereon.

This invention has as one of its objects the carrying out of the second mentioned method of tucking in a practical fashion particularly adapted to the superposed cylinder type of machine, though, as will be evident, the invention is applicable to machines of other types.

Another object of the invention is to provide an improved method of selection of knitting elements to provide patterning throughout a complete circumference of a stocking.

Further objects of the invention, particularly relating to details and the accomplishment of the above objects in simple fashion, will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

Figure 1 is a fragmentary elevation of a knitting machine of the superposed cylinder type showing only those parts which are concerned with the features of the present invention;

Figure 2 is a perspective view, illustrating in particular yarn controlling elements associated with the needles and the type of needle controlling slider providing for the selective formation of tuck stitches;

Figure 3 is an interior development of the slider controlling cams omitting those not concerned with the invention;

Figure 4 is a plan view, partly in section, showing the pattern controlling mechanism;

Figure 5 is a perspective view of certain elements arranged to control the advance of a pattern trick wheel;

Figure 6 is a plan view of the elements of Figure 5; and

Figure 7 is a diagram indicating the fashion in which the pattern controlling butts of the trick wheel elements are arranged.

The machine is shown as of the superposed cylinder type comprising upper and lower cylinders 2 and 4, respectively, provided with vertically aligned slots for the reception of double ended latch needles 6. These needles are controlled by upper and lower sliders in the usual fashion, only the lower sliders being illustrated at 8 in Figure 2, these being provided with hooks 9 for engagement with the lower needle hooks. These lower sliders are provided with knitting butts 10 which, as usual, are of two lengths, those of longer length being carried by the sliders of instep needles and those of shorter length by the sliders of sole needles. The sliders are also provided with transfer butts 12 of various lengths permitting selective transfers of the needles between the cylinders in usual fashion to provide, for example, 1 x 1 ribs at the top of the stocking, 6 x 3 ribs in the leg and instep, and plain knitted sole, heel and toe. The particular control of the needles for the formation of ribs forms no part of the present invention, and reference may be made to the prior art, for example, my Patent 2,170,078, for discussion of operations involved in the formation of various types of stockings. The present invention is concerned, as applied to the machine herein described, with the production of tuck patterns between broad ribs knit by needles in the upper cylinder.

The sliders 8, besides the butts 10 and 12 referred to above, are provided with selector butts occupying selectively the positions 14, 16, 18 or 20. As will be evident hereafter, for the production of more elaborate patterns greater numbers of selector butts may be provided. In general, the sliders are provided to the knitting machine operator with a full set of these selector butts, which are adapted to be broken or cut off to leave on each slider a single butt in one of the various positions.

As is usual in superposed cylinder machines, the lower cylinder carries sinkers 22, provided with

hooks 24 arranged to receive the yarn during the knitting operation. These sinkers 22 are semi-circular in shape and are mounted in semi-circular guide slots so as to be controlled by conventional sinker cams.

As described, for example, in Bentley et al. Patent 1,986,317, the sinkers of a machine of this type are desirably associated with shielding devices 26 provided with butts corresponding to the sinker butts so that they partake of the movements of the sinkers through circular arcs. They are, however, of less radial dimensions than the sinkers, so that they may be moved upwardly relative to the sinkers by engagement with extensions 28 projecting outwardly therefrom of laterally extending lugs 30 provided on the sliders 8. In said Bentley et al. patent, in which the nature of these devices is described in greater detail, they are provided for the purpose of preventing the yarn from entering the hooks of sinkers which are associated with the needles selectively raised out of action in the narrowing operations involved in the formation of heels and toes. In accordance with the present invention, I have found that these devices 26 may be used without structural change in association with needles involved in tucking for the proper control of yarn in effecting tucking in the fashion indicated above to secure stitches of suitable character. It has been found desirable to bevel off the outer corners of the associated sinkers 22, as indicated at 32, to secure a smoother control of the yarn.

