Sept. 27, 1938. A. R. PITCHERS ET AL 2,131,331

TOOL FOR USE IN KNITTING MACHINES

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Fig. 1.

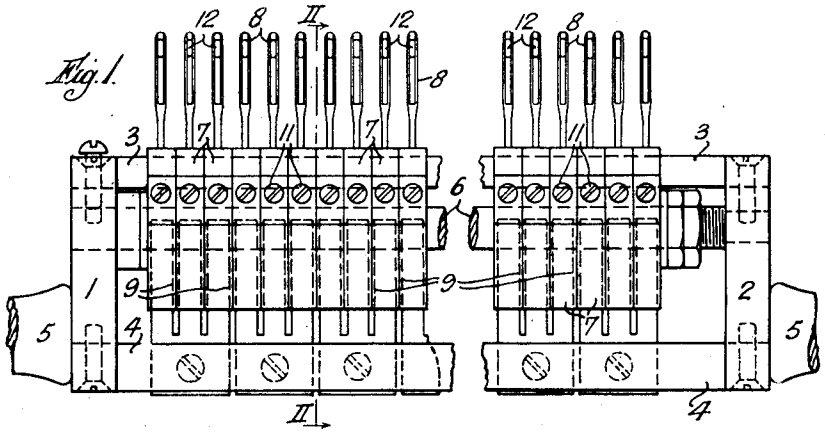
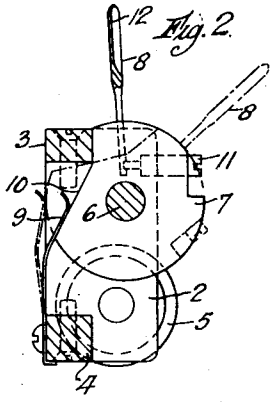


Fig. 2.



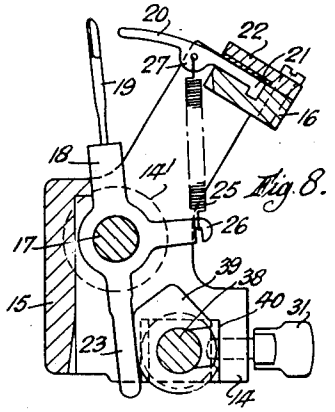
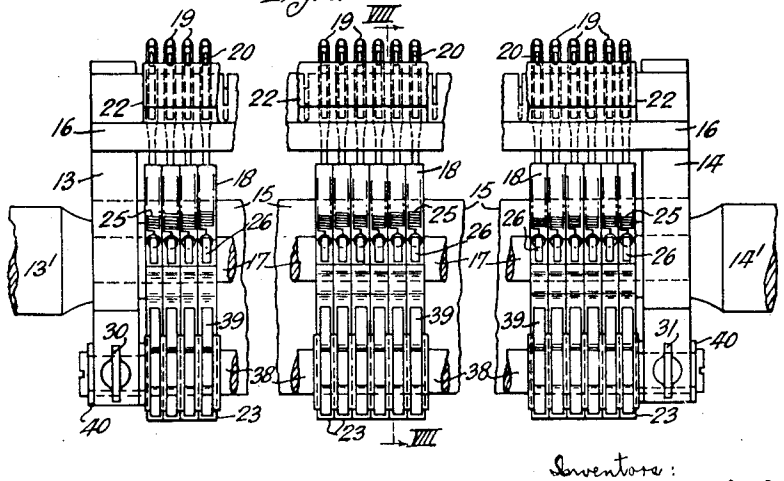


Fig. 8.

Fig. 4.



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Fig. 4.

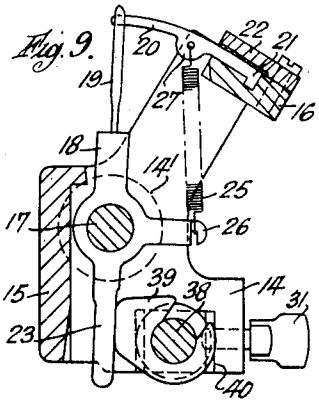


Fig. 5.

