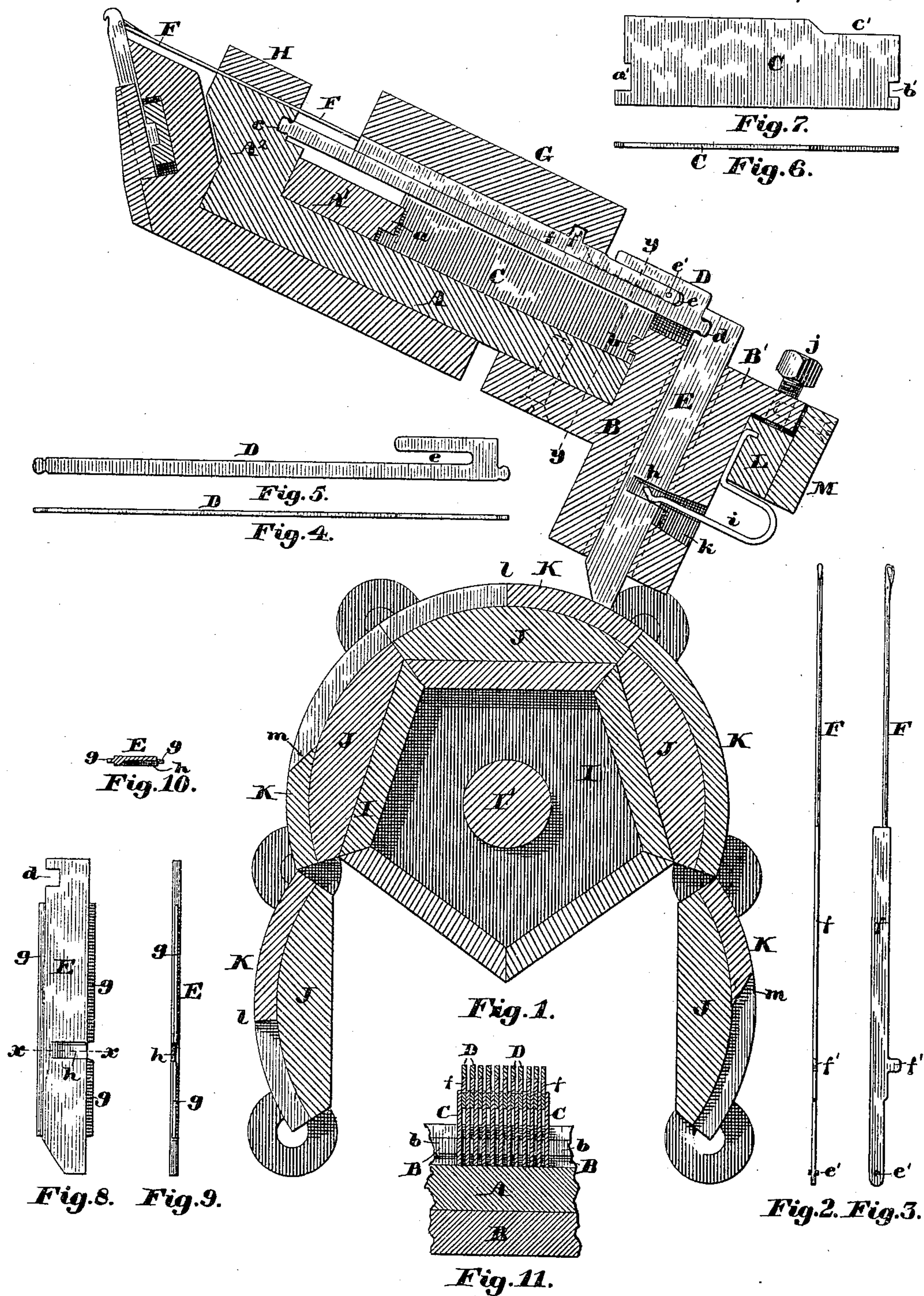


(No Model.)

W. ESTY.  
KNITTING MACHINE.

No. 371,562.

Patented Oct. 18, 1887.



***Witnesses:***

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# UNITED STATES PATENT OFFICE.

WILLIAM ESTY, OF LACONIA, NEW HAMPSHIRE.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 371,562, dated October 18, 1887.

Application filed December 12, 1884. Serial No. 150,160. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM ESTY, of Laconia, in the county of Belknap and State of New Hampshire, have invented certain new and useful Improvements in Knitting-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to knitting-machines; and it consists in a novel means for throwing the needles out of action when desired, such means acting by springing or bending the needle; and it also consists in certain novel constructions, arrangements, and combinations of parts, whereby the needles may be readily and automatically thrown into or out of action while knitting, in order to form a widened or narrowed fabric and for other purposes, all of which will be readily understood by reference to the description of the drawings and to the claims to be hereinafter given.

