Jan. 8, 1935. E. WILDT ET AL 1,987,091

KNITTING MACHINE

Filed Feb. 21, 1934 2 Sheets-Sheet 1

Fig. 1.

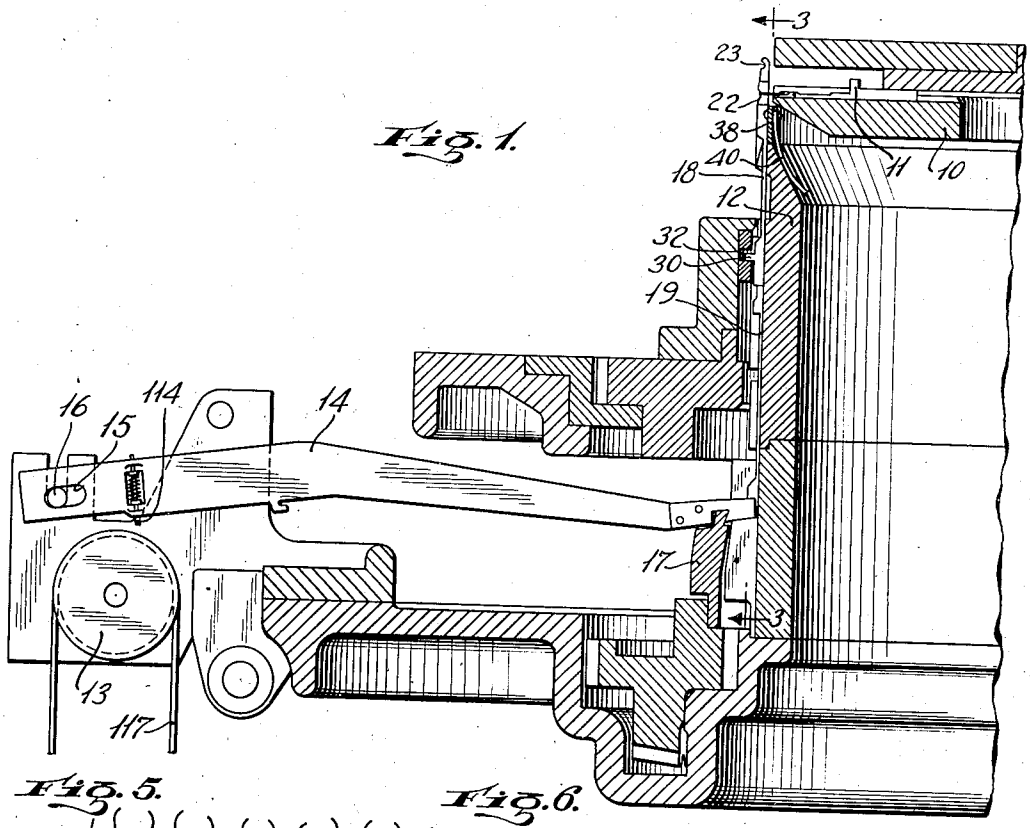


Fig. 5.

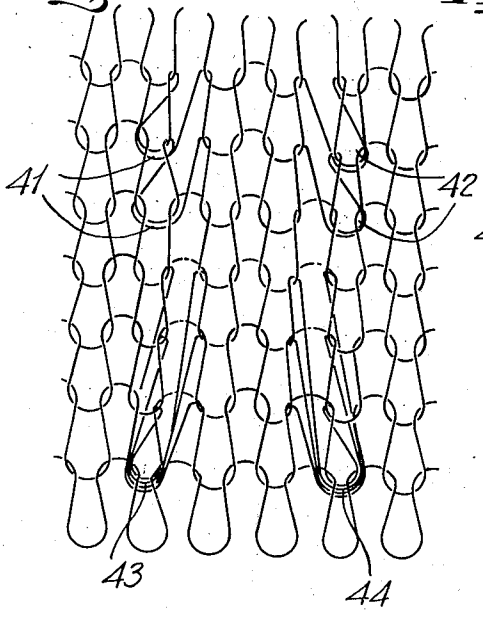
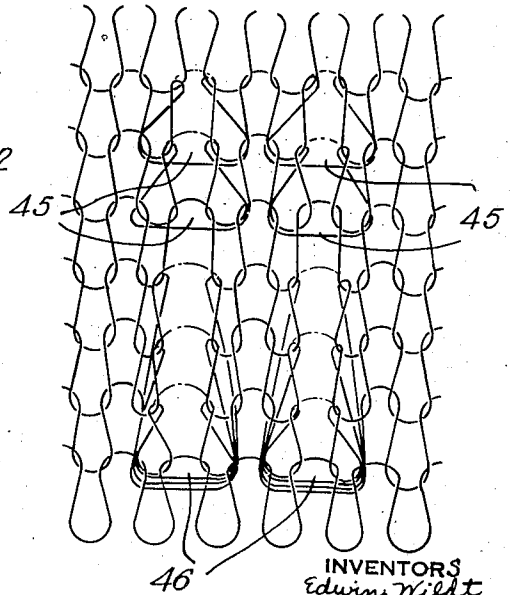


