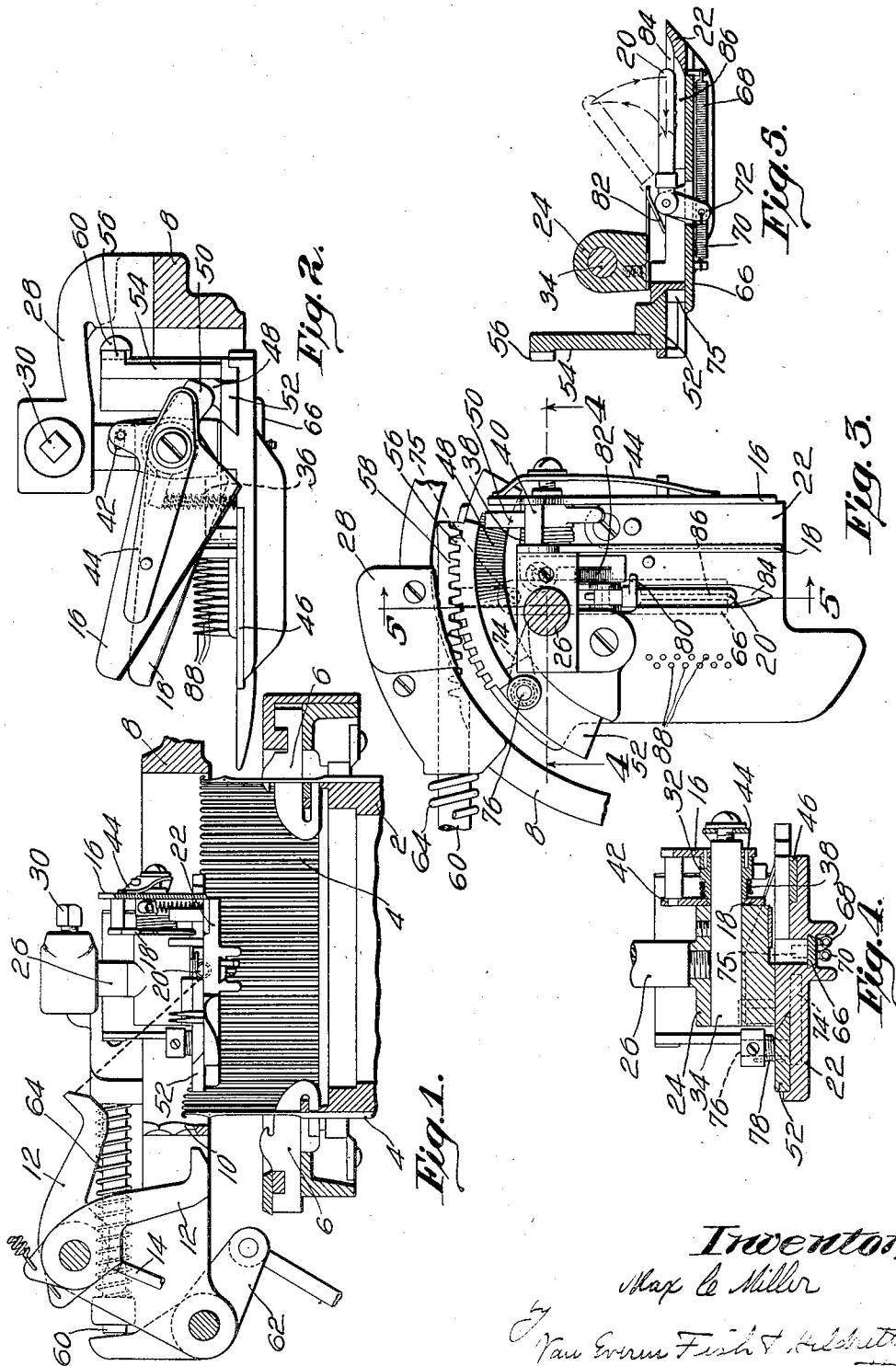


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FEEDING MEANS FOR CIRCULAR KNITTING MACHINES.
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12/20

UNITED STATES PATENT OFFICE.

