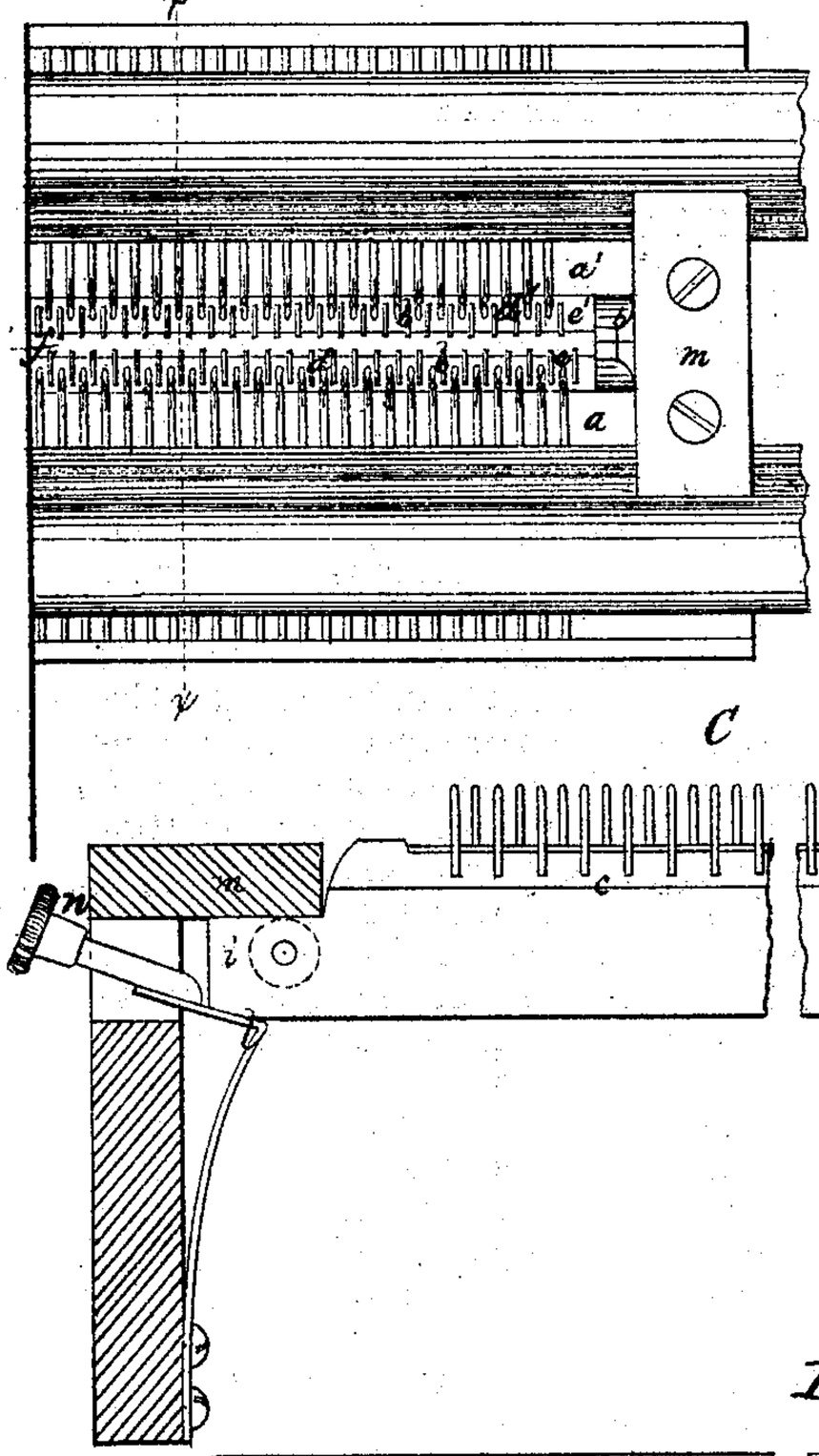
No. 121,924. Patented Dec. 12, 1871.

Nathaniel Clark.

Imp'ls in Knitting Machines.