Fig. 6.

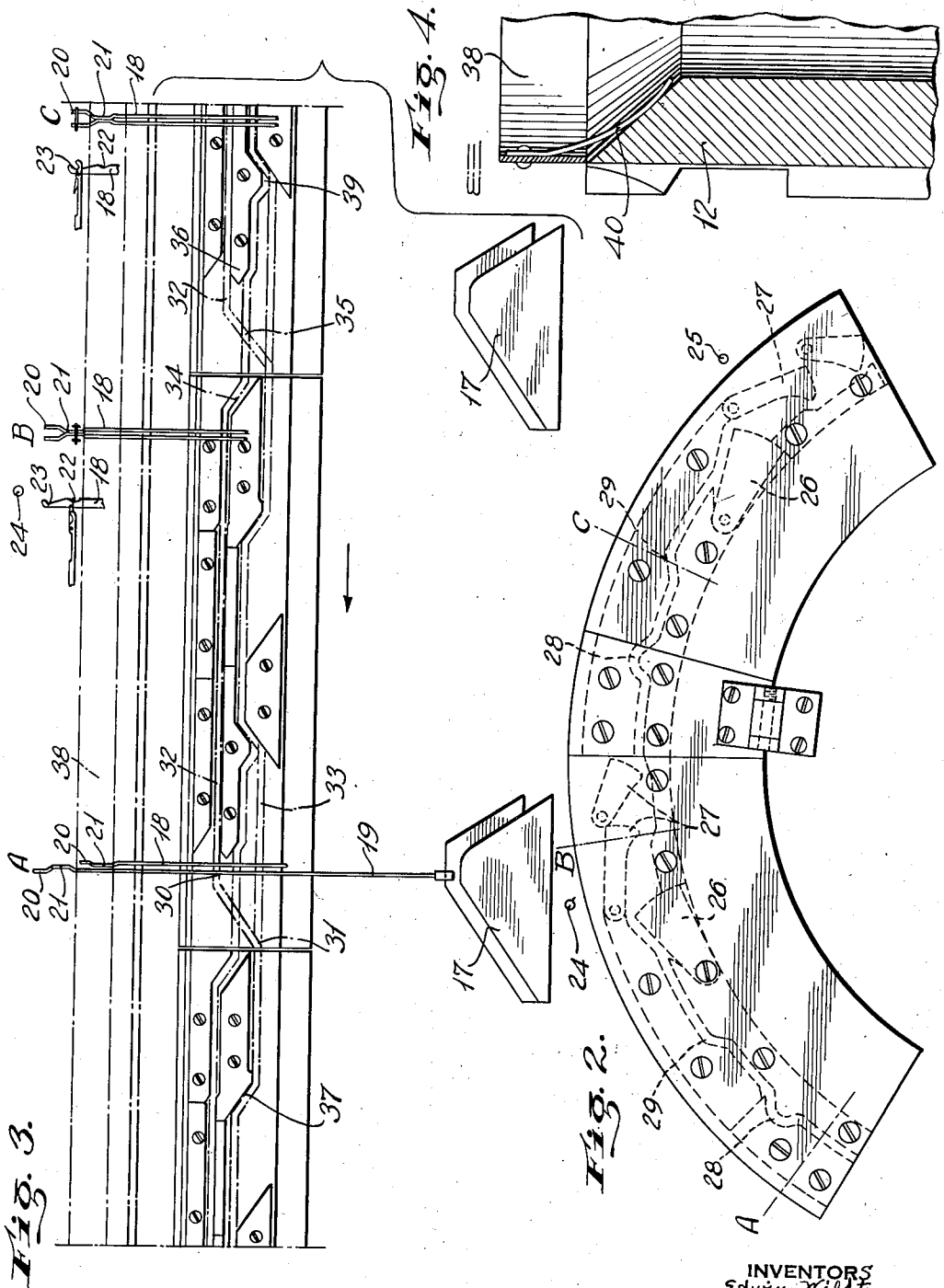


INVENTORS
Edwin Wildt
and
Henry Harold Holmes
BY
Jeffery, Kimball + Eggleston
ATTORNEYS

Jan. 8, 1935. E. WILDT ET AL 1,987,091

KNITTING MACHINE

Filed Feb. 21, 1934 2 Sheets-Sheet 2



INVENTORS
Edwin Wildt
and
Henry Harold Holmes
BY
Jeffery, Kimball & Eggleston
ATTORNEYS

Patented Jan. 8, 1935 1,987,091

UNITED STATES PATENT OFFICE

1,987,091

KNITTING MACHINE

Edwin Wildt and Henry Harold Holmes, Leicester, England, assignors to Jacquard Knitting Machine Company, Inc., Philadelphia, Pa., a corporation of New York

Application February 21, 1934, Serial No. 712,314
In Great Britain November 8, 1932

4 Claims. (Cl. 66—25)

This invention consists in improvements in or relating to knitting machines and has for its object to provide an improved means by which openwork effects can be produced in the fabric with the aid of what are commonly known as pelerine stitches.

A pelerine stitch is to be understood as one in which a needle-joining or sinker loop, or two or more of them, or the yarn between adjacent needle loops is displaced from its normal position and is passed around and over a needle or needles on one or opposite sides of that loop or loops. For instance, it may be passed over a needle to one side of it only or it may be expanded to pass simultaneously over adjacent needles on both sides. The needle joining or sinker loop is usually manipulated by means of an instrument which can either be inserted beneath the loop after the latter has been formed or can be positioned in relation to the yarn so that the yarn is drawn over the instrument. The instrument is then manipulated (and preferably is also specially shaped) so that by moving it the stitch can either be displaced to one side or expanded on both sides according to the nature and movement of the instrument and the form of pelerine stitch to be produced.

According to this invention, generally speaking, the stitch-forming elements (consisting, respectively, of a needle and a cooperating pelerine or loop-transferring instrument) perform their loop-transferring operations selectively, i. e. in accordance with a desired pattern or design, at stitches where loops are carried by such instruments and accordingly at stitches where pelerine or openwork stitches can be made. This can be done, for example, by causing the instruments to take the yarn selectively, or (say all the instruments taking the yarn) by causing only selected instruments or selected needles to perform the loop-transferring operation.

