(No Model.)

J. W. RIST.

KNITTING MACHINE CAM.

No. 244,079. Patented July 12, 1881.

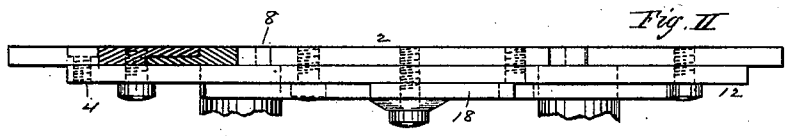


Fig. II

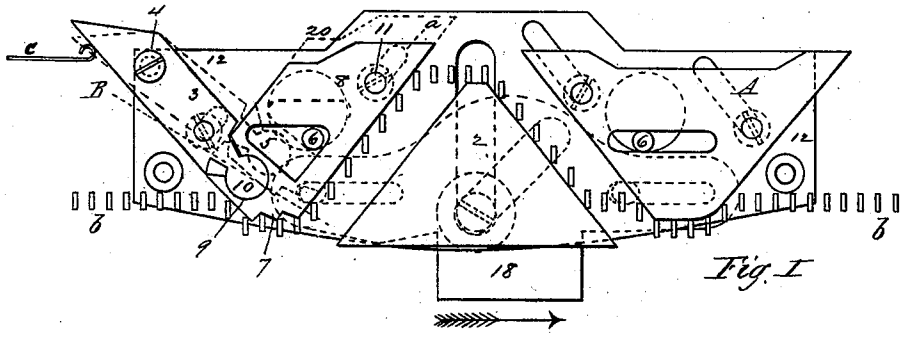


Fig. I

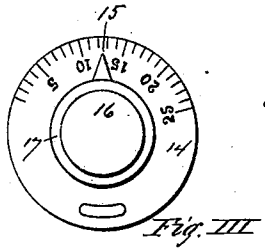


Fig. III

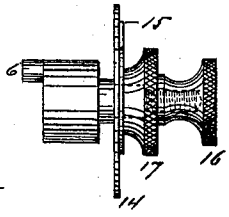


Fig. V

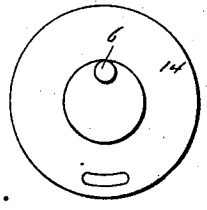


Fig. IV

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UNITED STATES PATENT OFFICE.

JOEL W. RIST, OF CHICOPEE FALLS, MASSACHUSETTS.

KNITTING-MACHINE CAM.

SPECIFICATION forming part of Letters Patent No. 244,079, dated July 12, 1881.

Application filed May 2, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOEL W. RIST, of Chicopee Falls, in the county of Hampden and State of Massachusetts, have invented a new and useful Improvement in Knitting-Machine Cams, of which the following is a full, clear, and exact specification and description, reference being had to the accompanying drawings, making a part of this specification.

The object of my invention is to prevent the needles in a knitting-machine from being forced down below their normal position which they usually occupy after the stitches have been formed thereon by the advance cam in each movement of the carriage to and fro, which downward movement of the needles causes a "drag" or unnecessary strain upon the yarn, and also causes an additional and useless friction of the parts in the ordinary machines; and I accomplish this by the mechanism and in the manner substantially as hereinafter described, the needles themselves, in the operation of knitting, being the primary means used in accomplishing the desired result.

Figure I is a reverse plan view of the plate and lock of a straight-knitting machine having my invention applied at one end. Fig. II is a lower edge view of the same with relief-cam in section at line B. Fig. III is a plan view of the index and fastening-nut connected with the eccentric and stud. Fig. IV is a reverse plan view, showing the eccentric and stud used in the ordinary machine, and Fig. V is a side view of the same.