A



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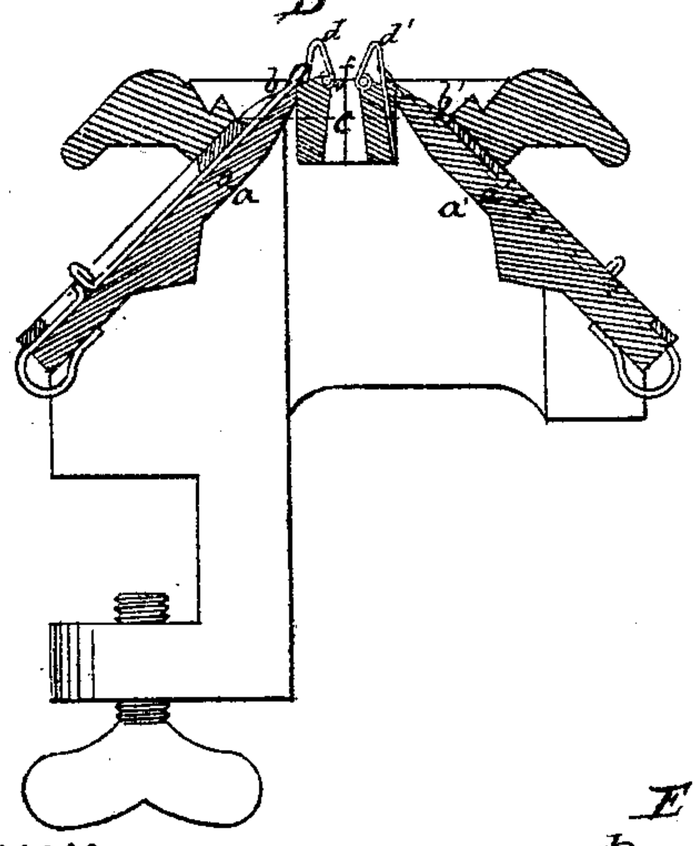

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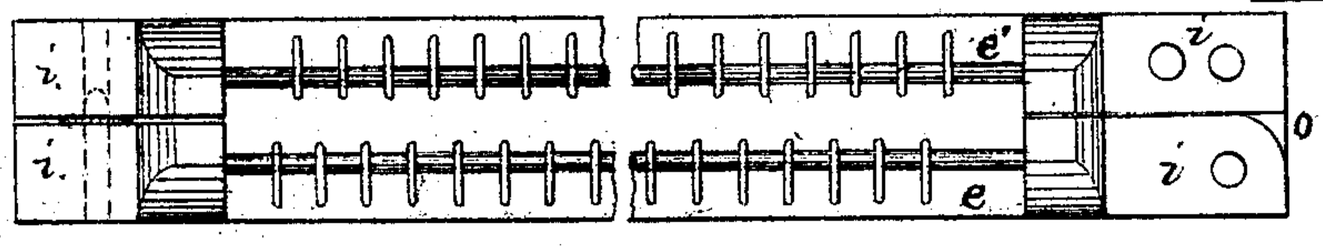

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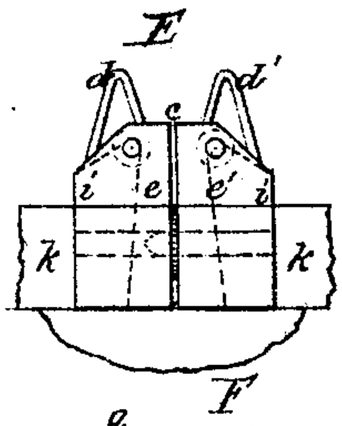

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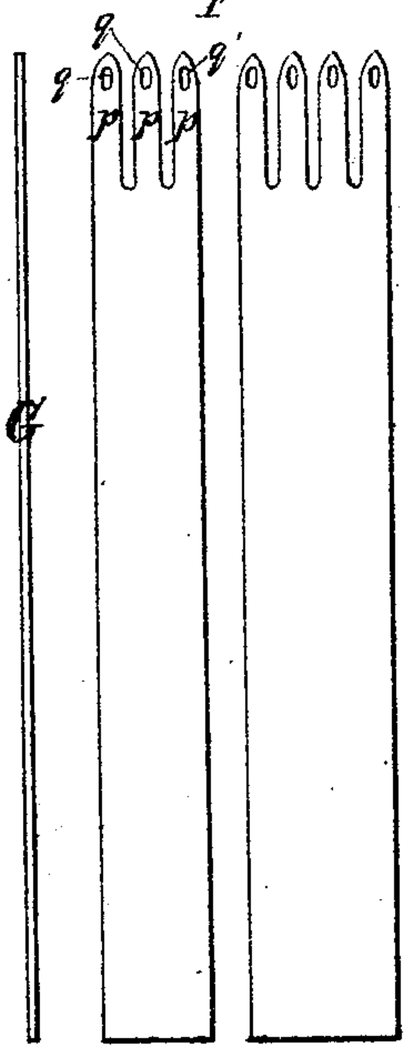

