

UNITED STATES PATENT OFFICE.

WILLIAM H. H. HOLLEN, OF FOSTORIA, PENNSYLVANIA.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 124,357, dated March 5, 1872.

Specification describing certain Improvements in Rotary Knitting-Machines, invented by WILLIAM H. H. HOLLEN, of Fostoria, in the county of Blair and State of Pennsylvania.

The first part of my invention relates to the construction and arrangement of a rotary cam fixed on the driving-shaft, two vibrating levers, a slotted guide-plate, a thread-carrier, a spring, and inclined plane, in relation to a horizontal rotary needle-carrying cylinder, in such manner, as hereinafter described and set forth, that, during each complete rotary motion of the cam, the needle-carrying cylinder will be periodicaly moved by one of the vibrative levers, depressing the spring, and thus causing it to slide upon the plane into contact with one of the teeth of the needle-cylinder, and move the latter forward sufficiently to bring the nearest-approached needle directly opposite the open end of the slot in the plate, when the other vibrative lever will then be caused, first, to thrust the said needle forward to receive the thread from the carrier then moved for the purpose by the said cam, and, second, to draw the same needle back or inward to form the stitch in the stocking fabric (not shown) on the cylinder; the object of this part of my invention being the production of a more simple, compact, and reliable knitting-machine for domestic or family use. The second part of my invention relates to the construction and arrangement of a tilting double inclined plane, provided with two arms, extending in opposite directions diagonally across the needle-cylinder, so that said plane may be tilted alternately right and left by two respective needles to be drawn forward by hand at any required distance from the said arms, respectively, for the purpose, in such a manner as to cause the said inclined planes to guide the spring either to the one or the other side of the nearest tooth of the carrying-cylinder, to give the latter the right or left rotary motion required for knitting the heel of a stocking without changing the direction of the rotary motion of the cam which operates the whole machine; the object of this part of my invention being to simplify and render more reliable the devices for giving the alternating rotary motions required in the cylinder while knitting the fabric for the heel of the stocking.

Figure 1 is a left-hand-side elevation of a ro-

tary knitting-machine embodying my invention, the covering-plate of the case being removed for the purpose of disclosing the whole of the cam and levers. Fig. 2 is a sectional plan view, showing the slotted plate, thread-carrier, spring, arms of the double inclined plane, lower ends of the levers, and the needle-carrying cylinder in their relative positions. Fig. 3 is a front view of the double inclined plane, with its arms, as applied to the rear part of the main frame of the machine, detached.

A is a metal case, which covers from dust, &c., the needle-moving lever B, the spring-moving lever C, and the cam D. The said case A is supported upon the rear part of the frame *a'* in an upright longitudinal position directly over and out of contact with the needle-cylinder E below. The guide-plate F is secured to the front edge of the case A, and extends backward directly over the needle-cylinder E, and parallel to, but not in contact with, the needles below it. Its inner end has an open slot, *f'*, into and out of which the radially-bent rear ends of the needles are successively moved by means of the bifurcate lower end of the lever B. The lower end of the front branch *b'* has a flat foot, *b''*, extending across the slot *f'*, and the other branch *b'''* also has a foot, *b'''*, which is concave in front, and extends across the said slot. The lever B turns upon a fulcrum-pin, 5, and has an arm, 6, projecting forward and downward. The cam D operates the lever B by coming successively in contact with two friction-rollers, 7 and 8, (see dotted lines, Fig. 1,) attached to the right-hand side of the lever B. The cam D has three equal concave edge-faces, *d'*, and three convex equidistant edge-toes, *d''*, and has its supporting-shaft fixed in its center. The thread-carrier G is a spring-lever, one end of which is fixed on the back part of the frame *a'*, and is guided and prevented from rising too high by a bridle, *g'*, and has a horizontal arm, *g''*, whereby it is periodically depressed by the successive action of the three toes *d''* of the rotary cam D, and thus the thread-carrier is moved up and down, so as to carry the thread (not shown) around the projecting needle *e'*. The lever C is of the first class, has its fulcrum-pin *c'* near the middle of its length, and is arranged in a slanting direction above the needle-cylinder, and has a lateral projection, *c''*, at its lower end, which rests across

