

No. 654,982.

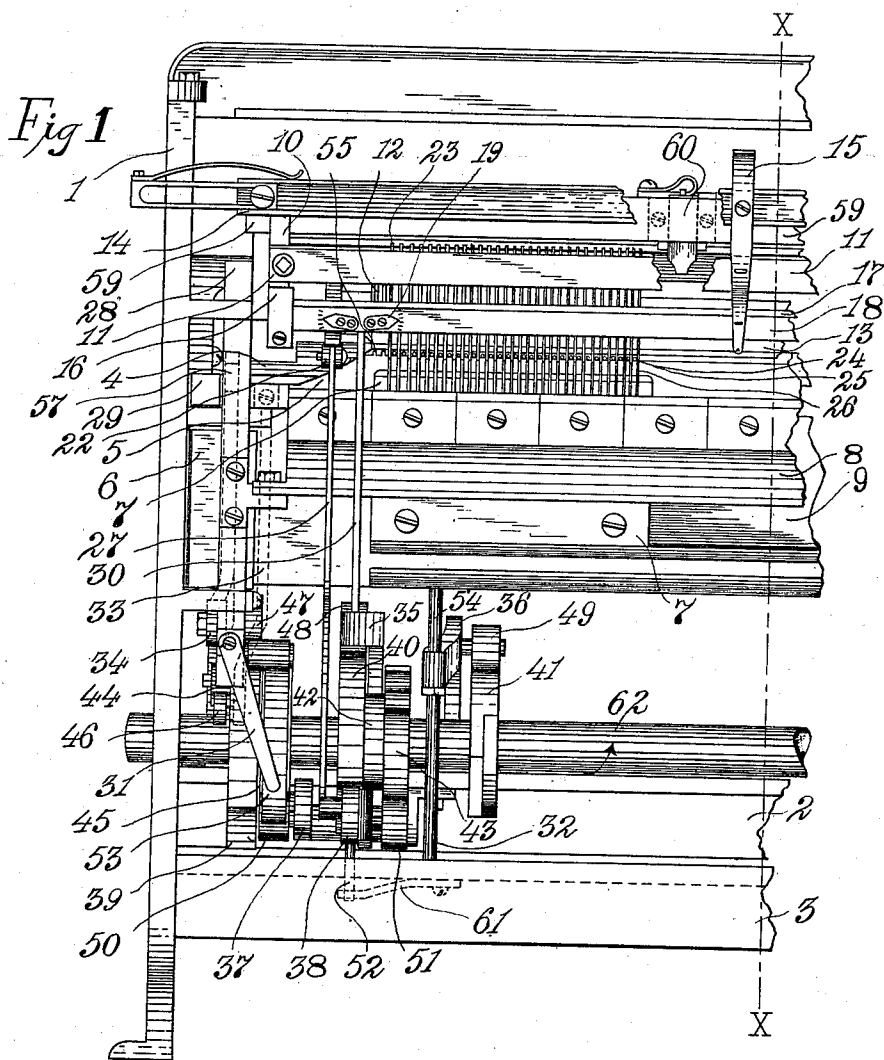
Patented July 31, 1900.

D. HURLEY & W. T. BARRATT.
STRAIGHT RIB KNITTING MACHINE.

(No Model.)

(Application filed Dec. 30, 1899.)

