Dec. 13, 1927. 1,652,308

K. HOWIE

SPRING BEARD KNITTING MACHINE

Filed Dec. 7, 1926

Fig.1.

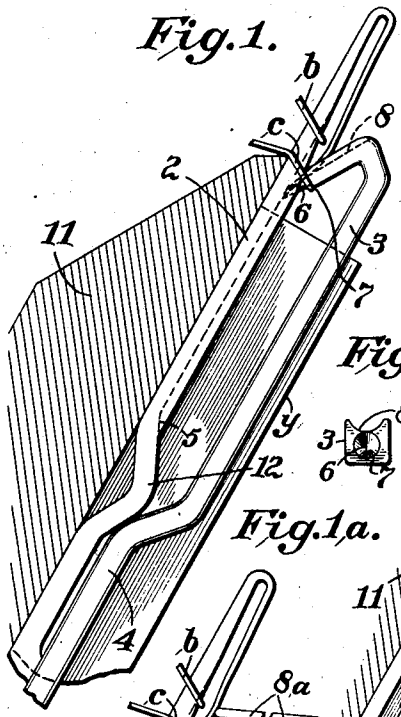


Fig.2.

Fig.3.

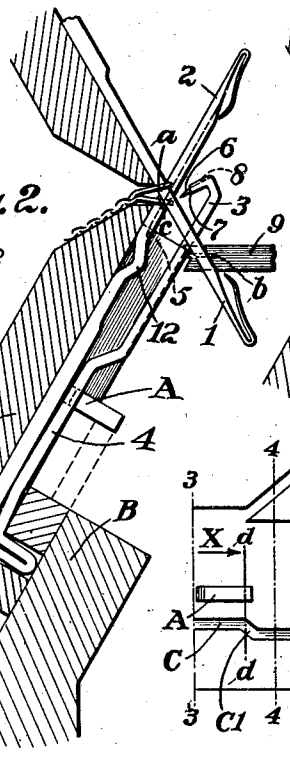


Fig.4.

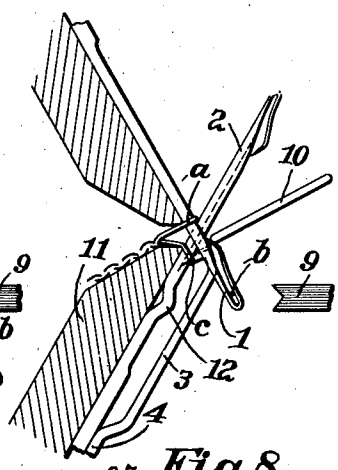


Fig.1a.

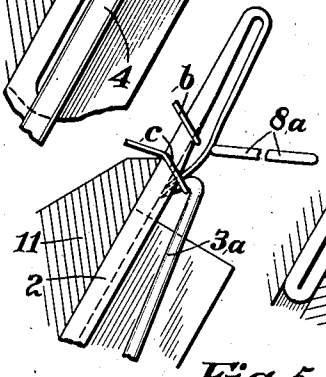


Fig.8.

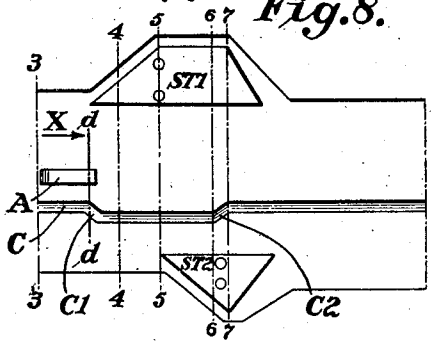


Fig.5.

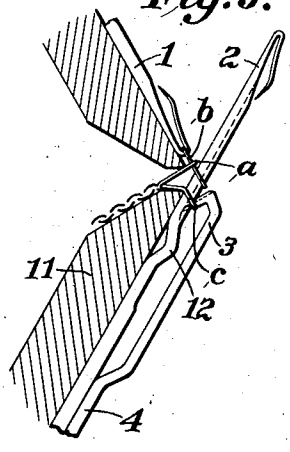


Fig.6.