Also the present invention comprises, in or for a knitting machine, an arrangement readily permitting the combination of pelerine stitch-forming instruments and pattern mechanism that selectively operates said instruments and which is of the type that employs a perforated pattern strip and selectors which control the action of the pelerine stitch-forming instruments and which are themselves selected by the pattern strip.

The invention also comprises, in a knitting machine the combination of pelerine instruments, actuating means operative to position them to receive a yarn at one feed and thereafter to move them to expand or deflect the sinker loops thus received and to hold them in the transferring position, and in addition operative on the instruments before they reach the loop transferring position for selectively causing them again to occupy a yarn receiving position when it is desired to accumulate untransferred sinker loops on the instruments thus selected.

When it is stated that the additional means acts selectively on the instruments it is to be understood that such additional means may act on all or any selected one or more of the instruments and those that are not selected will, therefore, not be again moved to the yarn-receiving position but will remain in the loop-transferring position.

The invention may also be said to comprise, in a knitting machine, a succession of feed and transferring positions spaced apart around the circumference of or along the length of the needle-bed, in combination with pelerine instruments and actuating means operative on the instruments between each feed and a succeeding transferring position for selectively controlling the position of the instruments to determine which of them shall be moved to a yarn-receiving position before they reach the feed, and after they have passed the feed, which of them shall be moved first to a loop-transferring position and back again to a yarn-receiving position, or which of them shall move to and remain in the loop-transferring position.