4 Sheets—Sheet 1.



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Chas. H. Baker

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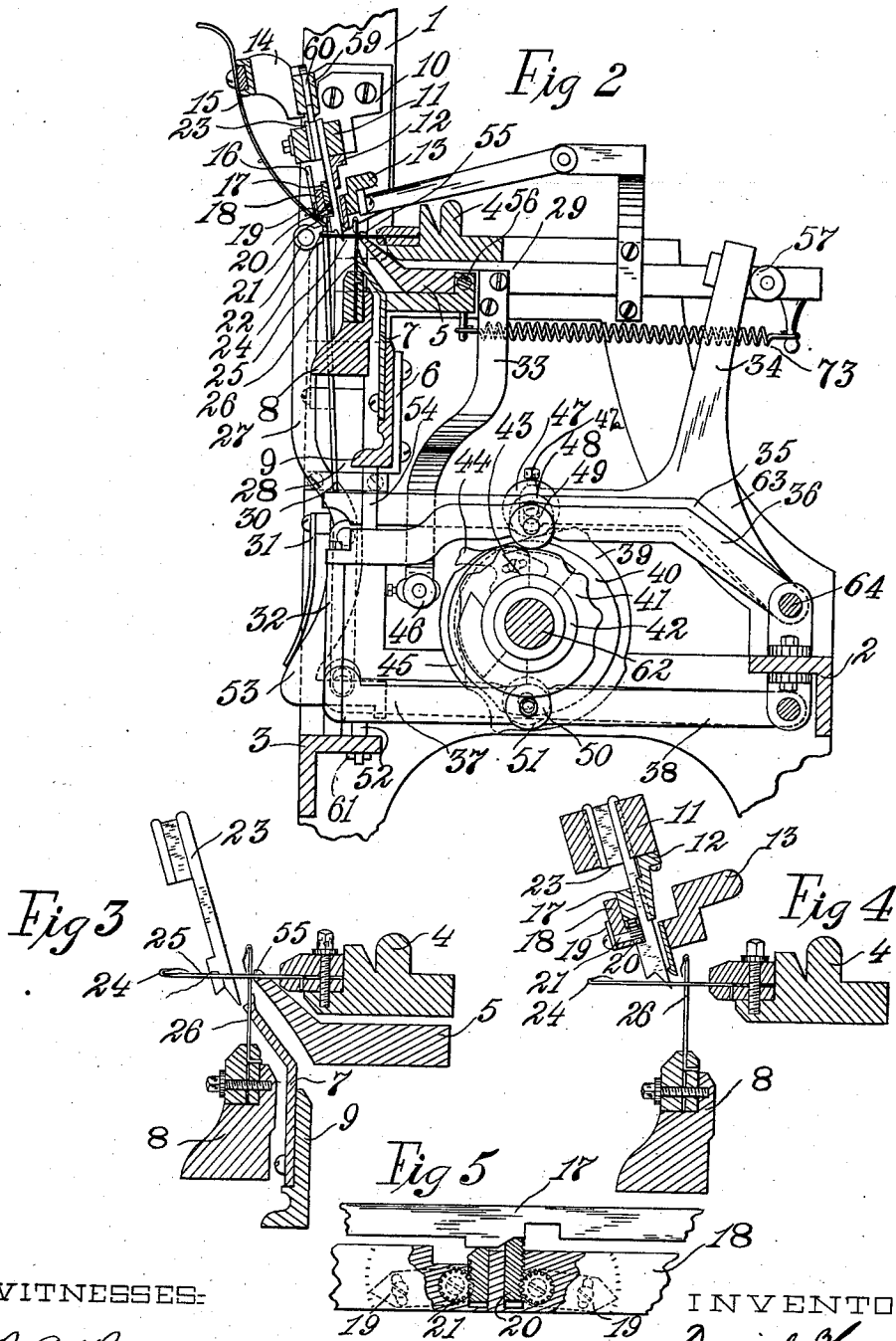
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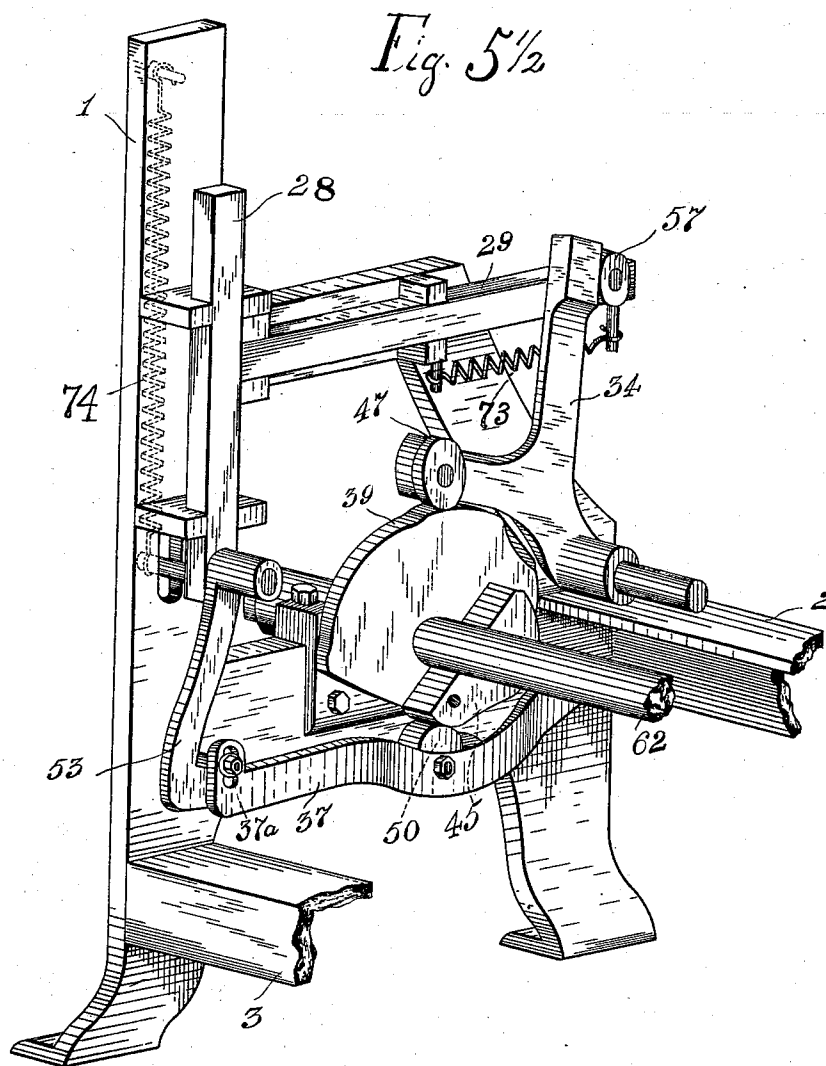
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4 Sheets—Sheet 3.