Before proceeding with the description of the fashion in which the yarn is controlled in the formation of tuck stitches, brief reference may be made to the cam layout fragmentarily illustrated in Figure 3, in which the top center cam is illustrated at 34 and the forward stitch cam at 36. Located above the top center cam is a guard cam 38 between which and the center cam there is defined the level of the knitting butts of the lower sliders which hold their needles in position to effect tucking by the reception below the needle latches of yarn from one or more of the yarn fingers indicated at 7. This level is also the level assumed by the knitting butts of the instep sliders during the formation of heels and toes.

Slide cams 52, 54, 56 and 58 are provided to cooperate respectively with selector butts in the various positions 14, 16, 18 and 20. By cooperation with such butts, the needles may be divided into two series, as indicated by the diagrammatic representation of the knitting butts in Figure 3, the sliders having butts engaging the cam slides being raised by them to the tuck level, while the other sliders pass through the knitting cams to cause their needles to take yarn in the usual fashion. A cam 44 serves to bring all of the sliders and their associated needles to a common level prior to selective action thereon of the cam slides 52 to 58. The positions of the lower and upper transfer cams are indicated at 40 and 42, respectively. A vertically movable cam 45 serves to raise instep needles prior to the formation of heels and toes, and a second function of cam 44 is to restore these needles to active position.

The fashion in which tuck stitches are produced may now be described. As already indicated, the needles which are raised to tuck level receive the yarns below their latches, so that these yarns lie thereon with the loops which have been drawn and cast off the latches by the action of the clearing cam in the formation of the preceding course. In the formation of the next subsequent course, the yarn will be drawn by the hook of the needle through the two loops lying on its shank (one a concatenated loop and the other constituting a float), thus providing a tuck stitch formation.

If the above was the sole operation involved, it will be evident that the loop formed by the yarn which was laid on the shank of the needle below its latch would contain substantially less yarn than the other loops and therefore the fabric at this region as the long tuck loop is drawn would be subject to considerable added tension in its formation. (It is the general region in which the tuck stitch is formed rather than any particular loop which must be said to lack sufficient yarn, since all the adjacent loops are distorted by reason of the insufficiency of yarn.) To avoid this, use is made of the elements 26, as illustrated in Figure 2. The lug 30 is so positioned on the slider 8 that as that slider rises to lift its needle to the tuck level, it will engage the element 26 to raise its upper edge substantially above the level of the upper edge of the sinker on which the loops normally rest. As a result, the yarn occupies, when stitches are being drawn, a position substantially higher than normal between the yarn drawing needles which are drawing loops on opposite sides of the needle occupying the tucking level, thus providing between these latter needles an extra amount of yarn available subsequently to provide a tuck stitch structure without producing an undue amount of tension. The element 26, of course, also serves to prevent this portion of the yarn extending across the tucking needle from being engaged by the hook of the sinker following it. As the sinker moves inwardly, therefore, in its normal wave, its hook moves below the yarn extending over the element 26. The beveled edge 32 permits it to move outwardly thereafter, freely camming the yarn upwardly without pushing it outwardly. The elements 26 move inwardly with the sinkers and, of course, drop downward under the tension of the yarn as soon as the lugs 30 disengage them by the action of cam 44 on the sliders. Instead of providing the special elements 26, the sinkers themselves may be selectively raised to provide the extra yarn. Or, alternatively, the sinkers may be caused to engage the yarn on both sides of the raised needle and be given an inward movement of abnormal extent; however, this, unless the sinker movement is quite considerable, does not lead so easily to the considerable slack required, and selective actuation of a sinker in this fashion is a matter of some difficulty.

Whereas by the usual method of tucking, a tucking needle can only draw slack yarn equivalent to loops drawn by needles which are knitting, by the new method, large loops for more open tucked effects may be formed at the tucking needle.

In the formation of tuck designs on needles between broad ribs, it is generally desirable that, through the formation of the leg, the same design extend through all of the plain panels. If, as is usual, the broad ribs continue through the instep but are interrupted in the sole, the same design should be continued without interruption through the instep plain panels between the ribs, there being no interruption of the design at the course which is first produced after coming out of the heel. It is also desirable that there should

be no region in the rear of the stocking where tucking will be omitted. For the purpose of securing proper control of the sliders to effect these results, there are provided, in accordance with the invention, control devices of a type which will now be described, which, as will be clear from the following description, are of more general application.