In order that the invention may be more clearly understood, a preferred example will now be described with the aid of the accompanying drawings, in which—

Figure 1 is a certain section containing the axis of a circular knitting machine showing only a portion of the needle-dial and cylinder of the machine, and also the pattern mechanism.

Figure 2 is a plan of a section of the cam mechanism for the dial needles.

Figure 3 is a developed view of a section of the cam mechanism for the pelerine instruments, this section corresponding substantially to the portion of the cam mechanism shown in Figure 2.

Figure 4 is a section similar to Figure 1 on an enlarged scale to show a detail of construction, and

Figures 5 and 6 are knitting diagrams illustrative of pelerine work.

Like reference numerals indicate like parts in the several figures of the drawings.

The machine illustrated comprises a dial-needle bed 10 having in its tricks dial-needles 11 of the latch type.

Associated with the dial is a cylinder 12 disposed coaxially with the dial and having longitu-

dinal tricks formed in its outer periphery to receive pelerine instruments each of which is movable longitudinally of the cylinder under the control of the patterning means. The latter may be, for instance, pattern means such as is described in the specification of prior British Letters Patent No. 293,059. Such a mechanism comprises an intermittently rotatable platen roller 13, selectors 14 which are slotted at 15 so as to pivot on a spindle 16 and to move lengthwise on the spindle, each selector having a feeler-finger 114 to drop through perforations in the pattern band 117 into the slots in the roller 13 and then engageable by a slot wall as the roller turns for movement of the respective selectors forwardly, and a raising cam 17 to engage and lift the ends of those selectors 14 which by selection of the perforated pattern band 117 have been moved forwardly to the position illustrated in Fig. 1.

The pelerine instruments are indicated at 18 and associated with each such instrument, for convenience of construction, is a jack 19, the lower end of which is engageable by the respective selector 14 associated with it; generally speaking the jacks 19 are, in effect, extensions of the respective pelerine instruments.

In the examples illustrated each pelerine instrument is intended to be received in the separate trick in the cylinder 12 although it is within the invention to arrange in each cylinder trick two pelerine instruments side by side with a selector 14 for each such instrument or for each pair of instruments. Adjacent instruments constitute co-operating pairs in sequence all round the cylinder or all round that portion of the cylinder over which pelerine patterning is desired. The upper ends of the instruments of each pair are laterally offset, as shown clearly in Figure 3, at 20, the offset of one instrument of a pair being in the opposite direction to that of the other. The offset extremities extend above convergent neck portions 21, which, when both instruments are simultaneously elevated, lie flat against one another for a certain length and then diverge from one another into straight portions sliding in the cylinder tricks. When the two instruments of a pair are simultaneously raised the offsets 20 form fork-like projections on to which a sinker-wale can be cast or received and by which the sinker-wale loop can be manipulated to be cast over adjacent needles on both sides. When only one instrument is elevated the sinker-wale loop will be deflected to one side or the other according to which instrument of a pair is raised. When thus deflected the sinker-wale loop can be eventually cast over a needle lying on that side of the sinker-wale to which the look is deflected.

In the neck portion of each instrument there is formed a shallow groove 22 (Figure 1) and it is around this portion and within the shallow groove that a sinker loop is first passed, the instrument being raised in a manner to be described later, to a sufficient height to bring this groove into the path of the yarn as it is laid across the dial needles. At their upper offset extremities the instruments are provided with deeper notches 23 to afford a shouldered horn-like extremity in which the sinker loop can rest after it has been expanded or deflected in known manner by drawing the instruments downwardly and in which it can be held until it is passed over one or both needles according to the type of pelerine stitch to be made.

In a multi-feed machine contemplated in the present example the cam system for the dial-needles will be the usual cam system except that in addition to cams for advancing the needles to take the yarn and thereafter for causing knitted loops to be made there will be projecting and return cams for the transfer operation. One such cam system is illustrated in Fig. 2 in which successive yarn feeds are indicated at 24 and 25 respectively, other feeds being equi-distantly spaced around the axis of the machine. The cam system comprises clearing cams 26, stitch cams 27, all of which are adjustable, and a fixed cam track affording latch opening and return cams 28 and needle-advancing cams 29 the purpose of which is to advance the needles to a position to receive sinker loops that have been expanded or deflected by the pelerine instruments. Thus, between the knocking-over point associated with each feed, and the position of the feed adjacent to it there will be a position at which needles are projected for loop transferring.