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FEEDING MEANS FOR CIRCULAR-KNITTING MACHINES.

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To all whom it may concern:

Be it known that I, MAX C. MILLER, a subject of the Emperor of Germany, residing at Cumberland Hill, in the county of Cumberland and State of Rhode Island, have invented certain new and useful Improvements in Feeding Means for Circular-Knitting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to yarn changing mechanism for circular knitting machines such as used in knitting seamless hosiery.

Yarn changing mechanisms of the type to which the invention relates have heretofore been provided with a clamp for holding the idle yarns which is temporarily opened to receive each yarn as it is withdrawn from the needles. The idle yarns are usually held during the opening and closing of the clamp by one or more spring clamping fingers under which each yarn is carried by the rotation of the needle cylinder when the yarn is withdrawn from the needles. Whenever an idle yarn is presented to the needles the waste end leading from the needles to the clamps is drawn about a guide pin and is withdrawn from the clamp by the continued rotation of the needles. In order that the yarns may be drawn under the spring clamp by the rotation of the needle cylinder, the pressure applied by the clamp must be comparatively light, thus rendering its action uncertain and effective. Some of the yarns, in drawing about the guide pins, are also liable to crowd and displace other yarns beneath the clamp, so that they raise the clamp sufficiently to prevent its proper action upon all the yarns.

It is the object of the present invention to eliminate the objectionable features outlined above, and to provide means for insuring the proper holding of the yarns as they are withdrawn and presented to the needles. To this end one feature of the invention contemplates the provision in a yarn changing mechanism of two alternately acting yarn holders, each of which is opened and closed to receive and hold the yarns withdrawn from the needles. A further feature of the invention, which may be combined with the feature outlined above, or

may be used with advantage in connection with the prior spring clamps, comprises a series of guide pins arranged in front of the clamp so that each yarn is withdrawn from the clamp about a guide pin which is so arranged that the yarn does not draw laterally against the other yarns under the clamp, and does not therefore tend to crowd and displace the other yarns.

In addition to the features outlined above, the invention also includes further features of constructions and combinations of parts hereinafter described and referred to in the claims.

The various features of the invention will be readily understood from an inspection of the accompanying drawings and the following detailed description of the mechanism illustrated therein.

In the drawings, Figure 1 is a sectional elevation showing so much of a knitting machine as is necessary to illustrate the application of the present invention thereto; Fig. 2 is an end elevation of the yarn severing and holding mechanism, on a somewhat larger scale, looking toward the left in Fig. 1; Fig. 3 is a plan view of the parts shown in Fig. 2; Fig. 4 is a sectional view on line 4-4, Fig. 3; and Fig. 5 is a sectional view on line 5-5, Fig. 3.

The machine shown in the drawings is provided with a rotary needle cylinder in which the needles are mounted to reciprocate in the usual manner. The machine is provided with web holding sinkers, and the needles and sinkers are operated in the usual manner by suitable cams, pickers and controlling devices which may be of any suitable or well-known construction. The machine is provided with a latch ring, and the yarns used during the knitting are presented to and withdrawn from the needles through a throat formed in the latch ring. The various yarns are carried on a series of yarn carriers, which may be of any suitable construction, and which, as shown, are in the form of pivoted arms operated through rods from a cam drum or other suitable operating mechanism.

The means for severing each yarn withdrawn from the needles by the upward movement of a yarn carrier, and for holding the end of the withdrawn yarn until the yarn is again presented to the needles by the

downward movement of the carrier, comprises a cutter blade 16 and two yarn holding clamps 18 and 20 which clamp the yarns against the upper side of a plate 22. The plate is so arranged within the needles that the yarn withdrawn by the upward movement of the yarn carrier is carried over the plate by the travel of the needles. The cutter is raised, the clamp 18 is opened, and the clamp 20 is closed and is holding the idle yarns when the yarn is withdrawn, so that the yarn passes over the clamp 20 and between the plate 22 and the clamp 18 and cutter 16. The cutter and clamp 18 are then operated to sever and hold the withdrawn yarn, the clamp also clamping and holding the other idle yarns. While the clamp 18 is closed the clamp 20 is withdrawn from under the withdrawn yarn, is raised, then advanced over the yarn, and then closed to clamp and hold this yarn and the other idle yarns. The clamp 18 and cutter may be opened any time before another yarn is withdrawn and carried over the plate 22, and in the construction shown they are both opened immediately after the clamp 20 closes.