A series of levers 62, 64, 66 and 68, respectively, engage the slide cams 52, 54, 56 and 58 to effect their selective inward and outward movements. These levers are provided with shoes 70 engageable by pattern elements 74 having selectively arranged butts and carried by a trick wheel 76, which is provided with a ratchet 78 and mounted on a vertical post, being pressed against an upper bracket by means of a spring pressed plunger 80 designed to provide sufficient friction to prevent overthrow in its advancing movements. The ratchet 78 is acted upon by a pawl 82 pivoted at 86 to an arm 88 carried by a vertical shaft 90, the pawl being urged into engagement with the ratchet by means of a spring 84. The shaft 90 extends upwardly to the top of the machine, where it carries a bell crank 94, urged in a clockwise direction, as viewed in plan, by a spring 92 against an abutment screw carried by the arm 96 of another bell crank pivoted at 98 and having a second arm 100 provided with a cam following roller 102 adapted to be engaged by cams 104 and 106 carried by a disc 110 rotating with the needle cylinders. An adjustable screw 112 is provided to limit the inward movement of the roller 102 by abutment with the fixed bearing element 114.

The teeth of the ratchet 78 subtend twice the angular spacing of the pattern elements 74. Accordingly, the arrangement is such that, upon each 180° of movement of the needle cylinders, a step is given to the trick wheel to bring the successive pattern elements into cooperation with the follower levers 62 to 68. To effect this result, the two cams 104 and 106 extend outwardly to different radial positions from the center of their rotation. The innermost of these cams 106 imparts a motion to the follower roller 102 only sufficient to advance the trick wheel one-half the angular spacing of the teeth 78, i. e., through a distance equal to the angular spacing of successive elements 74. The cam 104, when it engages the roller 102, imparts to it an additional extent of movement of equal amount, so that in a single revolution of the needle cylinders an advance of one tooth 78 is provided corresponding to two of the pattern elements 74. The cams 106 and 104 may be provided by different rises on a single circular cam, but the effect is the same if separate cams are provided as illustrated, the retraction of the pawl following advance by cam 106 being harmless.

In order to provide perfect continuity of the patterning, the advance of the trick wheel must be interrupted during the formation of the heel. To effect this result despite the continued movement of the cams 104 and 106, there is provided the member 116 pivoted at 118 and provided with a latching hook 120 urged downwardly toward engaging position with respect to the lever 100 by means of a spring 122. Normally, this latching lever is prevented from engaging the lever 100 by the action on its outwardly extending tail portion of a cam surface 128 provided on a lever 124 urged toward the right as viewed in Figure 5 by a spring 126 and controlled through a Bowden wire 130 connected to a lever 132 arranged to be acted upon by suitable cams on the main cam drum 134 of the machine. The arrangement is such that at the beginning of the knitting of the heel as the lever 100 is moved to its outermost position by the cam 104, the latch 116 will be released to engage it and prevent any inward movement under the action of spring 92. As a consequence, rotation of the trick wheel is interrupted until, when the heel is completed, the lever 132 is controlled to raise the hook 120 to release the lever 100.

In order to provide for the continuation of the tucking through the instep while interrupting it through the sole, and to provide control of the levers 62, 64, 66 and 68 independent of the trick wheel, there are provided two levers 138 and 140 urged in counter-clockwise direction as viewed in Figure 4 by springs 142 against a stop pin 144. The upper lever 138 is provided with an outwardly turned end arranged to engage the levers 62 and 64 for the purpose of withdrawing the cams 52 and 54. The lever 140 is provided with a similar end adapted to engage the levers 66 and 68 to withdraw the cams 56 and 58. The levers 138 and 140 are, respectively, connected by Bowden wires 139 and 141 to the lever 132 previously mentioned and to a similar lever 136, also arranged to be acted upon by cams on the drum 134.

While other detailed arrangements may obviously be made, and while further selection may be provided by the addition of other cams such as 52 to 58 and their associated elements, it will be assumed for consistency and simplicity of description that the upper selector butts 14 and 16 are provided on sliders of the instep series while butts 18 and 20 are provided on sliders of the sole series. The upper cams 52 and 54 accordingly control movements of instep needles only, while the cams 56 and 58 control movements of sole needles only to effect selective tucking. Likewise, levers 132 and 138 effect instep needle control and levers 136 and 140 sole needle control. Lever 116, by reason of connection with lever 132 is rendered operative upon removal of control from instep needles.