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4 Sheets—Sheet 4.

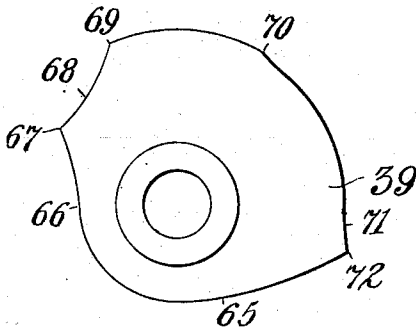


Fig. 6

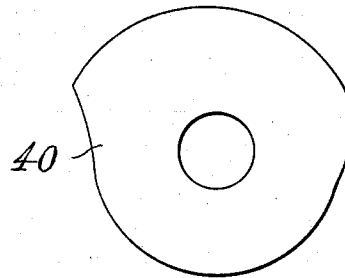


Fig. 7

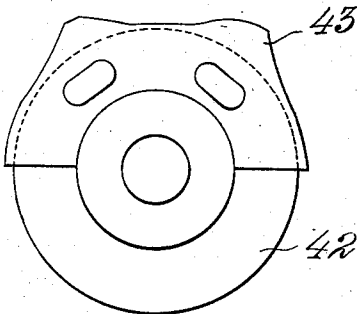


Fig. 8

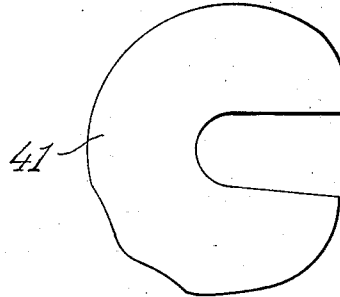


Fig. 9

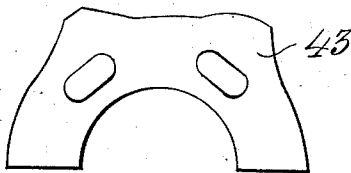


Fig. 10

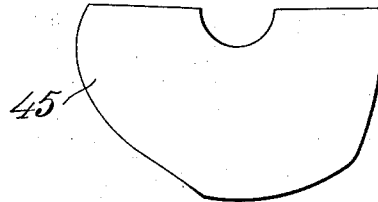


Fig. 11

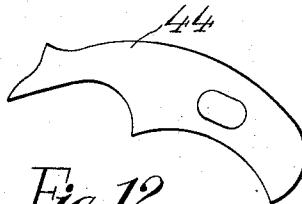


Fig. 12

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UNITED STATES PATENT OFFICE.

DANIEL HURLEY AND WILLIAM T. BARRATT, OF BENNINGTON, VERMONT,
ASSIGNORS TO CHARLES COOPER, OF SAME PLACE.

STRAIGHT-RIB-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,982, dated July 31, 1900.

Application filed December 30, 1899. Serial No. 742,150. (No model.)

To all whom it may concern:

Be it known that we, DANIEL HURLEY and WILLIAM T. BARRATT, citizens of the United States, residing at Bennington, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Straight-Rib-Knitting Machines; and we 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, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to straight-rib-knitting machines, and has for its object to so construct certain parts of the machine that the same machine may be used to knit fabrics of a different gage or weight, or, in other words, to enable us to use yarns of greatly-varying gage or weight with the same needles, it only being necessary to lengthen or shorten the stitch, as the case may be.

Referring to the drawings, Figure 1 is a front elevation of a portion of a straight-rib-knitting machine embodying our improvements. Fig. 2 is a vertical transverse section on the line *xx* of Fig. 1. Figs. 3 and 4 are sectional details on enlarged scale, showing the sinkers in different positions. Fig. 5 is a view, partly in section, showing the adjusting devices for the falling bars. Fig. 5½ is a perspective view showing means for actuating the front needle-bar slide. Figs. 6 to 12, inclusive, are face views of the various cams used to operate parts of the machine.