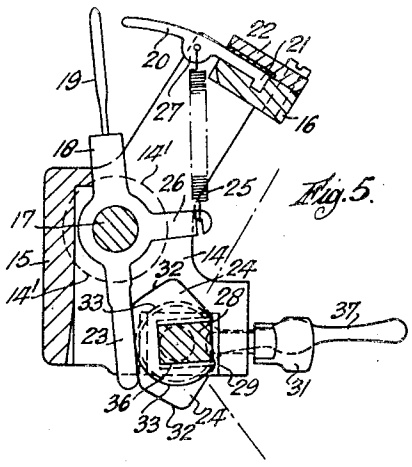


Fig. 3.

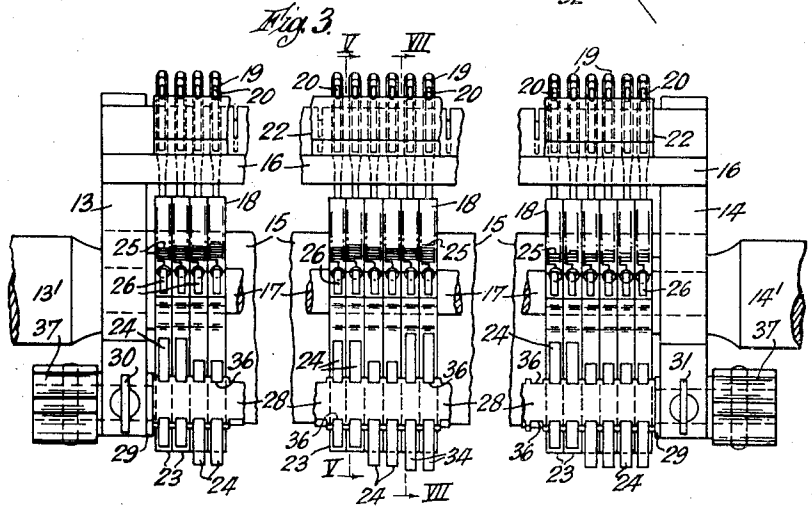


Fig. 6.

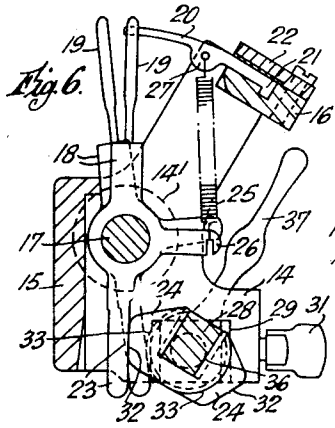
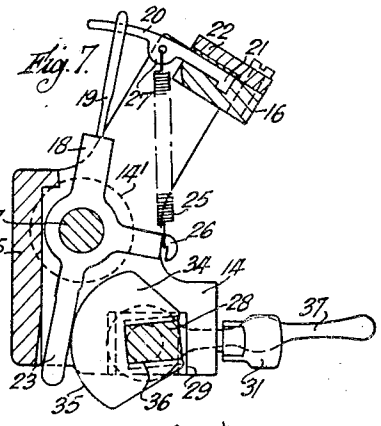


Fig. 7.



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UNITED STATES PATENT OFFICE

2,131,331

TOOL FOR USE IN KNITTING MACHINES

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Application July 28, 1937, Serial No. 156,246
In Great Britain July 31, 1936

10 Claims. (Cl. 66—96)

This invention relates to a tool for use in transferring the stitches from some needles of a knitting machine to other needles to vary the pattern of the knitted article produced by the machine.

The principal object of the invention is to provide such a tool in which any desired selection can be made as to the stitches to be transferred.