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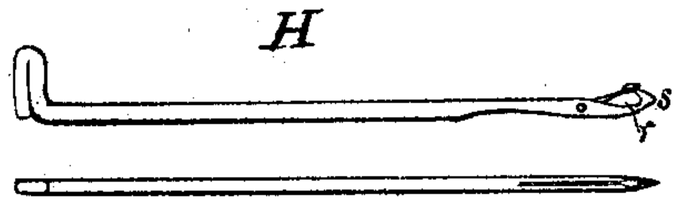

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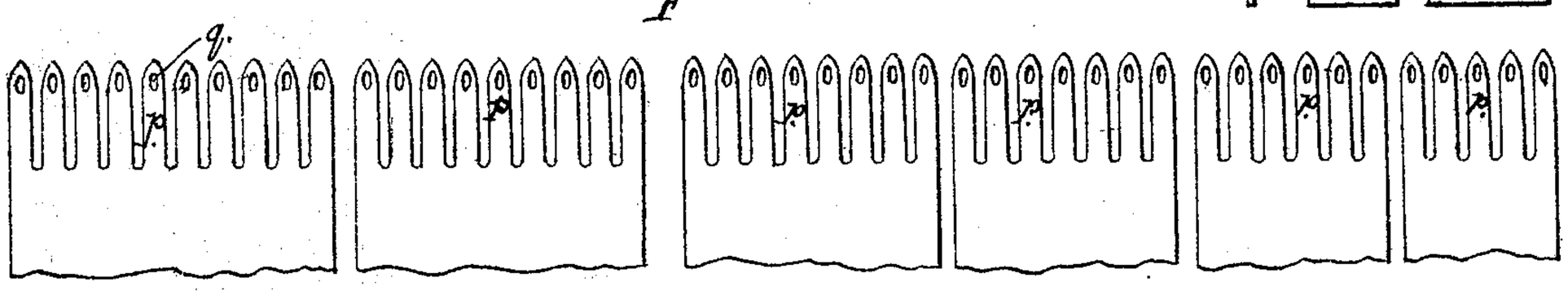

Witnesses.
S. B. Kidder.
M. W. Frothingham

Nathaniel Clark
by his Attys.
Crosby, Gaskell & Gould

UNITED STATES PATENT OFFICE.

NATHANIEL CLARK, OF MALDEN, MASSACHUSETTS.

IMPROVEMENT IN KNITTING-MACHINES AND PROCESSES OF KNITTING.

Specification forming part of Letters Patent No. 121,924, dated December 12, 1871; antedated November 27, 1871.

To all whom it may concern:

Be it known that I, NATHANIEL CLARK, of Malden, in the county of Middlesex and State of Massachusetts, have invented Improvements in Knitting-Machines; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention relates particularly to details of construction of some of the mechanism of that class of machines known as the "Lamb knitting-machines," and to the process of varying the width of the work made by such machines. The invention consists, primarily, in the employment, in combination with the parallel rows of needles, of a jack or jack-bar or plate, made attachable and detachable in the manner hereinafter set forth, by the removal of which a greater and unobstructed space is left between the needles to facilitate the insertion of a piece of web into the machine, and the picking up of stitches, and other manipulations. The invention further consists in hinging the opposite sides of this removable jack-bar so that the two jaws can be separated to bring the work into the open space between them without having to thrust it through the jack-opening.

The drawing represents the parts of a Lamb knitting-machine embodying my invention.

A shows a plan of part of the stitch-casting jack and needles; B, a vertical section on the line *x x;* C, a side elevation; D, a plan; and E, an end view of the jack. F shows a series of the combs or finger-plates; G, an edge view of one of them. H is a view of one of the needles.