The cam system for the pelerine instruments is illustrated in Fig. 3 and a feed point corresponding to 24, of Fig 2 is indicated by the same reference numeral. In order to appreciate the relative positions of the two cam systems chain-lines indicated by the reference characters A, B and C are marked on both Figs. 2 and 3.

At position A selected pelerine instruments are raised by the cam 17 so that butts 30 of the instruments thus selected will be raised along the cam track incline 31 into an upper cam-track 32.

The butts of unselected instruments travel in a lower cam track 33. At position B the dial needles are retracted to draw their loops and consequently the sinker loops are wrapped round the necks of selected instruments as indicated in Fig. 3, the profile view to the left of B illustrating the relative positions of dial needles and instruments. Thereafter the selected instruments are retracted down the reverse incline 34 to a position 35 and if no reselection occurs the butts of the retracted instruments will pass beneath a guard cam 36, to be actuated by depression 39. At position 39 the instruments carrying a sinker loop are further depressed below the level of track 35 thus pulling down the loop below the level of the dial needles, and into the notch 23, the dial needles at this position being completely retracted. Immediately following this, viz, at position C the instruments are elevated to carry the loop above the dial needle level and the dial needles are projected by cam 29 to enter the expanded sinker loop. In the illustration a loop is shown as expanded by two instruments which have been simultaneously retracted.

If, however, it is desired to accumulate uncast-off sinker loops on the pelerine instruments for a succeeding course a reselection will occur at position 35 with the aid of the pattern mechanism and raising cam 17 so that the instruments thus reselected are again elevated to the upper track above the guard cam 36 whereupon the old loop is forced back into the neck portions 21 of the instruments. Immediately following this, as will be seen from Fig. 2, the next feed is reached, so that instruments thus reselected will receive another sinker loop and the instruments are again treated as hereinbefore described.

The profile view at position C in Fig. 3 again indicates the relative positions of dial needles and instruments at that position.

Summarizing the action of the machine so far described it will be appreciated that prior to reaching feed 24 pelerine instruments are first selected by the pattern mechanism (for a fuller

understanding of which reference may be made to the specification of prior British Letters Patent No. 293,059) and shortly thereafter and prior to reaching that feed, the dial needles are projected by cam 26. In passing feed 24, the dial needles are retracted to draw their loops, and sinker loops will be passed around those pelerine instruments that have been selectively raised and have traversed the cam track 32. Other instruments which have not been selected and which traverse the lower cam-track 33 do not receive sinker loops. At position A one instrument is illustrated as having been selected and its companion instrument is unselected. Further rotation of the machine retracts the pelerine instruments until they reach the reselecting position 35 whereupon a second selection may occur if it is desired to accumulate uncast-off sinker loops on the instruments. Assuming that it is so desired to accumulate loops, reselected instruments will be raised by another cam 17 into the upper cam-track above the guard cam 36 while instruments which are to yield their loops to the dial needles traverse the track below the guard cam until they reach position C. At this position the needles are again projected by the transfer cam 29 to enter such loops as are held for them by those pelerine instruments which are in the transfer position at C and thereafter the pelerine instruments that are to cast off their loops will be drawn down further by a cam such as 37 immediately prior to the final projection of the needles by the succeeding cam 26 to receive yarn at the next feed 25. It will be understood that in Fig. 3 a complete section of cam system is shown representing only a portion of the circumference of the whole system and that the next section will follow by continuing the cam tracks shown at the right-hand end of Fig. 3 with the tracks commencing at the left-hand thereof. Also it will be understood that the pattern is advanced (e. g., platen 13 turned and pattern band 117 advanced one step), to make a new call on the selectors 14, for each feed as is represented by the presence of two of the raising cams 17 in Fig. 3.