According to the present invention, a portable tool for use in transferring stitches in a knitting machine comprises a portable frame, a plurality of stitch transferring points and a corresponding plurality of retaining points, each transferring point and its associated retaining point being mounted on the frame for relative movement, independent of the other points, to cause the transferring point to move into and out of transferring position and into and out of cooperation with its retaining point, and the frame carries an operating means and selector devices are provided to enable operation of the operating means to effect simultaneous relative movement of selected transferring points and their retaining points.

The operating means may comprise a rod or like member which is mounted for angular movement in the frame of the tool and the selector members preferably include cams, each of which is individually adjustable on the member to enable angular movement of the member to effect relative movement of the associated transferring point and retaining point. Each cam may be so shaped that it can operate to cause relative movement between its associated points when the operating member is rocked from a central position in one direction or in the other direction, the cams being adjustable to determine which direction of movement of the operating member shall be effective. In addition, there may also be employed cams shaped to hold the transferring points in cooperation with their retaining point independently of the movement of the operating member. The frame may be formed so as detachably to receive the operating means referred to so that these operating means can be detached from the frame and replaced by a support carrying individually adjustable devices such as cams which can be set individually on the member to hold the individual transferring points either in stitch taking position or in cooperation with their retaining points.

The invention is illustrated in the accompanying drawings in which Figures 1 and 2 illustrate one form of construction Figure 1 being an elevation and Figure 2 a section on the line II—II Figure 1: Figures 3–9 illustrate a modification, Figures 3 and 4 being elevations and Figures 5 and 6 sections on the line V—V Figure 3 showing the parts in different positions and Figure 7 a section on the line VII—VII Figure 3 while Figures 8 and 9 are sections on the line VIII—VIII Figure 4 showing the parts in different positions.

Referring firstly to Figures 1 and 2 the tool shown therein comprises a frame having two end plates or cheeks 1, 2 connected by a pair of longitudinal bars 3, 4 handles 5 by means of which the tool can be manipulated being secured to the cheeks 1, 2. Between the two cheeks extends a spindle 6 upon which are mounted for rotation a plurality of discs 7 each carrying an eyelet or transferring point 8. To the bar is secured a series of blade springs 9 one for each disc 7, the discs being as shown at 10 so that they are held by the springs 9 in one of two extreme positions corresponding to inoperative position and operative position. The operative position is indicated by the full lines in Figure 2 and the inoperative position by the dotted lines.

In operation, the stitches are transferred from one needle to another (in the manner well known to those skilled in the art) by the use of the eyelets or transferring points and it will be apparent that as each disc 7 can be rotated independently of the others on the spindle 6, any desired number and combination of transferring points can be selected to transfer any desired number and combination of stitches on the machine, those eyelets or transferring points (if any) which are not required being rocked out of the way (i. e. rocked into the inoperative position shown in dotted lines in Figure 2). The device shown is intended for use in a machine in which the needles of the machine are not closely spaced, the discs being formed with apertures to receive the eyelets or transferring points which are secured to the discs by set screws 11 screwing into the disc and engaging the eyelet. Where, however, the tool is intended for use with finer gauges of knitting (i. e. more closely spaced needles) the disc 7 and eyelet or transferring point 8 can be made in one piece so enabling the discs to be made thinner and consequently occupy less space.

The operating ends of the eyelets or transferring points are as is seen in Figure 2 of trough or channel shape, the "eyes" of the eyelets or transferring points being indicated at 12 and formed within the trough and at the outer end thereof.

Reference will now be made to the modified

form of construction shown in Figures 3–9. In this modification there is again provided a frame consisting of end cheeks 13, 14 united by bars 15, 16, a spindle 17 being carried by the end cheeks and the frame having handles 13', 14'. On this spindle is mounted for individual angular movement a plurality of holders or carriers 18, each carrier having a transferring point 19 secured to it, the operating ends of the transferring points being of trough or channel shape and the "eyes" of the eyelets indicated at 12 being formed within the trough and at the outer end thereof.