The plate 22 is attached to a support 24 on the lower end of a rod 26 which is adjustably secured in the arm of a bracket 28 by a set screw 30. The cutter plate is pinned to the end of a sleeve 32 which is mounted to turn on a stud 34, and is rocked in a direction to raise the cutter by a spring 36. The clamp 18 is pivoted on the sleeve and is connected with the cutter by a spring 38 and a pin 40 projecting from the cutter and engaging a slot 42 in the clamp. A leaf spring 44 holds the parts on the end of the stud and maintains the cutter blade in proper relation to the shear plate 46 on the rear edge of the plate 22. The cutter blade and clamp 18 are closed by a cam 48 arranged to engage an arm 50 on the sleeve 32, and formed on the upper side of a segmental slide 52 which is mounted in a guideway on the plate 22. The slide is provided with a vertical rib 54 having a segmental gear 56 at its upper edge. The gear is engaged by a rack 58 formed on the end of a bar 60 which is advanced by a lever 62 to advance the slide and close the cutter and clamp 18, and is retracted by a spring 64 to open them. The lever may be operated at suitable intervals by cams on the cam drum of the machine, or through any suitable mechanism.

The clamp 20 is in the form of a bar pivoted at its rear end between lugs which project from a slide 66 through a slot in the plate 22. The slide is mounted in a guideway in the under side of the plate, and is held in advanced position by a spring 68. The clamping bar is held in closed clamping position by a spring 70 connected to an arm 72 depending from the bar, and to a pin on

the slide 66. The slide is retracted to withdraw the clamping bar 20 by a cam 74 pivotally mounted on the under side of the segmental slide 52 and arranged to act upon a pin 75 in the rear end of the slide. The cam is formed on the lower end of a pivot pin 76 and is held yieldingly in a position to engage the pin 75 by a spring 78. When the segmental slide is advanced the cam 74 withdraws the bar 20 after the clamp 18 has been closed, and then during the final forward movement of the slide the pin 75 rides off the rear end of the cam, so that the bar is immediately advanced to its forward position by the spring 68 while the clamp 18 is still holding the yarns. When the clamping bar 20 is retracted, a finger 80 which projects laterally from the bar near its rear end passes under an inclined spring cam plate 82, the cam plate springing upward to allow the finger to pass thereunder. When the finger passes beyond the end of the cam plate the cam immediately springs back into its normal position, so that during the forward return movement of the clamping bar the finger rides up the cam plate, thus raising the clamping bar, as indicated in dotted lines in Fig. 5, so that it passes over the withdrawn yarn and over the other idle yarns leading from the clamp 18 to the yarn carriers. As the finger 80 passes beyond the forward end of the cam the bar is closed to clamp the withdrawn yarn and re-clamp the other idle yarns. This occurs while the yarns are still held by the clamp 18, and before the segmental slide 52 is returned to open this clamp and the cutter. When the segmental slide returns the pivot cam 74 rides idly over the pin 76 and snaps back into position to again engage the pin during the next forward movement of the slide. The cam 82 may be shaped to quickly release the clamping bar 20, or to allow it to gradually close during the latter part of its forward movement.

By the action of the two clamps the yarns are firmly held at all times, and the clamps are successively opened and closed to receive each yarn as it is withdrawn, so that the proper positioning of the yarns beneath the clamps is insured.

The clamping bar 20 which operates as the main holder for holding the idle yarns during the knitting is preferably constructed to cooperate with a groove 84 having converging sides against which yarns are deflected and clamped by the sides of the bar. To prevent the accumulation of lint within the groove, which might interfere with the efficient action of the clamp, the plate 22 is provided with a slot 86 extending from the bottom of the groove through the bottom of the plate.