In the machine described above it is intended that the needle dial will be raised for mechanical convenience considerably above the normal position which such a dial would have in a dial and cylinder knitting machine. If an existing machine of this nature is to be employed, or if it is desired to be able to employ it alternatively as an ordinary dial and cylinder machine, the normal cylinder verge will not be usable as a means for supporting the loops during transference. Consequently it is preferred, as clearly shown in Figs. 1 to 4, to provide a detachable ring 38 which can be clipped on to the top of the cylinder 12 to afford a virtual extension of the upper end of the cylinder and to afford a ledge upon which the pelerine loops can rest as they are being drawn down to a transferring position. This ensures accuracy in transferring. Had the ring not been provided and had the dial been allowed to remain in its normal position the cylinder top would have had to be removed thus precluding the cylinder from being used for its normal purpose if and when desired. Thus, the standard type of cylinder can be used and all that is necessary is to displace it from its normal position relatively to the dial to afford a greater space between it and the dial and thereafter clip in place the extension ring 38. This ring may be held in place by spring clips 40 spaced apart at intervals around the periphery of the ring.

The invention is not limited to the specific selector means described and illustrated in detail and pattern means other than those using perforated bands may be employed. However, by providing such or other equivalent selecting means for the pelerine instruments a large variation in the range of patterns producible by pelerine stitches is obtained.

In Fig. 5 sinker loops are shown at 41 as having been deflected to the left and at 42 as having been deflected to the right and this is obtained by the use in each case of only one of a companion pair of pelerine instruments. In these two instances, however, one loop only has been retained at a time and has been cast off at the transferring position immediately following its formation. At 43 and 44, however, an accumulation of three loops is shown, and this accumulation is obtained by reselecting the particular pelerine instruments twice in succession following the original selection before the transfer is made. In Fig. 6 pelerine stitches are shown at 45 producible by the use of a pair of companion instruments simultaneously in order to cast off the sinker loops onto two adjacent dial needles simultaneously and the retention of only one loop at a time is here illustrated. At 46, however, an accumulation of three loops cast off simultaneously to a pair of adjacent needles with the aid of a companion pair of pelerine instruments is shown.

Having now particularly described and ascertained the nature of our said invention and in the manner in which the same is to be performed, we declare that what we claim is:

1. In a knitting machine, the combination of a bank of needles, a plurality of instruments, cooperating therewith, adapted to take yarn and from which yarn taken by the instruments may be transferred to needles of said bank, means to cause knitting on said needles, a transfer cam for said instruments, a path for said instruments, alternative to the path over the transfer cam, being provided through which the instruments can pass the transfer cam without transferring, means to direct the instruments to the transfer cam or, alternately, to said path, and means to feed yarn, characterized by the fact that said alternative path directs the instruments in it to position for taking yarn.

2. In a knitting machine, the combination of a bank of needles, a plurality of instruments, cooperating therewith, adapted to take yarn and from which yarn taken by the instruments may be transferred to needles of said bank, means to cause knitting on said needles, a transfer cam for said instruments, a path for said instruments, alternative to the path over the transfer cam, being provided through which the instruments can pass the transfer cam without transferring, said alternative path directing the instruments in it to position for taking yarn, and pattern mechanism, acting in advance of the transfer cam, to direct the instruments selectively to the transfer cam or, alternately, to said path.

3. The combination with a circular rib knitting machine having a cylinder and a dial slotted to receive cooperating stitch-forming elements, and means to move said dial and cylinder relatively, one toward and from the other, of a cylinder extension ring, and means for detachably connecting said ring to the cylinder above the normal verge thereof to adapt said machine for use with instruments in the cylinder adapted to take yarn and transfer the yarn taken to needles in the dial.

4. In a circular knitting machine, the combination of stitch-forming elements including a circular bank of needles and a circular bank of instruments adapted to take yarn at spaces between adjacent needles of said needle bank and transfer said yarn to needles of said bank, a plurality of means individually allocated to substantially individual pairs of said needles and their respectively cooperating yarn-transferring instruments, to actuate at least one member of each of said pairs to control the performance of the loop-transferring operation by said elements, a yarn feeder revolving around said banks to feed yarn to said needles and instruments, mechanism to actuate said plurality of means, said mechanism operating on said means successively around said banks at the same angular rate as said yarn feeder, a pattern means to selectively control the operation of said plurality of means, and means to advance said pattern to make new calls on said plurality of means in advance of said mechanism, characterized by the fact that said plurality of means controls the movement of said instruments to yarn-taking positions, and said mechanism operates each of said plurality of means between two adjacent feeds and in advance of a yarn transferring position that lies between said two feeds.

EDWIN WILDT.
HENRY HAROLD HOLMES.