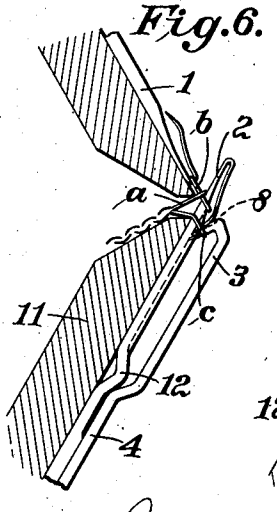
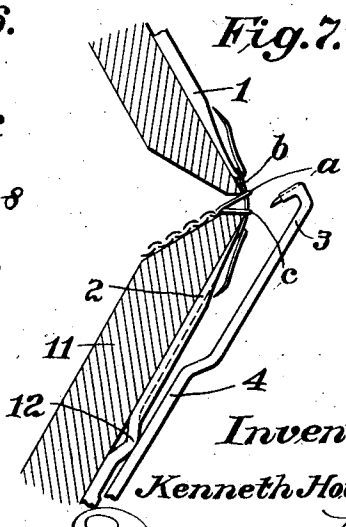


Fig.7.



Inventor:
Kenneth Howie,
by Spear, Middleton, Donaldson & Hall
Attys.

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UNITED STATES PATENT OFFICE.

KENNETH HOWIE, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO WILDMAN MFG. CO., OF NORRISTOWN, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SPRING-BEARD KNITTING MACHINE.

Application filed December 7, 1926. Serial No. 153,117.

The invention relates to spring beard knitting machines, one object being to provide means for dividing the old loop from the new loop to facilitate pressing of the needle beard. Another object of the invention is to utilize the same implement which is employed in dividing the old loop from the new loop for the purpose of pressing the needle beard.

Other objects of the invention will appear from the following description.

In the accompanying drawings:

Figure 1 is a view enlarged of the spring needle and the implement for dividing the old loop from the new yarn, said implement in this view being shown as adapted to also perform the pressing of the needle beard.

Fig. 1ª is a view similar to Fig. 1 of a portion thereof showing the hooked implement adapted to perform only the loop dividing action, the beard pressing being done by an ordinary presser wheel or cam.

Fig. 2 is an enlarged view of the end of the loop dividing and beard pressing instrument.

Fig. 3 is a view of the spring needles of a rib knitting machine with the needles of both sets indicated as in advanced position, and illustrating the sinking of the yarn to the needles of the first set.

Fig. 4 is a view similar to Fig. 3 with the elements in the positions assumed when the pressing of the needle beards of the first set of needles takes place.

Figs. 5, 6 and 7 show the elements in the different relative positions assumed during the knitting operation as will be described.

Fig. 8 is a diagram of the needle cams and the presser operating cam.

As is well known to those skilled in this art, difficulty has been experienced in rib machines employing spring beard needles owing to the restricted space between the old and new loops on the needles of the second set in which pressing of the needle beards must be done, this restriction imposing limitation upon the fineness of gage and rendering the operation of pressing uncertain owing to the liability of the beard being closed too soon and casting off both loops or being pressed too late and causing tuck stitches.

In order to increase this divisional space and provide means whereby the pressing of the beards of the needles of the second set may be effected, I provide a hook shaped implement which cooperates with the needles of the second set.

These needles 2 are arranged at any desired angle to the needles of the first set indicated at 1. In the drawings I have shown both sets of needles arranged at an angle of about 30° to the vertical. The hook shaped loop divider and beard presser is indicated at 3, there being one of these for each needle of the second set.

Its stem 4 works in the same needle groove with the needle 2 of the second set with which said hook is to cooperate, and it is rocked and reciprocated as will be referred to later. The needles 2 of the second set are of special construction in that instead of having an eye of a length which will receive only the needle beard, this eye in the present invention is extended as shown to the point 5 so that this needle when in advanced position, may receive the barb 6 of the hook shaped implement 3. This barb projects from the end of the hook shaped implement. The hook shaped implement has a groove 8 formed in this upper edge which edge inclines downwardly and inwardly in respect to the needle circle and is adapted to receive and press the beard of the needle of the second set, with which the hooked presser is associated. The pressing action is due to the beard of the receding needle engaging and riding along the inclined pressing surface of the pressing instrument 3 within the groove.

With the elements in the position shown in Fig. 3 the yarn is being fed to the advanced needles of the first set 1 by sinkers 9 as in ordinary practice. The loop dividing and beard pressing instrument 3 is in its retracted position, i. e., it is raised and set off laterally from the needle.