In this modification the setting of the carrier 18 is determined by cams on a bar parallel with the spindle 17. In addition there are provided retaining members or points one for each transferring point for retaining stitches taken by the transferring points and each transferring point is arranged to move relatively to its retaining point from stitch transferring position to a position in which it cooperates with its retaining point, this relative movement being due to the movement of the transferring point holders 18 on the spindle 17. These retaining points (one for each eyelet) are in the form of plates 20 the ends of which are adapted to enter the trough and eye of the respective point 19 and these retaining points are secured to the bars 16, for which purpose the bar is recessed to accommodate the heads 21 of the retaining points and has secured to it a plate 22 which clamps the retaining points in the recesses.

In order that selected transferring points shall be simultaneously moved into or out of cooperation with their retaining points, the following selector cam mechanism is provided. Each holder 18 is provided with an extension 23 arranged to be pulled against a cam 24 by a spring 25 secured at one end to a second extension 26 on the holder and to a lug 27 on the retaining point 20. The cams for the various eyelet carriers (it being understood that a separate cam is provided for each carrier) are mounted on a squared rod 28 journalled in bearing blocks 29 secured in recess in the cheeks 13 and 14 by thumb screws 30, 31. These cams are detachable from the rod and are reversible, it being noted that each cam has an operating edge 32 and an opposite non-operating edge 33. Thus when the cams are arranged with their operating edges 32 in alignment then when the rod 28 is rocked in an anticlockwise direction the operating edges will come into operation to engage the extensions 23 of the carriers 18 and to rock these carriers in a clockwise direction so moving the eyelets 19 towards and into engagement with the retaining points 20. If now some of the cams 24 are removed from the bar 28 and replaced in reversed position as seen in Figures 3, 5 and 6 the operating edges 32 of some of the cams will be in line with the non-operating edges of other cams, this condition of the parts being shown in Figures 5 and 6.

It will now be seen that if the bar 28 is moved from its central or inoperative position shown in Figure 5 in an anticlockwise direction, the cams 24 whose operating edges are uppermost will cause the associated eyelets to move towards the retaining points as is shown in Figure 6, the now operating edges of the remaining cams leaving the associated holders unaffected so that some transferring points will be engaged by the retaining points and others will be clear of the retaining points. If on the other hand the bar be moved in a clockwise direction from its central or inoperative position, those transferring points which were before unaffected will be moved up to their retaining points 20 and the others will be unaffected. The bar 28 can also receive additional cams indicated at 34 (Figure 7), these cams being so shaped as always to hold the transferring points upon which they act in engagement with their associated retaining points 20 regardless of whether the bar 28 be moved, as described, in a clockwise or anti-clockwise direction: in short, these additional cams have accurate surfaces indicated at 35 which always maintain their engagement with the associated holder as is seen in Figure 7.

Thus, it will be seen that by means of the removable and reversible cams, the disposition of transferring points which will be caused by a movement of the bar 28 to cooperate with their retaining points can be varied to provide any desired combination, additionally by the substitution of cams 34 for the cams 24 the disposition of transferring points which are unaffected can also be selected at will.

To enable the cams to be readily fitted on the bar 28 the bar is conveniently of square cross section and provided on one (or as shown on opposite faces) with a recess or recesses 36 and the cams are provided with a slot leaving a jaw, the limbs of which fit into the recesses. In addition to provide for the ready manipulation of the bar 28 while the device is held by the handles, the bar 28 is provided at its ends with thumb pieces 37.

For some uses, it may be desirable to have a more or less permanent setting of transferring points some for use in being presented to the stitches to be transferred and others out of use; for such an arrangement, the bar 28 is removable to enable it to be replaced by a second bar 38 on which are set cams 39 some of which are arranged as shown in Figure 9 when the bar 38 is placed in position, to hold the transferring points corresponding to cams 39 on the bar permanently in engagement with their retaining points and the others, as seen in Figure 8, set to leave the other transferring points free to be presented to take and transfer stitches. These cams are capable of being set individually so as to be in a position either to hold the eyelets in or out of engagement with the corresponding retaining points 20. To enable the bar 28 to be replaced by the second bar 38 this second bar 38 as is also the first bar, is carried at its ends in bearing blocks 40: these bearing blocks 40, like the bearing blocks 29 are arranged to be received in the recesses in the cheeks 13—14 so that by releasing the thumb screws 30, 31 one bar can be removed and replaced by the other bar, the thumb screws then being tightened.