a a' denote the opposite needle-beds upon which the needles slide; *b b'*, the two sets of needles; *c*, the jack or loop-guide, having two series of jack-wires, *d d'*, projecting from the two jack-bars *e e'*, between which bars is the open space *f*, over which the needles work in forming the web, and down through which the work is drawn by a suitable weight as the knitting progresses. The operations of the carriage and of the needles in all kinds of work are precisely the same as in the Lamb machines in common use, and they need not, therefore, be herein described or particularly alluded to. The jack *c* is shown as formed with projecting ends *i*, one of which sits between cheeks *k k* at the one end of the needle-beds and the other end rests upon a spring, *l*, the cap-plates *m* covering them. To the spring *l* a finger-piece, *n*, is fixed, and by depressing the same the spring is drawn back and permits the jack to fall and be removed by the operator. This removal leaves the needles with a wide intermediate space and facilitates the taking up of stitches when dropped; and the operation of casting the loops or stitches of a piece of work to be put into the machine for a continuation of the knitting. Even when the jack is removed for taking up stitches, or for entrance of a web, it is difficult to replace it if the web has to be drawn through the narrow space between the jack-wires. I therefore make the two bars separable, jointing them together at one end, as seen at *o*. It will readily be seen that by opening the bars or jaws they may be placed upon the opposite sides of the web and then closed together so as to embrace the web between them, obviating any necessity of thrusting the web through the open space.

In varying the width of a flat or a flat tubular web it has been customary to use a loop-hook and take up the loop at the end of the web, transferring it from one hook to the next one at each formation of a new set of stitches, or at intervals, as may be desired, the change of stitches being, however, always made at the ends of the web. Sometimes two or more stitches are transferred at once; but even then no change of stitches is made, excepting at the ends of the web, and then of only one or two stitches at a time.

In my improvement I narrow at several places along the web at once, or at one or more places besides at the ends; and I effect this, preferably, by using combs with graduated series of loop-fingers, so that the work may not only be narrowed all along the web, but in such manner that the change of stitches shall show in concentric or approximately concentric rows of stitches, which gradually enlarge or diminish. The drawing represents, at F, a series of these loop-holes or transferrers.

To narrow a web made with twenty needles on each side, for instance, and beginning with a comb having six fingers, for instance: The operator may leave, say three stitches at the end and take the next six with the comb and transfer them together, each to its next needle. Then, with a three-pronged comb or with three prongs of the same comb, he transfers the three end stitches

each two needles inward instead of one, and, pursuing the same course with both sets of needles when knitting a tubular web and at each end of the web, it will be seen that he narrows not only at or near the ends, but at other points along the web. After having then knit across the web one or more times the same narrowing operation is repeated, but, as the web is less wide than before, he uses a five-pronged comb instead of one with four prongs, transferring one less in number of the stitches along the web, but preferably the same number as before at the ends; and this operation may be continued until the web is narrowed down to two stitches on a side. By thus distributing the narrowing across the web the work itself is made of more uniform texture as well as better in appearance and more like hand-work; and the operation of narrowing can be accomplished with great speed, ease, and accuracy.

Each comb or loop-transferrer is made with a series of prongs or teeth, *p*, in each of which is an eye, *q*. In using the comb the teeth are pushed down between the jack-wires and the latches are thrown down by them, bringing the eyes of the teeth over the points of the needle-hooks. The eyes are then slipped upon the needle-hooks and the needles are drawn up by the comb, thereby throwing the needle-loops down over the latches. If the needles are then pushed down the loops close the latches and pass off of the needles onto the teeth, which are then disengaged from the needles, leaving the loops upon the teeth, by which they are transferred toward or from the center of the web, accordingly as the web is to be narrowed or widened.

Over the curved outer surface of the hooks of the needles commonly used the loop is not sure to slide in the proper direction, being as likely to move in one direction as in the other in casting loops upon them.

The needle which I prefer to employ has the hook made with a curved notch or recess, *r*, (or a recess curved throughout,) and with an angular point or apex, *s*, on its outer surface, so that the loop, being cast on, if forced beyond the point, cannot slip in the opposite direction, or cannot accidentally slip from the needle.

In putting a web into the machine and casting loops upon the needles with a loop-hook, the yarn being pushed by the point, enables each loop to be cast upon its needle with quickness and certainty; whereas with the curved hook it is a tedious and troublesome operation, and requires a very steady hand to get the loops properly upon the needles.

I claim—

1. In combination with the parallel rows of needle-beds and needles, the jack made, detachable, and fastened in position by the spring *l* or its equivalent to enable the jack to be slipped into or out of position, substantially as shown and described.

2. The jack made in two parts, jointed together and so as to open and close, substantially as described.

3. The process, substantially as described, of narrowing a tubular or flat web at three or more points along the web.

NATHANIEL CLARK.

Witnesses:

FRANCIS GOULD,

S. B. KIDDER.

(89)