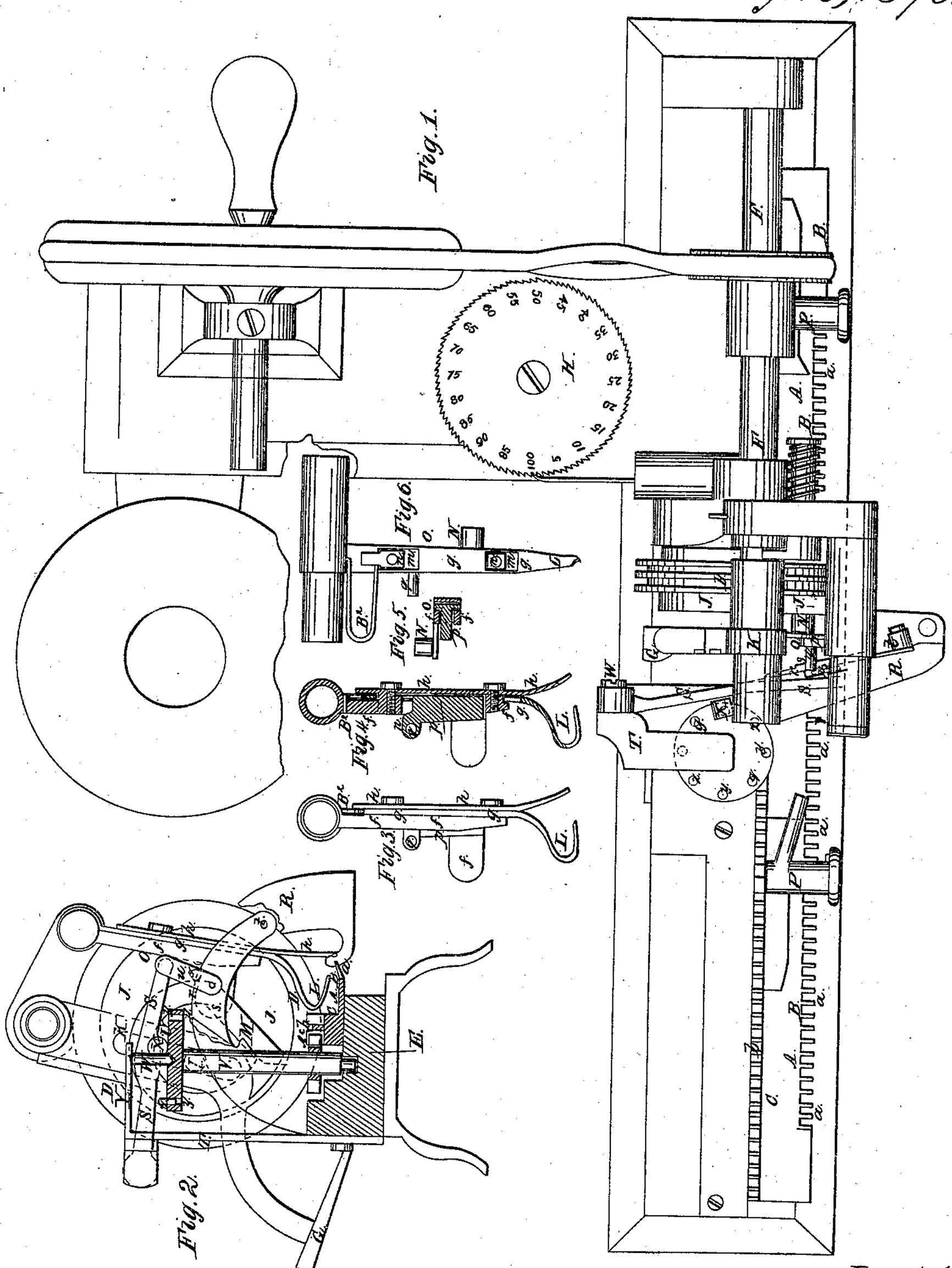
E. Morse.

Straight Knitting Mach.

No. 106,499. Patented Aug. 10, 1870.



Witnesses.
John C. Hazell
A. E. Fisher

Inventor.
Edward Morse
per
Brown Brothers
Attorneys.

UNITED STATES PATENT OFFICE.

EDWARD MORSE, OF WINCHENDON, MASSACHUSETTS, ASSIGNOR TO HINKLEY KNITTING-MACHINE COMPANY.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. **106,499**, dated August 16, 1870.

To all persons to whom these presents shall come:

Be it known that I, EDWARD MORSE, of Winchendon, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Knitting-Machines; and that the following is a full and exact description of the same, reference being had to the accompanying drawing.

This invention relates more particularly to the "Hinkley Family Knitting-Machine," so called.

