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IDLING MECHANISM FOR KNITTING NEEDLES IN A HAND KNITTING MACHINE

Filed April 16, 1958

Fig. 1

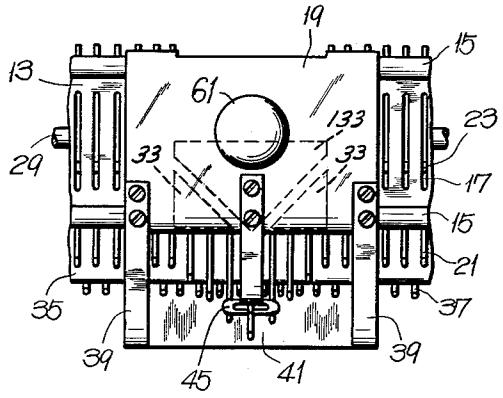


Fig. 2

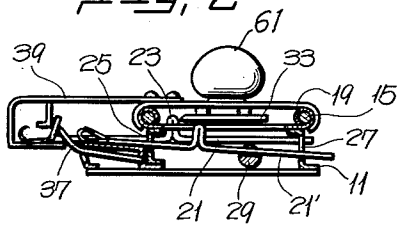
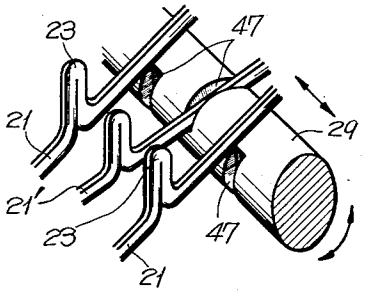


Fig. 3



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IDLING MECHANISM FOR KNITTING NEEDLES IN A HAND KNITTING MACHINE

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5 Claims. (Cl. 66—72)

This invention relates to an improvement in a hand knitting machine, and particularly to an idling mechanism for knitting needles in a hand knitting machine.

Heretofore, it has been inefficient to knit a figured fabric by a hand knitting machine because the figure is formed by hand-worked stitches. Therefore, when it is intended to knit a figured fabric, a hand knitting machine becomes worthless because of trouble and time required to hand-work stitches. In addition, it has become general that knitted fabrics are employed not only for winter clothing but also for decoration. Therefore, it is necessary to provide an effective hand knitting machine whereby a figured fabric may be formed mechanically.

One object of this invention is to provide a hand knitting machine whereby figured fabrics may be knitted mechanically.

Another object of this invention is to provide a hand knitting machine whereby figured fabrics may be formed mechanically with a high efficiency in operation.

Still another object of this invention is to provide a hand knitting machine whereby substantially infinite kinds of figures may be formed in knitted fabrics at will.

A further object of this invention is to provide a foolproof and durable hand knitting machine of the class described.

According to this invention, a hand knitting machine comprises a plurality of knitting needles having shanks, respectively, a plurality of sinker needles arranged alternately therewith, and a carriage adapted to slide across said knitting needles supplying a yarn thereto, so as to effect cooperation of said knitting needles with said sinker needles in such a manner that said knitting needles approach said sinker needles successively, catch said yarn, and then recede away from said sinker needles, and further comprises an idling mechanism for said knitting needles, comprising a cylindrical change shaft, said shanks of the knitting needles being placed on the cylindrical surface of said shaft, and said surface having recesses adapted to engage with a predetermined group of said shanks so as to lower the latter when said shaft is displaced, whereby a group of knitting needles having said predetermined group of shanks is made idle so as to be inactive in said co-operation with said sinker needles.

The invention will be better understood and other objects and additional advantages of the invention will become apparent upon perusal of the following description taken in connection with the drawings, and the scope of the invention will be defined in the appended claims.

In the drawings,

Fig. 1 is a plan view of an essential part of a hand knitting machine embodying the principles of this invention.

Fig. 2 is a side elevation thereof.

Fig. 3 is a perspective view of a part of the idling mechanism of the hand knitting machine.

Referring now to Figs. 1 and 2, a body 11 is formed as a trough having a front wall and a rear wall. A

needle bed 13 is fixed on the body 11. The needle bed 13 has rounded front and rear edges 15 and a plurality of longitudinally extended perforations 17. The rounded edges 15 are parallel with each other and serve to guide a carriage 19. A plurality of latch type knitting needles 21 each having a butt 23 are spaced under the needle bed 13. The stems or shanks of the knitting needles 21 are slidably inserted through holes 25 provided in the front wall of the body 11 and vertically elongated holes 27 provided in the rear wall of the body 11. The butts 23 of the knitting needles 21 protrude through the perforation 17 of the needle bed 13. The hole 25 is somewhat vertically elongated in shape and the vertically elongated hole 27 is appreciably vertically elongated.

A cylindrical change shaft 29 is provided transversely between and substantially parallel to the side walls of the body 11 so as to support the shanks of knitting needles 21 on the cylindrical surface of the shaft 29.

The carriage 19 is mounted on the needle bed 13 in engagement with the guide rails 15 so as to be slidable transversely and carries a raising cam 133 and a pair of knitting cams 33, whereby the knitting needles are operated. A sinker case 35, a transversely extended box of a sheet metal, is fixed on the body 11 along the front edge thereof. There is a plurality of sinker needles 37 formed from metal rods each having a substantially L-shaped upper end. The other ends of the sinker needles 37 are fixed on the sinker case 35 so as to locate the sinker needles 37 alternately with the knitting needles 21. Two invertedly L-shaped arms 39 fixed on the front end of the carriage 19 carry a fabric presser 41 of a sheet metal. The rear edge of the fabric presser 41 is able to slide together with the carriage 19, pressing lightly the fabric, hung from hooks of the knitting needles 21, towards the sinker case 35. One end of a yarn feeder arm 43 is fixed on the carriage 19 and the other end of the yarn feeder arm 43 is provided with a yarn feeder 45.