Like figures of reference refer to corresponding parts in each figure of the drawings.

We will first briefly describe the parts of the machine which are of usual construction and the operation of which is well understood by those skilled in the art to which this invention belongs.

1 indicates the frame of the machine, having the front rail 3 and the back rail 2, upon which many of the parts of the machine are supported. The back needle-bar is indicated by 4 and carries the back needles 25, the heads of these needles being indicated by 24. The front needle-bar 8 carries the front needles 26, and it is of course understood that

the front and back needle-bars are supported to respectively reciprocate horizontally and vertically, they being connected to slides 28 and 29.

10 represents a casting which holds the sinker-bars 11, and 12 is the sinker-support bar, the sinkers being indicated by 23. The inside falling bar 17, which limits the downward movement of the sinkers, is adjustable vertically by means of rack-pins 20, mounted in the outside falling bar 18, said pins being actuated by pinions 21, the latter being operated by the latches 19, which may be locked in the desired position in any approved manner. The falling bar 18 is supported and guided by caps 16. The sinkers are pushed down until they engage the falling bar 17 by the slur-cock 60, which is mounted on the bar 59, and the falling bars are raised to return the sinkers to their normal position by means of a cam 40, which engages a truck 48 on a lever 35, the latter being connected to the falling bar 18 by a rod 30. The thread-carrier needle is indicated by 15, and it slides upon a bar 14 and lays the thread upon the back needles in position to be sunk between the needles by the sinkers to form loops.

The presser-bar is indicated by 13 and is connected to the presser-lever 38 through the medium of arms 22 and 27. The cam 43 is attached to a blank 42, the latter being mounted on the driving-shaft 62. The lever 38 is provided with a laterally-extending stud, on which a truck or roller 51 is journaled, and this truck is held in position to be engaged by the cam 43 by a flat spring 61, which engages a pin 52, projecting from the lever.

The front needle-bar slide 28 is connected to a small link 53, which is adjustably connected to a pivoted lever 37, as indicated at 37^a in Fig. 5½, and this latter lever is actuated by a cam 45, which engages a truck 50, pivoted on the lever. As the cam 45 passes off the truck 50 a coil-spring 74 (shown in dotted lines in Fig. 5½) draws the slide 28 upward into its normal position. A spring 31 holds lever 53 in engagement with lever 37.

The front knocking-over bar 9 slides in a box 6 and carries a knocking-over plate 7. This bar 9 engages a pin 54, projecting from a pivoted lever 36, and the latter carries a

roller 49, which is engaged by a cam 41. The free end of the lever 36 is limited in its downward movement by a rod 32, with which it is adapted to engage.

5 All the parts heretofore described are of ordinary construction and form no part of our present invention.

In order to carry out our present invention, it is necessary to move the back-bar needles to almost their extreme rearward position before the stitches are cast off from the front-bar needles, and subsequently it is necessary to slightly elevate the heads of the back-bar needles in order that they may move to their forward position without interfering with the stitches on the front-bar needles. The back knocking-over bar is indicated by 5 and is provided at its edge with grooves 55, in which the needles rest and by which they are guided. 15 As shown, the bar 5 is supported on trunnions 56 near its rear end, and to the rear of these trunnions a depending arm 33 is connected to the bar and provided at its lower end with a roller 46, with which a cam 44 is adapted to engage. This engagement will move the lower end of the arm forward, and thus elevate the forward edge of the bar 5, and consequently lift the needles 25, which rest upon it. The slide 29, to which the back needle-bar 4 is connected, is provided with a roller 57, with which the upwardly-projecting arm 34 of a lever 63 engages to reciprocate the needle-bar. The lever 63 is pivoted at its rear end on a shaft 64 and its forward end carries a roller 47, which rests upon a cam 39, mounted upon the shaft 62. The connection between the lever 63 and the roller 47 may be adjusted by a set-screw 47^a in order that the free end of the lever 63 may be raised or lowered relatively to the roller. The normal tendency of the front end of the lever is to drop, and thereby move the upper end of its arm 34 forward. The several cams being so mounted as to actuate the parts they control at the proper times, the operation of the machine will be as follows: Assuming there are a series of loops on the back-bar needles 25 from the fabric already knitted and that these needles are in their extreme forward position and that the front needles 26 are in their highest position crossing the needles 25 at a right angle with the beards standing toward each other, the thread-carrier 15 will then move across and lay the yarn on the back needles 25, followed by the slur-cock 60 pushing the sinkers 23 down on the falling bar 17 and sinking the yarn down between the needles 25. During this operation that part of cam 39 of least diameter from 65 to 66 will have been engaged with the roller 47 and the needle-bar 4 will have remained practically stationary in its extreme forward position. From this point 66 the diameter of the cam gradually increases to the point 67 and will operate the lever 63 and cause it to retract the needle-bar 4 and the needles 25 until the loops are under the beards of the