The object of the invention is to adapt the machine to knit ribbed fabrics; and for this purpose the invention consists in arranging the looper employed in said machine for carrying the loops from the knitting-needle to and placing them on and over the teeth of the comb, the one after the other, to be moved up and down at stated stitches in the successive rows of stitches knit by the machine, so that in the operation of the needle at such stated stitches it (the looper) will not take a loop from the needle, but will allow the yarn to be carried back by the needle as the needle moves back under the comb, thereby dropping a stitch and producing a fabric ribbed in and between said dropped stitches.

This invention consists, in addition to the above, of arranging and constructing the parts by which the looper is actuated, as aforesaid, to drop a stitch, for producing a ribbed fabric, in such manner that they can be adjusted for producing ribs in the fabric of varying or uniform width, or for non-action, according as may be desired.

In the accompanying drawing my improvements in knitting-machines are illustrated, Figure 1 being a plan or top view of a so-called "Hinkley knitting-machine" with my improvements applied; Fig. 2, a transverse section in plane of line *x x*, Fig. 1; Figs. 3, 4, 5, and 6, views in detail of the looper and its shank.

A in the drawing represents the comb of a Hinkley knitting-machine, provided along its front edge, B, with a series of teeth, *a*, at equal distances apart, and along its rear edge, C, with a double row of parallel cog or gear teeth, *b*, by which, through a worm-wheel, D, interlocking therewith, the comb is moved forward and backward upon the foundation or bed E, suitably constructed therefor. The worm-wheel D is, through shaft F, turning in suitable bearing, driven by the driving mechanism employed.

G is the needle-bar, carrying the needle of the machine, and receiving a reciprocating motion from a crank-pin, I, on the disk J attached to one side of the worm-wheel D, which pin works in the slot of the slotted arm K of needle-bar; K, the looping-hook or looper. This looper L is operated by means of the cam-slot M of the disk J, into which a pin, N, of the looper-shank O projects.

The several parts above described operate to knit as follows: The needle-bar G, receiving its motion from the crank-pin in its slotted arm, advances with each revolution of the disk J, and the needle, passing through the stitch immediately in front, under the tooth *a* of the comb A, removes that loop from its tooth. The revolution of the cam-slot M brings the looper-hook L forward in season to take up a new loop from the eye of the needle, and on its backward movement deposits it on the tooth which held its predecessor. Now, the disk-cam J, which has held the comb stationary while the new loop has been formed, reaches the gaining or cam part of its circumference, causing the comb to traverse one tooth for the repetition of the stitch-forming operation.

The machine above described is provided with dogs P, as in the Hinkley knitting-machine, and its worm-wheel is constructed as in said machine, for the purpose of reversing the feed-motion of such worm-wheel upon the comb. The comb of the machine is also graduated or marked according to the number of its teeth, as indicated in the drawing, and it is also provided with a wheel-counter, H, graduated, and other parts in detail, as in the Hinkley knitting-machine, to which the present invention more particularly applies, the several parts operating as in said machine, and therefore needing no further explanation herein.

The mechanism and arrangement of parts by which the purpose of this invention is carried out is as follows:

The shank O of the looper L is constructed in the direction of its length in three parts, *f*, *g*, and *h*, the part *f* carrying the pin by which it is arranged for motion by the cam-slot M, the part *g* being a bar, in continuation of the

looper L proper, and the part *h* a plate applied by screws to the part *f*, confining the looper-bar *g* in position upon the part *f*, the looper-bar *g* being provided with slots *m* at or near each end, so that it may have a motion up and down upon the part *f* over its studs or projections *n*, by which the looper is guided in its said motion.

The part *h* of the looper-shank is extended below the shank, and at its lower end is fork-shaped, between the tines of which the needle plays in its forward-and-backward movement, as in the said Hinkley machine.

Through a slot, *o*, in the part *f* of looper-shank a stud, *p*, of the looper-bar *g* proper projects, which stud is provided with a pin, *q*, resting upon the edge *r* of a lever-bar, *s*, hung at one end to a fulcrum-pin, *t*, of the fixed arm R of the Hinkley knitting-machine, just in front of the comb.

The lever-bar *s*, by and through a link-bar, U, is connected to and with one end of a horizontal lever, S, that is extended backward, and at its rear end is hung to a fulcrum-pin, *w*, of a standard or upright, T, fixed to the frame on which the comb travels.

The lever S, through a friction-wheel, X, rests upon the top surface of a horizonal circular disk, U, attached to the upper end of a vertical shaft, V, turning in bearings at its lower end in the bed E for the comb, and at its upper end upon a pointed vertical spindle, W, fastened in the horizontal projecting arm Y of the standard T, hereinbefore referred to.

The disk U on its upper face is provided, in a circular line concentric with its center, with a series of apertures, *y*, at equal and regular distances apart. In the present instance the number of the holes is eight, in two of which a pin, *z*, is inserted, projecting slightly above the face of the disk U, and in line for them to pass under the friction-wheel *x* of the lever S, raising said lever as the said disk carrying them is revolved, being actuated by its pinion A^2, that is attached thereto, and disposed in the bed E to gear with the rear line of the cog-teeth of the comb.