In the formation of a stocking, during the knitting of a 1 x 1 rib top, the mechanism for effecting tucking is rendered inoperative by the action of cams on levers 132 and 136 to move levers 140, and 138 outwardly, thereby to withdraw the cams 52 to 58. At the same time, the hook lever 116 will hold the lever 100 out of position to be acted upon effectively by the cams 106 and 104, and consequently there will be no advance of the trick wheel 76.

When the change to broad rib leg knitting takes place by the suitable transfer of needles in conventional fashion, advance of the main cam drum 134 effects release of levers 132 and 136, and consequently the trick wheel is rotated step by step and is effective to control the cams 52 to 58, inclusive, to effect the selective raising of needles to produce tuck stitches as described above.

As indicated above, provision is made to effect the production of tuck stitch patterns throughout the entire circle of needles without providing any interruption of the pattern through a panel, for example, at the rear of a stocking, as is usually necessary. It is for this purpose that the two cams 104 and 106 are provided to effect advances of the trick wheel at each half revolution of the needle cylinder. One of these ad-

vances occurs as the sole needles are passing the position of the cams 52 to 58, while the other occurs as the instep needles are passing these cams. To indicate how this results in patterning through the circumference of the stocking, reference may be made to Figure 7, in which are illustrated the butt positions on the trick wheel patterning elements, the positions provided with butts being shaded, while those from which butts are removed or are absent are illustrated without shading. As already indicated, the set-up is such that the upper levers 62 and 64 control butts on instep needles only in the positions 14 and 16, whereas the lower levers 66 and 68 control butts in the positions 18 and 20 on sole needles only. As indicated at the left of Figure 7, therefore, *i* indicates the butts controlling instep needles, while *s* indicates the butts controlling sole needles.

The vertical columns of butt positions are labeled at the bottom of Figure 7 to indicate the particular needles during whose passage by the cams 52 to 58 they are brought into operative relationship with the levers 62 to 68. For example, the first butt arrangement in the first column labeled S is brought into position by a step of the trick wheel during the passage of sole needles by the cams 52 to 58.

It will be evident how this arrangement effects a complete control of needles throughout the entire circumference. As the instep needles, for example pass the pattern controlling cams, the trick wheel is advanced, but the butt positions controlling instep needle selection are the same as before. There is, however, a change of butt arrangements controlling the sole needle selection, but since this change occurs as instep needles are passing the cams, the cams 56 and 58 may be moved quite freely without engaging or disengaging any butts. Similarly, as the sole needles pass the sole needle controlling butt positions remain the same, but the instep needle butt positions are changed. Thus by a simple arrangement, patterning throughout the entire circumference may be effected.

While the ratchet 78 has been described as advanced through a complete step during each revolution of the needle cylinder, it will be evident that the ratchet may be indexed to correspond to the angular space of the trick wheel elements and given a full step upon each half rotation of the needle cylinders. The arrangement described is convenient, however, in that, for example, by omission of cam 106, the mechanism is available for other controlling use requiring a single step upon each revolution of the cylinders.

It is desirable in some cases to interrupt the broad ribs in the rear of the stocking several courses in advance of the formation of the heel of the stocking. This is accomplished by transfer of sole needles to the lower cylinder, and at the same time it is necessary to interrupt the tuck stitch patterning. To effect this result, the drum 134 is advanced to move the lever 136, thereby to actuate lever 140 to hold out despite trick wheel control the sole needle controlling cams 56 and 58. The tuck stitch patterning will accordingly take place during the formation of these courses on instep needles only.

When the position of the heel is reached, the instep needles will, as usual, be raised out of action by cam 45, which is moved upwardly for that purpose. The needles are then at the same level as for tucking. To provide continuity of the tuck pattern into the instep, the operation of the trick wheel must be discontinued, and for this purpose a cam on the main cam drum acts on lever 132, lever 136 continuing being acted upon, with the result that not only are all of cams 52 to 58 inclusive, withdrawn, but the lever 108 is latched, so that the trick wheel remains at rest during the formation of the heel.