Returning plates of the form referred to with reference to Figures 3–9 can also be employed on the arrangement shown in Figures 1 and 2 so as to enable stitches to be retained positively in selected eyelets or transferring points. For this purpose the spindle 6 already referred to may have mounted upon it a plurality of discs similar to the discs 7 every other one of which carries an eyelet or transferring point and the intervening ones carry a retaining point, the discs carrying the transferring points being of a pitch or spacing equal to that of the needles on the machine.

In order to provide, in the manner referred to with reference to Figures 3—4 selection of the transferring points and points which are to co-

operate, each of the discs having an eyelet is provided with two lugs either of which can at will be projected from the periphery of the disc to engage selectively recesses in one or other of two rods mounted to rotate in the end cheeks: each disc carrying a retaining point is provided with a single lug which extends into a recess formed in a third rod which is secured against rotation to the end cheeks; this third rod thus operates to hold against rotation the discs carrying retaining points with reference to the cheeks: rotation of one or other of the first two rods will, however, through its co-operation with the lugs on the eyelet discs cause these discs to be rotated and so to move the transferring points carried thereby into or out of engagement with the adjacent retaining points.

It will be apparent that either of the first two rods will rock only those discs the lugs of which have been projected into the groove within the particular rod. By reason of the provision of the two lugs or each eyelet carrying disc, it is possible to select in any desired combination which eyelets or transferring points shall be moved by one or other rod with reference to the retaining points.

The discs carrying the transferring points can be spring loaded in any convenient manner so as to be biased to move their eyelets into a normal position of alignment with the other eyelets, the operation of the rods, to effect displacement of the discs carrying the transferring points, being effected against the action of the spring, which when the rods are released return the eyelet carrying discs to their normal position of alignment.

In order to provide for the selection of the two lugs on the eyelet carrying discs, the two lugs on each disc may be hingedly mounted thereon, the lug in one position projecting from the periphery of the disc and extending into the recesses in one or other rod and in the other position being contained within the periphery of the disc so as to be clear of the rotatable rods. If desired to reduce the frictional effects between adjacent discs the discs may be reduced in width to accommodate washers between them.

As an alternative to the provision on each eyelet disc of two lugs, two sets of eyelet discs could be provided the one set having lugs to engage one of the rods and the other to engage the other rod, and the spindle carrying the discs can be mounted in split bearings on the cheeks: with this arrangement to provide for selection as to the eyelet discs which are rocked by one or other rod, it would be necessary to remove the spindle and the discs from the spindle and then reassemble the discs of the two sets in the desired order, it being understood that each eyelet disc, after it has been threaded on to the spindle would be followed by a disc carrying a retaining point.

Another method of removing the discs would be to have each disc so slotted as to enable it to be pulled over the spindle and arranged to spring on and off the spindle.

The grooved bars may be sprung horizontally and fitted with a lever to raise the bars above the lugs for the purpose of freeing the discs and rotating them to an in or out of use position.

What we claim is:—

1. A portable tool for transferring stitches in a knitting machine, comprising a portable frame, a plurality of stitch transferring points, a corresponding plurality of retaining points, means mounting each transferring point and its retaining point on the frame for relative movement into and out of cooperation, an operating member, means movably mounting the operating member on the frame, a plurality of selector devices, one for each transferring point and its associated retaining point, and means mounting the selector devices for individual adjustment to cause movement of the operating member to effect simultaneous relative movement of selected retaining points and transferring points.