In Fig. 4 the needle 1 has retracted to the

point where its beard has been pressed by an ordinary presser wheel 10 so that the needle may draw the new loop *b* through the old loop *a* on this needle and cast off said old loop *a*. In this figure also it will be noted that the hooked instrument 3 has been operated by its cams so that it has advanced from the position shown in Fig. 3 to that shown in Fig. 4 and has moved into connection with the needle 2 so that its barb 6 has entered the eye of the needle and has also entered the loop *c* on the stem of the needle 2 of the second set and has bent this loop down over the outer edge of the needle cylinder 11 so that said loop occupies a position lower than it otherwise normally would do. In this action of engaging and drawing this loop *c* down along the stem of needle 2 the barb 6 buries itself in the elongated eye of the needle 2. In this action of pulling the old loop down along the stem of the needle 2 it will be widely separated from the point where the new loop *b* is drawn across the stem of the needle 2 by the recession of the needle 1 to its inward limit, or retracted position. Fig. 5 illustrates the position of the elements just mentioned. Now when the needle 2 retracts from the position shown in Fig. 5 and has reached the position shown in Fig. 6 its beard has entered the groove 8 at the top of the hooked implement and has been directed down the said groove and through the loop *c* which is held down away from the new loop *b* by the loop dividing and beard pressing hook 3. It will be noted that there is thus provided ample space for the pressing of the beard between the new and old loops *b* and *c* and the same implement which provides the wide separation or division between the old and the new loops also provides the means for pressing the needle beards.

Fig. 7 illustrates the completed stitch drawing stroke of the needles, new loop *b* now having been drawn through old loop *c*, and the latter having been cast off into the fabric. In this figure the hooked instrument has assumed its retracted position away from and in respect to the needle 2 with which it has just cooperated, and that needle is now free to advance again to take new yarn for making a new loop.

The cams for operating the needles and the presser instruments are shown diagrammatically in Fig. 8. These include the usual stitch cams ST^1 and ST^2 for the first and second sets of needles, also a cam A for operating the hook 3 into contact with the needle, and the cam groove C for giving the hook its movement in the direction of its length.

The cam A is suitably mounted on a post extending up from the cam box B. This cam A is contacted by the back edge of the stem 4 of the presser and when this contact takes place the presser is moved up against the stem of the needle to bury its barb in the elongation of the eye of said needle. The stem of the hooked instrument has a butt to run in the groove C of the cam set. This groove has a portion C^1 which, following the action just described of the cam A, moves the said instrument along the needle so that the barb of the instrument will pass through the old loop as shown in Fig. 4. The relation of these cams A and C^1 is shown in Fig. 8 by their positions in respect to the vertical line *d*—*d*, it being noted that relatively, the needles are supposed to be moving as a series in the direction of the arrow X.

I have marked on this diagram several vertical lines which indicate the several points along the course of these cams at which the various positions of the parts are taken as illustrated in the diagrams Figs. 3 to 7 inclusive. That is to say, at the line marked 3—3 the needles and the hooked instrument are in approximately the relative positions shown in Fig. 3, and so the needles and hook will be in the positions shown in the other Figures 4, 5, 6 and 7 when they reach the lines correspondingly marked in Fig. 8.

It may be noted that the cam portion A which moves the hooked instrument radially inward to bury its barb in the needle eye, need be long enough only to insure the holding of the instrument against its companion needle until the part C^1 of the cam groove has advanced the instrument to the point where the barb has passed into the old loop. After this barb has passed into the old loop the instrument will be held by the loop thus engaged until pressing of the needle beard is accomplished.

In Figs. 4, 5, 6 and 7 this backing cam A does not appear for the reason just stated.

In Fig. 6 the pressing of the needle beard is taking place substantially on the line marked 6—6 of Fig. 8. Here the beard after entering the old loop, will exert a dislodging action against the presser, tending to move it outward laterally away from the needle stem and old loop following which the rise C^2 of the presser cam will act to elevate the presser. The needle 2 is formed with a slight hump 12 which as the needle recedes as shown in Fig. 6, will ride against the stem of the implement 3 and will move it away, or radially outward. This action takes place after the beard has been pressed and during the time that the needle is passing through the old loop. This action augments the pressure of the beard tending to force the presser implement outwardly after said beard has been pressed. This hump on the needle 2 will, therefore, act to hold the presser away from the needle as the needle rises from the position of Fig. 7, and there-

fore the head of the needle will not catch under the hook of the presser implement when the needle advances. The line y in Fig. 1 indicates the outer edge of the needle groove wall of the slotted cylinder.