When the heel is completed, if ribs are to be continued through the instep only in the usual fashion, only the lever 132 is released by the cams on the main cam drum 134, with the result that advance of the trick wheel continues and the pattern begins without interruption from the point where it left off. It will be evident from the fashion in which the tucking is effected that no interruption of the pattern will occur by reason of the location of the instep needles in upper inactive position during the formation of the heel. While all of the instep needles are lowered at the end of heel knitting by the action of cam 44, if tucking is to occur in the first course of rotary knitting some of them are immediately raised by cam 52 or cam 54.

If either immediately after the formation of the heel or after the formation of some plain sole courses during rotary knitting, the ribs are continued through the sole by transfer of the needles, the tuck pattern in such ribs may also be continued by the release of lever 136.

Prior to the beginning of the toe, it is generally desirable to interrupt the rib structure and provide several plain courses by the transfer of all of the needles to the lower cylinder. Simultaneously with the interruption of the ribs, both levers 132 and 136 are acted upon by cams to render the patterning mechanism inoperative and stop the advance of the trick wheel. If the tuck pattern is of a repetitive type with which no regard need be paid to its initiation, it is immaterial in what position the trick wheel is stopped, and the pattern will be correspondingly started in the next stocking.

In the event, however, that the pattern should be begun in each stocking with a particular element of the trick wheel operative, provision may be made for idly moving the trick wheel to a suitable initial position during the formation of the toe, and for this purpose it may be timed up by the provision of pawl guarding means in conjunction with a low ratchet tooth, as disclosed, for example, in my Patent 2,012,310. In such case, instead of effecting trick wheel stepping control through the medium of the same lever 132 which control the instep needle patterning, a separate lever may be provided to be controlled by cams on the main cam drum to affect mechanism similar to that described in said Patent 2,012,310.

What I claim and desire to protect by Letters Patent is:

1. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means cooperating with said needles for the formation of stitches, means for effecting the presentation of yarn to selected needles so that said selected needles fail to knit normal loops thereof thereby to produce tuck stitches, and means in addition to the normal stitch forming elements for forming loose loops at the location of said selected needles.

2. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means cooperating with said needles for the formation of stitches, means for effecting the

presentation of yarn to selected needles so that said selected needles fail to knit normal loops thereof thereby to produce tuck stitches, and means in addition to the normal stitch forming elements for engaging the yarn for forming loose loops at the location of said selected needles.

3. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means for effecting the presentation of yarn to selected needles so that said selected needles fail to knit normal loops thereof thereby to produce tuck stitches, and means for engaging the yarn adjacent said selected needles for forming loose loops at the location of the same.

4. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means for effecting the presentation of yarn to selected needles so that said selected needles fail to knit normal loops thereof thereby to produce tuck stitches, and means for abnormally displacing the yarn at the location of the selected needles.

5. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means for effecting the presentation of yarn to selected needles so that said selected needles fail to knit normal loops thereof thereby to produce tuck stitches, and means for abnormally raising knitting instrumentalities adjacent said selected needles for abnormally displacing the yarn at the location of the same.

6. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means for effecting the presentation of yarn to selected needles so that said selected needles fail to knit normal loops thereof thereby to produce tuck stitches, and means for abnormally raising knitting instrumentalities adjacent said selected needles to cause adjacent needles to produce abnormally large loops.

7. A knitting machine comprising a series of needles, means for feeding yarn to said needles, means cooperating with said needles for the formation of stitches including a knitting cam down which the needles normally pass to draw loops of yarn, means for selectively causing needles to pass said knitting cam without being engaged thereby, and means for placing the yarn on said needles in a slack manner to lie with the loops already on said needles so that, when the gathered loops are subsequently cast, loose tucked stitches will be formed.

8. A knitting machine comprising a series of needles, means for feeding yarn to said needles, a knitting cam down which the needles pass to form loops of said yarn, means for selectively passing needles by said cam to cause them to tuck, and means for causing slack portions of yarn to lie on the tucking needles.