My invention relates to that class of knitting-machines which is provided with a lock-plate, to which are secured actuating-cams adapted to operate in the plane of the face of the plate, and acting against the shanks of a series of needles to slide them up and down in the grooves. These cams have heretofore been three in number on each plate—a central elevating-cam, 2, of a general triangular shape and with the apex upward, and two depressing or wing cams similar to that shown at A, one each side the elevating-cam 2 and with their small ends downward. The cam 2 acts at each reciprocating movement of the carriage to raise the needles; but the other cams depress them, the cam A, when the movement of the carriage is in the direction of the arrow, acting against the shanks of the needles to draw them down, and the corresponding cam, on the opposite side of the cam 2, operating to draw the needles down when the carriage is moving in the opposite direction.

In the ordinary machines of this class the cams A, one each side the elevating-cam 2, are just alike and act alternately, the rear cam, in each movement of the carriage, operating to depress the needles. In either movement of the carriage the advance cam is the idle one, and the other or rear cam is the active one. Ordinarily the depressing-cams are secured in position at the same height, and in the operation of knitting the needle-shanks are consequently compelled to pass down beneath the forward or idle cam to the same extent that they are forced down by the rear and active cam. The elasticity of the yarn, after the stitches have been formed, has the effect to hold the shanks of the needles in a position a little elevated above the lower ends of the cams A, as shown at *b* in Fig. I.

I have shown but one of the ordinary depressing-cams A in the illustration or drawings, (which have always been arranged to slide bodily up and down on the plate,) because the use of my invention is intended to dispense entirely with this description of bodily-sliding cam, either at one or both ends of the lock-plate, so that the ordinary depressing-cam A is shown on one side of the elevating-cam 2 and my invention shown on the other, although the latter is as practicable when used at both ends of the lock-plate as at one end only.

In the drawings, 12 denotes the lock-plate of an ordinary straight-knitting machine of this class, and 2 denotes the elevating-cam, or cam which raises the needles by operating against the shanks, and arranged in the ordinary manner.

A denotes the ordinary depressing-cam, as before mentioned, and held in any desired position by the stud or crank-pin 6, extending through the lock-plate and into a horizontal slot in the cam.

8 denotes a cam made according to my invention, which is secured to the lock-plate 12, with its lower edge parallel with the adjacent edge of the elevating-cam 2, and so as to slide

on the lock-plate with its lower edge always in substantially that position, by means of a stud or pivot, 11, moving in a slot in the lock-plate, as shown in dotted lines at *a*, and with its lower portion hinged or connected with the lower end of an arm, 3, pivoted at its upper end to the lock-plate, as at 4.

The extreme lower end of the cam 8 may have one or more notches, as 7, made therein, and the cam is provided with an opening, as 5, into which the crank-pin 6 projects, so that when said crank-pin is turned into the proper positions the sliding motion of the cam 8 and the pivoted arm 3 will be limited more or less, as desired. By turning the crank-pin into proper position the said cam 8 may be fixed in a position with its upper end as shown in dotted lines at 20, and by turning the crank-pin 6 more or less downward the cam will be permitted to move downward more or less in the direction of its length.

A dial, 14, may surround the short shaft, upon the end of which the crank-pin is made, and may be secured in any desired position to the outside of the carriage by a screw inserted through a slot therein, with an index, 15, and knob 17, by which to turn the crank-pin and index into any desired relative position with the scale on the dial 14.

A check-nut, 16, turned upon the outer end of the shaft and firmly against the knob 17, secures the crank-pin and index in any desired position into which it may be turned.

A spring, *c*, attached to the carriage and bearing against the cam, may be made to assist, if need be, in causing a quicker downward movement of the cam, although this is not essential to the practical and successful operation of the machine.

The lower end of the pivoted arm 3 may be connected with the cam 8 in any desired manner.

In the drawings a circular recess, 9, is made in the cam, with a correspondingly-shaped tongue on the lower end of the arm to engage in said recess; but the lower end of the pivoted arm 3 may be connected with the lower part of the cam 8 in any other desired manner, so long as the two are connected together in such a manner that the cam and its pivoted arm will be moved down by the pressure of the needle-shanks against its side when the carriage is passing in one direction, (indicated by the arrow;) or both may be moved up by the pressure of the needle-shanks against its lower end when moving in the opposite direction.