needles. Then the presser-bar 13 is moved down to force down the beards of the needles 25 so that their points will go under the old loops, and temporarily the needles 25 will be at rest while the presser-bar is moving into engagement with them, this rest being permitted by the cam 39 being inoperative on the lever in moving from points 67 to 68. From points 68 to 69, however, it again becomes operative and acts on the lever 63 to force the needle-bar 4 back to its extreme rearward position, and in this movement the new loops will be caused to move out into the heads of the needles 25 by engagement with the sinkers and then drawn through the old loops, and the latter will be cast off the needles 25, the sinkers in the meantime having been lifted just before the new loops were drawn through the old ones. In nearly all the old construction of machines the needles 25 would immediately be returned to their forward position, thereby moving through the new loops until the latter hung upon them where the wire is of much larger diameter than it is beneath the beard, and the stitches on the front needles 26 would then be cast off. It is at this point that our improvement begins, for it will be seen that the cam 39 has its greatest diameter from the points 69 to 70, and while this part is moving against the roller 47 the needle-bar 4 will be maintained in its extreme rearward position, then from the points 70 to 71 the needle-bar 4 will move forward very slightly, and from 71 to 72 it will again move to its extreme rearward position, and during all this time the new loops will be in the heads of the needles below the beards. During the movement of the cam 39 from the points 69 to 71 the proper cams will have operated to actuate the presser to force down the beards of the front needles 26, to move such needles down to cast off the old stitches and take up the new ones, and then return the needles to their highest position. Immediately after the needles are at their highest position the portion of the cam 39 from 71 to 72 will operate to give the bar 4 a slight backward movement, which will tighten the stitches, and then in the movement of the cam 39 from 72 to 65 the bar 4 will again move forward to its extreme forward position ready for the next course, it being impelled by the spring 73. Just as the point 72 of the cam 39 moves off the roller 47 the cam 44 will engage the roller 46 and actuate the arm 33 to tilt the knocking-over bar 5, and thereby elevate the front ends of the needles 25, so that in moving forward they will not interfere with the stitches on the needles 26, and as soon as the front ends of the needles 25 have passed forward sufficiently to clear the needles 26 and the yarn thereon the knocking-over bar 5 will resume its normal position and permit the needles 25 to resume their position. By this mode of operation we are able to use the same machine and the same needles therein to knit

fabrics of widely-varying weights, running from the lightest the machine can knit to a fabric as heavy as can be made, and to accomplish this it is only necessary to adjust the length of the stitches by raising the inside falling bar 17 by means of the latch 19, and also adjusting the connection between the lever 37 and the lever 53, which regulates the movement of the front needle-bar 8, and the connection between the lever 63 and roller 47, which governs the movement of the back needle-bar 4, to make the extent of movements of the needle-bars suitable to the length of stitch.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a straight-rib-knitting machine, the combination with the front and back needles, of mechanism to hold the back needles in their extreme or nearly extreme backward position until after the stitches have been cast off the front needles and the latter returned to their highest position, and mechanism to elevate the front ends of the back needles to carry them over the stitches on the front needles, as and for the purpose set forth.

2. In a straight-rib-knitting machine, the combination with the front and back needles, of means to lay the new loops in the heads of the back needles beneath their beards, means

to retract and hold the back needles in their extreme or nearly extreme backward position, with the new loops hanging from their heads beneath their beards, during the period necessary to cast off the stitches from the front needles and return the latter needles to their highest position, and means to elevate the front ends of the back needles to carry them over the stitches on the front needles, as and for the purpose set forth.

3. In a straight-rib-knitting machine, the combination with the front and back needles, and mechanism to hold the back needles in approximately their extreme backward position until after the stitches have been cast off the front needles and the latter elevated, of a bar 5 on the front edge of which the back needles rest, said bar being supported on trunnions, a depending arm connected to the rear end of said bar, and a cam to intermittently engage the lower end of said bar and thereby elevate the heads of the back needles as they return to their forward position, substantially as set forth.

In testimony whereof we have signed our names in presence of two witnesses.

DANIEL HURLEY.

WILLIAM T. BARRATT.

Witnesses:

CHARLES S. KEHOE,

LOUIS L. TIFFANY.