In order that each yarn when presented to the needles may be withdrawn from under

the clamping bar 20 without interfering with or displacing other yarns held thereby, vertical guide pins 88 are arranged in a series extending along the front of and substantially parallel to the bar. These pins are preferably arranged in staggered rows, as indicated, in order that the different yarns may draw about different pins. When a yarn is presented to the needles by the downward movement of one of the yarn carriers, it passes down between two of the guide pins, and as the needles rotate the yarn is drawn from beneath the clamp bar 20 in a direction substantially at right angles to the bar, and does not tend to crowd against and displace the other yarns.

While it is preferred to employ the specific construction and arrangement of parts shown and described, it will be understood that this construction and arrangement is not essential, and may be varied or modified as found desirable or best suited to the construction of the machine in which the invention is to be embodied.

Having explained the nature and object of the invention, and specifically described one form of mechanism in which it may be embodied, what is claimed is:—

1. A knitting machine, having, in combination, means for presenting yarns to and withdrawing them from the needles, two yarn holders for holding the ends of the idle yarns, and mechanism for successively opening the holders to receive the yarns withdrawn from the needles and for closing each holder before the other is opened.

2. A knitting machine, having, in combination, a needle cylinder, a series of yarn carriers, a plate within the needles, two yarn clamps thereon arranged to act on the same yarns, and mechanism for alternately opening and closing the clamps to receive and hold the yarns withdrawn from the needles.

3. A knitting machine, having, in combination, a needle cylinder, a series of yarn carriers, a cutter, a yarn clamp in front of the cutter, mechanism for opening and closing the clamp, a second clamp in front of the first, and mechanism for opening the second clamp after the first is closed and closing it before the first is opened.

4. A knitting machine, having, in combination, a needle cylinder, a series of yarn carriers, a clamp for the yarn within the needles, a second clamp in front of the first over which the yarn withdrawn from the needles passes to the first clamp, and mechanism for withdrawing the second clamp, advancing it over the yarn, and depressing it to clamp the idle yarns, and mechanism for closing the first clamp to hold the idle yarns while released by the second clamp.

5. A knitting machine, having, in com-

bination, a needle cylinder, a series of yarn carriers, a plate within the needles, a cutter, a clamp in front of the cutter, mechanism for opening and closing the clamp and cutter, a second clamp in front of the first, and means for retracting the second clamp, raising, advancing and re-closing it while the first clamp is closed.

6. A knitting machine, having, in combination, a needle cylinder, a series of yarn carriers, a plate within the needles over which the withdrawn yarns are carried by the travel of the needles and provided with a groove in its upper side having converging sides, a clamp bar engaging the opposite sides of the groove, means for opening and closing the clamp, and means for holding the idle yarns while the clamp is opened.

7. A knitting machine, having, in combination, a needle cylinder, a series of yarn carriers, a plate within the needles over which the withdrawn yarns are carried by the travel of the needles and provided with a groove in its upper side having converging sides, a clamp bar engaging the opposite sides of the groove, a slot at the bottom of the groove passing through the plate, means for opening and closing the clamp, and means for holding the idle yarns while the clamp is opened.

8. A knitting machine, having, in combination, a needle cylinder, a series of yarn carriers, a plate within the needles over which the withdrawn yarns are carried by the travel of the needles, a cutter blade, a clamp connected to move with the blade, a cam slide on the plate provided with a cam for opening and closing the cutter and clamp, a second clamp in front of the first, a slide to which the clamp is pivoted, a cam on the cam slide for retracting the clamp slide, a spring for returning the slide, and a cam for raising the clamp during the advance of its slide.

9. A knitting machine, having, in combination, means for presenting yarns to and withdrawing them from the needles, a clamp for holding the idle yarns, and a plurality of guide pins arranged in a series in front of the clamp to prevent the displacing of idle yarns by the withdrawal of an active yarn from the clamp.

10. A knitting machine, having, in combination, means for presenting yarns to and withdrawing them from the needles, a clamp for holding the idle yarns within the needles, and a series of guide pins in front of the clamp about different ones of which different yarns when presented to the needles may draw in a direction substantially at right angles to the bar.

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