The operation of my invention is as follows: When the carriage is moving in the direction indicated by the arrow in Fig. I, the needles, having stitches thereon, occupy a position shown by their shanks at *b*, and in machines in which the cam A is used the needles are drawn still farther down by the cam A, which is in advance in the movement of the carriage. As the elevating-cam 2 passes in contact with the needle-shanks these are thrown upward to pass the apex, and then, as they strike the inclined edge of the cam 8, they are thrown down again by contact with the edge of said cam, this contact also moving the said cam 8 downward into its lowest position, the needle-shanks being thus compelled to pass below and around the lower end of said cam, and thus giving the yarn the desired and proper tension in forming the stitches, until said cam has passed all the needles set for knitting. The elasticity of the yarn draws the needles upward, after the cam has passed, into the position shown at *b*, in rear of the arrow, which is the normal position of the needles when the knitting is finished; and when the movement of the carriage is reversed the shanks of the needles strike against the lower end of the cam 8 and move the latter upward into the position shown in dotted lines, so that the needles are not drawn down, as was the case by their contact with the lower end of the cam A in the other and opposite movement of the carriage; and the needles are, by the use of this cam 8 and arm 3, connected therewith, entirely relieved of the useless drag, and unnecessary strain upon the yarn is entirely avoided, the cam 8 being converted into a relief-cam to relieve the machine of its friction and wear of its parts, occasioned by the drag upon the needles, and the frequent breakage of the yarn. This arrangement of relief-cam 8 is intended to take the place of the cam A, either at one or both ends of the lock-plate, as desired; but it will be found most advantageous to use the relief-cam at one end of the lock-plate and the ordinary cam A at the other end in practicing the ordinary styles of knitting. This dragging down of the needles has heretofore been avoided by making the cam A at each end of the carriage movable, with an attachment connected therewith which would strike against a stop fixed to the end of the machine at each alternate movement of the carriage—that is to say, the stop is attached to the stationary part of the machine, at each end, and when the carriage is moved in either direction to the end of the machine the cam attachment strikes against the stop and the cam is thereby shifted, and the advance cam is moved up sufficiently to allow the shanks of the needles to pass beneath without drawing them down, and thereby avoiding the straining of the yarn. These methods, however, of alternately changing the cams automatically by the movement of the carriage and stops connected therewith are very undesirable, owing to the fact that the mechanism for accomplishing the result is too complicated, requiring a great number of parts necessarily somewhat delicate, and are therefore extremely liable to be broken and to become deranged in the practical working of the machine.

In the machines having the attachment just described the jar resulting from the striking of the cam attachment against the stop at the end of the machine at each movement or each

alternate movement of the carriage is also a very undesirable and unfavorable feature in the machine.

It will readily be seen by reference to the illustration that by simply substituting the cam 8 and the pivoted arm 3 in place of the ordinary triangular cam A no appliances are necessary to operate the cam 8, as the needles themselves operate it by their ordinary movements in knitting, and the invention is therefore entirely free from the objection of complication and consequent liability to get out of order.

As the needle-shanks pass down in contact with the lower edge of the cam 8 and strike against the shoulders 7 in the lower end of said cam, the horizontal pressure of the needle-shanks against said shoulders assists in holding or retaining the cam in its lowest position until all said shanks have passed its lower end.

Having thus described my invention, what I claim as new is—

The combination, with the lock-plate of a knitting-machine, of a relief-cam pivoted to said lock-plate, and having a sliding connection therewith, a vibrating arm pivoted to said lock-plate and connected with said relief-cam, and the needles, whereby the said cam is moved and held down by the action of the needle-shanks against it when moving in one direction, and is moved and held up by the action of the needle-shanks against the vibrating arm when moving in the opposite direction, substantially as described.

JOEL W. RIST.

Witnesses:
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