upon the spring H, the rear end of which latter is fixed to the frame *a'*, while its forward end extends freely just across the line of teeth *e''* of the needle-cylinder E, so that the said end of spring H can be depressed between the teeth by the pressure upon it of the lever C, and will spring up from between any two of the line of teeth *e''* when the pressure of the lever C is removed. The lever C is operated by means of three equidistant friction-rollers, *g*, (see dotted lines, Fig. 1,) on the right-hand side of the cam D. The tilting double inclined plane I is formed on the upper end of a flat bar, *i'*, (see Fig. 3,) the lower end of which bar is pivoted to the frame *a'* at a point between the latter and the rear end of the cylinder E, with its two arms *i''* extending upward and in diagonal directions forward to the right and left, respectively, over the rear end of said cylinder. (See Fig. 2.) The cylinder E rotates upon a horizontal axis, 10, the rear end of which latter is fixed in the frame. (See Figs. 1 and 3.)

The operation of the machine is as follows, viz.: Rotary motion being given to the cam D in the direction of the arrows thereon, the toe nearest to the arm 6 of lever B comes in contact with the friction-roller 7, raises the arm, and thus causes the foot 4 of the rear branch *b'''* to come in contact with the radial end of the nearest needle *e'* and push it into the slot of the plate F, consequently thrusting the hook of the needle outward in front of the cylinder E, when, immediately afterward, and as the needle is drawn back, the preceding toe of the cam depresses the spring thread-carrier G, and, passing it, the said carrier rises, and thus completes the act of threading the needle. The first-mentioned toe of the cam D, having come in contact with the friction-roller 8, forces the lever B backward, and consequently the foot *b''* of the front branch *b'* of said lever pushes the needle *e'* back to its normal position, thus completing the stitch in the fabric. (Not shown.) Of the three friction-rollers on the cam D, the one which is nearest to the upper end of lever C (see dotted line, Fig. 1) now comes in contact with and raises said upper end of lever C, causing its lower end to depress the spring H down between the two nearest of the teeth *e''*, and at the same time down that side which is

directly under it of the double inclined plane I, causing the cylinder to rotate sufficiently to bring the next succeeding needle into position for a like subsequent movement, and so on during the process of knitting continuously around the fabric. When the part for the heel of the stocking (not shown) is to be knit, two needles, *e''' e''*, are to be pulled forward by hand, one on each side of the case A, so as to leave a space between them equal to the intended width of said part of the stocking, and so far also as to cause the radial rear end of each of said two needles to come alternately in contact with the respective projecting arms *i'' i''* of the tilting double inclined plane I, as the cylinder rotates in either direction. Now, as the cylinder E is rotated, the radial rear end of the needle which is approaching comes in contact with the arm *i'''* on that side of the tilting double-inclined plane I, tilts the plane, and thus causes the spring H to move the cylinder E around in the opposite direction until the radial rear end of the projecting needle *e'''* comes in contact with the other arm *i'''* and tilts the plane back again, and so on until the heel part of the fabric is finished.

The guards V V (see Fig. 2) prevent any of the other needles from accidentally slipping out far enough to tilt the plane I.

I claim as my invention—

1. The cam D, vibrative levers B and C, slotted guide-plate F, thread-carrier G, spring H, and plate I, the said mechanical devices being constructed and arranged to operate, in relation to the needle-carrying cylinder E, substantially as and for the purposes hereinbefore set forth.
2. The combination, with the needle-cylinder E, of the tilting double inclined plate I, provided with the arms *i'' i''*, arranged, as described, so as to be operated upon alternately by the radial rear ends of any two of the needles, which may be drawn forward by the attendant for the purpose of reversing the motion of the said cylinder for knitting a flat web, substantially as set forth.

W. H. H. HOLLEN.

Witnesses:

AMBROSE McMULLEN,
S. S. RAMSEY.