Of the drawings, Figure 1 represents a sectional elevation of so much of a knitting-machine as is necessary to illustrate my invention. Figs. 2 and 3 represent, respectively, a plan and a side elevation of one of the needles. Figs. 4 and 5 represent, respectively, a plan and a side elevation of one of the needle-shifters. Figs. 6 and 7 represent, respectively, a plan and a side elevation of one of the partitions between the needle-jacks. Figs. 8 and 9 represent, respectively, a side elevation and an end elevation of one of the needle-guide operating-bars. Fig. 10 represents a sectional plan of the same on line *xx* on Fig. 8; and Fig. 11 represents a section of a portion of the machine on line *yy* on Fig. 1, showing the relative positions of the needles and their guides and partitions.

The table A is secured to the side frames (not shown) of a knitting-machine, and has mounted thereon the bar A', provided with the lip *a*, and the bar B, provided with the lip *b*, which lips project into the notches *a'* and *b'* of the partitions C to hold the same in position. Between every two of the partitions C C is placed a needle-shifter, D, one end of which has a bearing in the groove *c* in the projection A<sup>2</sup> of the table A, while its opposite end has a bearing in the notch *d* in the needle-shifter operating-bar E. The outer end of the needle-

shifter D is made wider and is provided with a slot, *e*, in which is mounted the outer end of the flat jack *f* of the needle F, and in which said jack reciprocates when the projection *f'* is acted upon by the cam path of the bar G, the construction of said parts being shown in Figs. 1, 2, 3, 4, and 5.

The upper end of the projection A<sup>2</sup> of the table A is provided with suitable transverse grooves, in which the needles F F find bearings when the cap H is placed in position.

Beneath the needle-shifter operating-bar is placed a hollow polygonal drum, I, mounted upon a suitable shaft, I', with which it is revolved by any suitable mechanism. (Not shown.) Upon this drum I is placed an endless chain, which revolves therewith, and which has its several links J J made of such a shape that their inner surfaces correspond with the sides of the drum and that their outer surfaces in passing around said drum I form a portion of a cylinder. Upon these links are secured cam-plates K K, which form the pattern by which the shape of the stocking is regulated while it is being knit.

The needle-shifter operating-bar E is provided with the lips *g g*, which fit into and slide in suitable grooves formed in the bar B and the bar B', firmly secured to said bar B at each end, and it is also provided with a notch or recess, *h*, in which one end of the spring *i* rests, while its opposite end is firmly secured to the adjustable bar L, which is held in position by the bar M being clamped against it so as to cause considerable friction. The spring *i* is adjusted to a greater or less tension by adjusting the bar L by means of the set-screws *j*.

The spring *i* acts upon the bar E with a tendency to keep said bar in a downward position, the bar B' being provided with a suitable slot, *k*, to allow of the necessary movement of the said spring, all as shown in Fig. 1.

The upper edges of the partitions C are cut away for a portion of their lengths, as at *c'*, in order to allow of the reciprocation of the pin *e'* in the outer end of the needle-jack *f*. (See Figs. 6 and 7.)

The operation of my invention is as follows: When the needles are desired to be in action and knitting a continuous fabric, the parts are in the positions shown in the drawings; but at



the point where it is desired to throw out of action one or more of the needles, in order to narrow the fabric or to construct a heel or toe bulge, one of the edges *l* of one of the cam-plates *K* passes beneath the toe of the needle-shifter operating-bar *E* and allows the spring *i* to force said bar downward, and with the needle-shifters *D*, carrying the needle *F*, thus removing the projection *f'* from the cam-path of the bar *G* and bending the needle between the inner end of its flat jack *f* and the cap *H*. In thus bending the needle and bringing the outer end of its jack *f* downward, the pin *e'* set in said outer end is carried behind the outer end of the partition *C*, and thus prevents the needle from being carried forward by any possible chance. In these positions the several parts remain until it is desired to again knit the same width of fabric or to widen when the inclined throw *m* is caused to pass beneath the toe of the bar *E*, overcoming the tension of the spring *i* and raising said bar, together with the needle-shifter *D* and needle *F*, into their normal positions, as shown in the drawings, in which positions they are again ready for action.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with a knitting-needle and a bar provided with a cam-path for operating the same, the shifter *D*, carrying the needle-jack upon its upperside, the bar *E*, and a pattern-cam for operating said bar, substantially as described.

2. In combination with a knitting-needle and a bar provided with a cam-path for operating the same, the needle-shifter *D*, the bar *E*, the spring *i*, the drum *I*, a pattern-chain composed of links *J J*, mounted upon said drum, and the cam-plates *K*, provided with the throws *m*, for operating said bar, substantially as described.

3. In combination with a knitting-needle and a bar provided with a cam-path for operating the same, the partitions *C C* and supporting and securing means therefor, each partition having a portion thereof cut away, as at *c'*, the pin *e'*, secured to the outer end of the needle-jack, the needle-shifter *D*, the bar *E*, and a pattern-cam for operating said bar, substantially as described.

4. In combination with a knitting-needle and a bar provided with a cam-path for operating the same, the needle-shifter *D*, the bar *E*, the spring *i*, and the pattern-cams *K K*, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 9th day of December, A. D. 1884.

WILLIAM ESTY.

Witnesses:

N. C. LOMBARD,  
WALTER E. LOMBARD.