In Fig. 1^a is shown a hooked implement 3^a which performs only the function of dividing the old loop from the new yarn, but not the function of pressing the needle beard, this latter function being performed by a presser wheel or cam indicated at 8^a, of any well known form. This implement 3^a has a hooked portion of slightly different form from the form first described, as will be obvious from an inspection of Fig. 1^a, it having no shoulder 7 with reduced barb 6 like that first described and the hook being smaller than that first described. In this form of the invention the hooked implement will be operated in substantially the same manner as illustrated in connection with the form first described.

Figs. 1 and 1^a show the hooked implement in cooperation with a needle which may be one of a single row and it therefore will be understood that the invention is not limited to rib machines, the scope of said invention being defined by the appended claims.

I claim:

1. In combination in a rib knitting machine, spring beard needles, means for feeding and pressing the needles of the first set, and an instrument for drawing the old loops on the second set of needles away from the new loop lengths, fed across their stems by the needles of the first set, said instruments also pressing the needle beards of the second set to pass through said old loops, substantially as described.

2. In combination in a rib knitting machine having spring beard needles, of which those of the second set have elongated eyes, an instrument for each of the needles of the second set having a point to enter said elongated eye and to pass through the old loop on said needle and pull it away from the position of the new loop on said needle, said instrument having a surface inclined in respect to the needle stem for receiving and closing the needle beard as said needle retracts, substantially as described.

3. In combination in a rib knitting machine, spring beard needles and instruments cooperating with the needles of the second set for engaging and separating the old loops thereon from the new loops, and for pressing the beards of said second set of needles, and cam means for moving said instruments relative to the needles, substantially as described.

4. In combination in a rib knitting machine, spring beard needles, in two sets, one of which feeds yarn to the other, the needles of which latter set have elongated eyes, and instruments cooperating with the latter needles having points to enter the said eyes and the old loops of said needles and to separate them from the new loop lengths, said instruments presenting surfaces at an inclination to the needle to receive and press the needle beards as said needles retract past said instruments, substantially as described.

5. In a rib knitting machine, the combination of spring beard needles, and implements having pointed ends to enter the old loops of the second set of needles, and divide them from the new loops, said implements having surfaces along which the needle beards move and are pressed to pass through the old loops, and means for operating the said implements relative to the needles.

6. In connection with the features of claim 4, the groove in the instrument to receive and guide the needle beard, the bottom of said groove extending at an acute angle to the direction of retracting movement of the needle, substantially as described.

7. In combination in a rib knitting machine, spring beard needles and instruments, one for each of the needles of the second set to engage the old loop thereof and withdraw them along the needle stems from the new loop lengths, fed thereto by the needles of the first set for dividing the old and new loops for pressing, substantially as described.

8. In connection with the features of claim 5 the cam for moving the pressers against the needles, and for reciprocating the pressers.

9. In connection with the features of claim 5 means for moving the pressers towards and away from the needles, and means for reciprocating said pressers, substantially as described.

10. In connection with the features of claim 5 the hump on the needle which when said needle retracts engages the stem of the presser implement and moves said presser away from the needle, substantially as described.

11. In combination in a knitting machine, a spring beard needle, and an implement associated therewith to withdraw the old loop along the needle stem for dividing said old loop from the new loop fed to the needle to permit pressing of the needle beard in the space thus provided.

12. A knitting machine according to claim 11 in which the implement which divides the old loop from the new loop also serves to press the needle beard.

13. A knitting machine according to claim 11 in which the spring beard needle has an elongated eye and the loop dividing implement has a point to enter and move along said eye and to pass through the old loop.

14. A knitting machine according to claim 11 in which the loop dividing instrument has a point to enter the old loop and withdraw

the same from the new loop, said instrument also having a surface inclined in respect to the needle stem for receiving and closing the needle beard as said needle retracts, substantially as described.

15. A knitting machine according to claim 11 in which the loop dividing implement has a groove, the bottom of which is at an acute angle to the direction of the retracting movement of the needle to guide and close the needle beard.

16. A knitting organization according to claim 11 in which the said needle works in a groove of a needle bed and the said implement works in the same groove with the needle, and along the front edge thereof.

In testimony whereof I affix my signature.

KENNETH HOWIE.