2. A portable tool for transferring stitches in a knitting machine, comprising a portable frame, a plurality of stitch transferring points, a corresponding plurality of retaining points, means mounting each transferring point and its retaining point on the frame for relative movement into and out of cooperation, an operating member, means movably mounting the operating member on the frame, a plurality of selector devices, one for each transferring point and its associated retaining point, and means so mounting the selector devices for individual movement on the operating member that selected transferring and retaining points are moved simultaneously by movement of the operating member.

3. A portable tool for transferring stitches to a knitting machine, comprising a portable frame, a plurality of stitch transferring points, a corresponding plurality of retaining points, one for each transferring point, means mounting the points on the frame for relative movement into and out of cooperation, an operating bar, means mounting the bar for angular movement in the frame and a plurality of cam members, one for each transferring and associated retaining point, each cam member being mounted for individual adjustment on the bar into and out of position causing movement of the bar to effect movement of the associated points, whereby selection can be made as to the points moved simultaneously by movement of the bar.

4. A portable tool for use in transferring stitches in a knitting machine, comprising a portable frame, a plurality of transferring points, a corresponding plurality of retaining points, means mounting the points on the frame for relative movement into and out of cooperation, an operating bar, means mounting the bar in the frame for angular movement in either direction from a central position, a plurality of cam members, one for each transferring point and associated retaining point, and means mounting the cam members for individual adjustment to enable movement of the bar in one direction to produce simultaneous relative movement of selected points and to enable movement of the bar in the other direction to produce simultaneous relative movement of other selected points.

5. A portable tool for use in transferring stitches in a knitting machine, comprising a portable frame, a plurality of transferring points, a corresponding plurality of retaining points, means mounting the points on the frame for relative movement into and out of cooperation, an operating bar, means mounting the bar on the frame for angular movement in either direction from a central position, a plurality of cam members, one for each transferring point and associated retaining point, each cam member having an operating part and a non-operating part, and means so mounting the cam members for individual adjustment on the operating bar that movement of the bar in one direction from its central position brings the operating

parts of selected cam members into operation to effect relative movement of the corresponding points while movement of the operating bar in the other direction brings the operating parts of other selected cam members into operation to effect relative movement of the corresponding points.

6. A tool as claimed in claim 5, and in which there are also provided further cam members which are adjustable on the bar to hold selected transferring and retaining points in engagement independently of the movement of the operating bar.

7. A tool as claimed in claim 5, and in which the cam members are detachably mounted on the operating member so that their operating parts can be reversed in position and then replaced.

8. A portable tool for use in transferring stitches in a knitting machine, comprising a portable frame, a plurality of transferring points, a corresponding plurality of retaining points, means mounting the points on the frame for movement into and out of cooperation, a plurality of operating members, one for each transferring point and its associated retaining point, and means mounting the operating members on the frame for individual adjustment into position holding the associated transferring point and its retaining point in or out of engagement.

9. A portable tool for use in transferring stitches in a knitting machine, comprising a portable frame, a plurality of transferring points, a corresponding plurality of retaining points, means mounting the points on the frame for movement into and out of cooperation, a support, means securing the support to the frame, a plurality of cam members, one for each transferring and associated retaining point, and means mounting the cam members for individual adjustment on the support into and out of a position holding the associated transferring point and its retaining point in or out of engagement.

10. A portable tool for use in transferring stitches in a knitting machine, comprising a portable frame, a plurality of transferring points, a corresponding plurality of retaining points, one for each transferring point, means mounting the points on the frame for movement into and out of cooperation, a bar, means supporting the bar for movement, means detachably securing the said supporting means in the frame, a plurality of cam members, means adjustably supporting the cam members on the bar to cause movement of the bar to effect cooperation between selected transferring points and their retaining points, a second bar, a second plurality of cam members, means adjusting the cam members individually on the bar, and means securing the second bar to the frame in substitution for the first bar, the adjustment of the cam members on the second bar causing selected transferring points and associated retaining points to be held in or out of engagement.

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