Through the arrangement and construction of the parts just above described between the looper-shank O and the cog-teeth of the comb it will be seen that as the comb is moved forward and backward on its bed the disk U of said parts has imparted to it an intermittent reciprocating rotary motion, because of its pinion-connection with said comb-toothed rack, thereby producing, through the pins inserted in said disk at stated periods or intervals of its movement, a raising of the lever S, and through its link U connecting it with the lever-bar, on which rests the stud *q* of the part *g* of the looper-shank, a raising of the looper in its position with reference to the needle of the machine, and when the pin of the disk producing such lifting of the lever has passed from under the same the looper is moved back and down to its original position through the action of a bent spring, B^2, arranged upon the looper-shank O to suitably bear upon the upper end of the part *g* of the said shank.

Thus it is obvious that at stated periods in the operation of the knitting mechanism a raising and lowering of the looper is produced, enabling thereby, with a proper relative construction and arrangement of the several parts by which such raising and lowering of the looper is produced, the looper to be so actuated—that is, raised—that at certain and stated movements of the needle to make a stitch it will pass above the yarn-loop of the needle without engaging with the same, leaving the loop to be carried back by the needle in lieu of taking it and transferring or placing it on a tooth of the comb, as it would otherwise do had it not been so raised.

By this arrangement and operation of parts, producing a dropping of a needle-loop, the knitting mechanism, as is apparent, is adapted to the knitting of ribbed fabrics.

The peculiar operation of the connecting parts above described between the looper and the comb-rack, and with the pins of the disk U adjusted in the apertures thereof, as shown in the drawing and herein explained, in combination with the ordinary operation of the needle of the knitting-machine, (supposing the needle and looper to be at the end of their backward movement and just about to move forward, and the frictional wheel of the lever S to have just been actuated by a pin, *z*, of the disk U, but to have come to a bearing on the disk,) is as follows: The worm-wheel being turned in the proper direction, the needle and looper are carried forward and backward, the comb during such time remaining stationary as a loop of the yarn from the needle is carried and deposited upon the tooth of the comb, the needle passing in its forward movement through the loop previously placed thereon, when, the needle and looper having reached, or nearly so, the end of their backward movement, the comb is then fed along one tooth, revolving the disk having pins *z*, accordingly, one space of its several divisions, when the needle and looper again move forward and backward, transferring another loop to a tooth of the comb in position therefor, after which, as before, the comb is fed along the other tooth, revolving the disk U another space, and bringing on such turn of the disk one of its pins *z* under the frictional wheel of the lever S, raising the same, and, through the connection described, lifting the looper, in which raised position the looper passes forward with the needle above the loop or yarn thereof, consequently not taking the loop to carry it to a tooth of the comb, but leaving it to be carried back with the needle; when, the needle and looper having reached, or nearly so, their backward position, and the comb moved along a tooth, the disk U is revolved another space, leaving the looper free to assume its original position for taking a loop of the needle, and so on during the operation of

the machine. The looper, at stated times, according to the position of the pins of the disk U, thus dropping a stitch, produces a fabric knit with ribs, and in the present instance the dropping of stitches occurs on every third forward or stitch movement of the needle.

By changing the positions of the pins in the disk-apertures—that is, setting them nearer together or farther apart—ribs of varying widths or of the same width in the fabric knit by the mahcine may be produced, or by removing them all the machine will knit plain, the looper then simply having its ordinary movement.

In lieu of constructing the disk and pins for a removal and adjustment of the pins, separate disks may be provided to accompany the machine, having pins variously located to produce, by substituting one for another in the machine, varying widths of ribs in the knit fabric or a plain knitted fabric; but it is preferable to construct the disks as described.

Although I have herein particularly described the present invention as applied to the Hinkley knitting-machine, I wish it to be distinctly understood that I do not intend to limit the use of the same to that machine, but intend to apply the improvements to whatever other machines they may be adapted.

Having thus described my improvements in knitting-machines, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the looper L, or its equivalent, of a knitting-machine, of a mechanism, substantially such as herein shown and described, which will impart to the looper (besides its ordinary movements to carry a loop from the needle to a tooth of the comb of the machine) a rising-and-falling or other suitable movement, at certain intervals, to clear the yarn carried by the needle, so as not to form a loop therefrom, thereby producing a ribbed appearance in the fabric knit, substantially as described.

2. The looper-shank O, constructed in parts *f*, *g*, and *h*, arranged together substantially as described, in combination with the lever-bar *s*, link *u*, lever S, and disk U, having apertures for the reception of pins, and a pinion, A, on its shaft, arranged to gear with the rack of the comb, when the whole are arranged together for operation, substantially as and for the purpose described.

The above specification of my invention signed by me this 6th day of May, A. D. 1870.

EDWARD MORSE.

Witnesses:

ALBERT W. BROWN,

EDWIN W. BROWN.