9. A knitting machine comprising a series of needles, means for feeding yarn to said needles, a knitting cam down which the needles pass to draw loops of yarn, means for selectively passing needles by said cam to cause them to tuck, and means for abnormally raising knitting instrumentalities adjacent said selected needles to cause adjacent needles to produce abnormally large loops.

10. The method of forming loose tucked stitches comprising causing needles to pass through a loop drawing wave, causing selected needles interspersed with the aforementioned needles to fail to pass through said wave, and, at the region where the first mentioned needles pass through such wave, laying yarn on the second mentioned needles in a loose manner, as compared with the manner in which they are laid on needles passing through said wave.

11. A knitting machine comprising a continuous series of cyclically operating elements for controlling production of knitted fabric, said elements being arranged in a plurality of successive groups, pattern means arranged to effect selection of said elements at a particular phase common to the cycles of operation of elements of both groups and entered successively by the various groups, and means for controlling said pattern means so that, during the passage through said phase of one group of elements subject to selection thereby, the pattern means is advanced to effect a subsequent new selection of elements of a subsequent group while not effecting new selection of the group then passing through said phase, said pattern means being stationary throughout the major portion of each cycle and each such advance thereof occurring during a small fraction of a cycle.

12. A knitting machine comprising a continuous series of cyclically operating elements for controlling production of knitted fabric, said elements being arranged in a plurality of successive groups, pattern means arranged to effect selection of said elements at a particular phase common to the cycles of operation of elements of both groups and entered successively by the various groups, and means for controlling said pattern means so that, during the passage through said phase of each group of elements subject to selection thereby, the pattern means is advanced to effect a subsequent new selection of elements of a subsequent group while not effecting new selection of the group then passing through said phase, said pattern means being stationary throughout the major portion of each cycle and each such advance thereof occurring during a small fraction of a cycle.

13. A knitting machine comprising a circle of elements rotating relatively to cooperating devices during the operation of the machine and controlling the production of knitted fabric, said elements being arranged in a plurality of successive circumferential groups, said cooperating devices including pattern means arranged to effect selection of said elements at a particular phase common to the cycles of operation of elements of both groups and entered successively by the various groups, and means for imparting a plurality of advances to said pattern means in each cycle so that, during the passage through said phase of one group of elements subject to selection thereby, the pattern means is advanced to effect a subsequent new selection of elements of a subsequent group while not effecting new selection of the group then passing through said phase, said pattern means being stationary throughout the major portion of each cycle and each such advance thereof occurring during a small fraction of a cycle.

14. A knitting machine comprising a continuous series of cyclically operating elements for controlling production of knitted fabric, said elements being arranged in a plurality of successive groups, pattern means comprising a trick wheel arranged to effect selection of said elements at a particular phase common to the cycles of operation of elements of both groups and entered successively by the various groups, and means for controlling said trick wheel so that, during the passage through said phase of one group of elements subject to selection thereby, the trick wheel

is advanced to effect a subsequent new selection of elements of a subsequent group while not effecting new selection of the group then passing through said phase, said trick wheel being stationary throughout the major portion of each cycle and each such advance thereof occurring during a small fraction of a cycle.

15. A knitting machine comprising a continuous series of cyclically operating elements for controlling production of knitted fabric, said elements being arranged in a plurality of successive groups, pattern means arranged to effect selection of said elements at a particular phase common to the cycles of operation of elements of both groups and entered successively by the various groups, and means for controlling said pattern means so that, during passage through said phase of one group of elements subject to selection thereby, the pattern means is advanced to effect a subsequent new selection of elements of a subsequent group while presenting to the group then passing through said phase a controlling aspect the same as that presented prior to said advance.

16. A knitting machine comprising a continuous series of cyclically operating elements for controlling production of knitted fabric, said elements being arranged in a plurality of successive groups, pattern means comprising members arranged to effect selection of said elements at a particular phase common to the cycles of operation of elements of both groups and entered successively by the various groups, and means for controlling said pattern means so that, during the passage through said phase of one group of elements subject to selection thereby, the pattern means is advanced to move one group of members out of operative position and another group of members into operative position to effect a subsequent new selection of elements of a subsequent group while not effecting new selection of the group then passing through said phase.

HAROLD E. HOUSEMAN.