It is necessary that the knitting needles 21 be so arranged with respect to the carriage 19 that the needles 21 are able to be slid longitudinally, being guided by the hole 25 and the elongated hole 27 when the butts 23 of the needles 21 are pressed transversely by the cams provided under the carriage 19. In order to engage the butts 23 with the cams, it is necessary that the hole 25, the elongated hole 27, and the change shaft 29 are arranged appropriately so as to carry the knitting needle 21 at an appropriate height.

Now according to this invention, the change shaft 29 is adapted to be rotatable and slidable axially, and is provided with a plurality of recesses 47. Each of the recesses 47 is formed on the cylindrical surface of the shaft 29 along a part of a circumference of the cylinder and so shaped in depth that, when the shank of a knitting needle 21 engages the bottom of the recess 47, the top of the butt 23 of the needle 21 may appear above the needle bed 13 through the perforation 17 but does not engage with the cams, thereby to make idle the needle 21. Accordingly, it is necessary that the vertically elongated hole 27 is vertically long enough to position the needle as above.

In order to knit a figured fabric, it is necessary that a group of specified knitting needles 21 be made to take such an idle position. Therefore, such recesses are formed spaced accordingly to the positions of the specified needles 21. In order to get a differently figured fabric, another group of specified needles is selected for idling. Corresponding recesses are formed also on the cylindrical surface of the shaft 29 along different parts of the circumferences from the above-mentioned recesses. For example, the former recesses are formed for every

third needle while the latter recesses are formed for every fourth needle.

In operation, it is a well known fact that the carriage **19** having a carriage handle **61** is made to slide transversely being guided along the rails **15**. The cams provided under the carriage **19** operate the knitting needles **21** through their butts **23** so as to slide the needles longitudinally. A yarn supplied from the feeder **45** is caught by the hooks of the knitting needles **21** and by the sinker needles **37** thereby to knit a fabric as usual.

Referring now to Figs. 2 and 3, according to this invention, when it is intended to knit a figured fabric, the change shaft **29** is operated. The change shaft **29** is slid transversely or turned through an angle so as to place the shanks of a required group of the knitting needles **21** on the bottoms of a corresponding group of recesses formed on the cylindrical surface of the change shaft **29**. Thus the shanks of this group of the knitting needles **21** are lowered together with their butts **23** by their own weight, whereby the specified knitting needles **21** cannot engage the cams, respectively. Accordingly, the specified knitting needles **21** (as shown by a numeral **21'** in Figs. 2 and 3) do not make stitches while the other knitting needles **21** make stitches, respectively, when the carriage **19** is slid across these needles supplying a yarn. Thus a figured fabric is knitted.

In order to substitute another group of the knitting needles for the above specified group **21'**, the change shaft **29** is turned or turned and slid axially so as to raise the group of the specified needles **21'** and effect lowering of another group of the needles into another group of the recesses. Thus differently selected knitting needles may be made to idle. According to selection of the group, differently figured fabric may be knitted at will.

While a particular embodiment of the invention has been illustrated and described, modifications thereof will readily occur to those skilled in the art. It should be understood therefore that the invention is not limited to the particular arrangement disclosed but that the appended claims are intended to cover all modifications which do not depart from the true spirit and scope of the invention.

We claim:

1. In a hand knitting machine comprising a plurality of latch-type knitting needles having butts and mounted for longitudinal reciprocation, sinker needles cooperable with said knitting needles, a carriage mounted for sliding reciprocation transversely of said knitting needles, yarn feeding means on said carriage, and cam means on said carriage engageable with said butts to reciprocate said knitting needles relative to said yarn feeding means: mechanism for idling selected groups of said knitting needles comprising, in combination, guide means for said knitting needles providing for vertical movement thereof to position their butts into and out of operative engagement with said cam means; and a cylindrical shaft extending transversely of said knitting needles beneath and with its cylindrical surface supportingly engaging the shanks thereof to maintain said butts engaged with said cam means, and movable relative to such shank; said shaft being formed with distinct groups of axially spaced chordal slots in its periphery, the chordal slots of each group subtending the same respective arc of the shaft surface and having chordal bottom surfaces lying in a common plane; the respective groups of slots having their slots spaced axially in accordance with the transverse spacing of the selected groups of knitting needles to be idled; whereby, upon movement of said shaft to vertically align the slots of a selected group with the shanks of the group of knitting needles to be idled, the knitting needles of such group to be idled will move into the slots of said selected group to drop the needle butts out of operative engagement with said cam means.

2. Mechanism for idling selected groups of knitting needles as claimed in claim 1 in which said shaft is rotatable about its axis.

3. Mechanism for idling selected groups of knitting needles as claimed in claim 1 in which said shaft is axially slidable transversely of said knitting needles and rotatable about its axis.

4. Mechanism for idling selected groups of knitting needles as claimed in claim 3 in which said groups of chordal slots are spaced circumferentially of said shaft.

5. Mechanism for idling selected groups of said knitting needles as claimed in claim 1 in which said groups of chordal slots are spaced axially of said shaft.

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