(No Model.) 2 Sheets—Sheet 1.

B. HOLT.

KNITTING MACHINE.

No. 448,719. Patented Mar. 24, 1891.

FIG. 2.

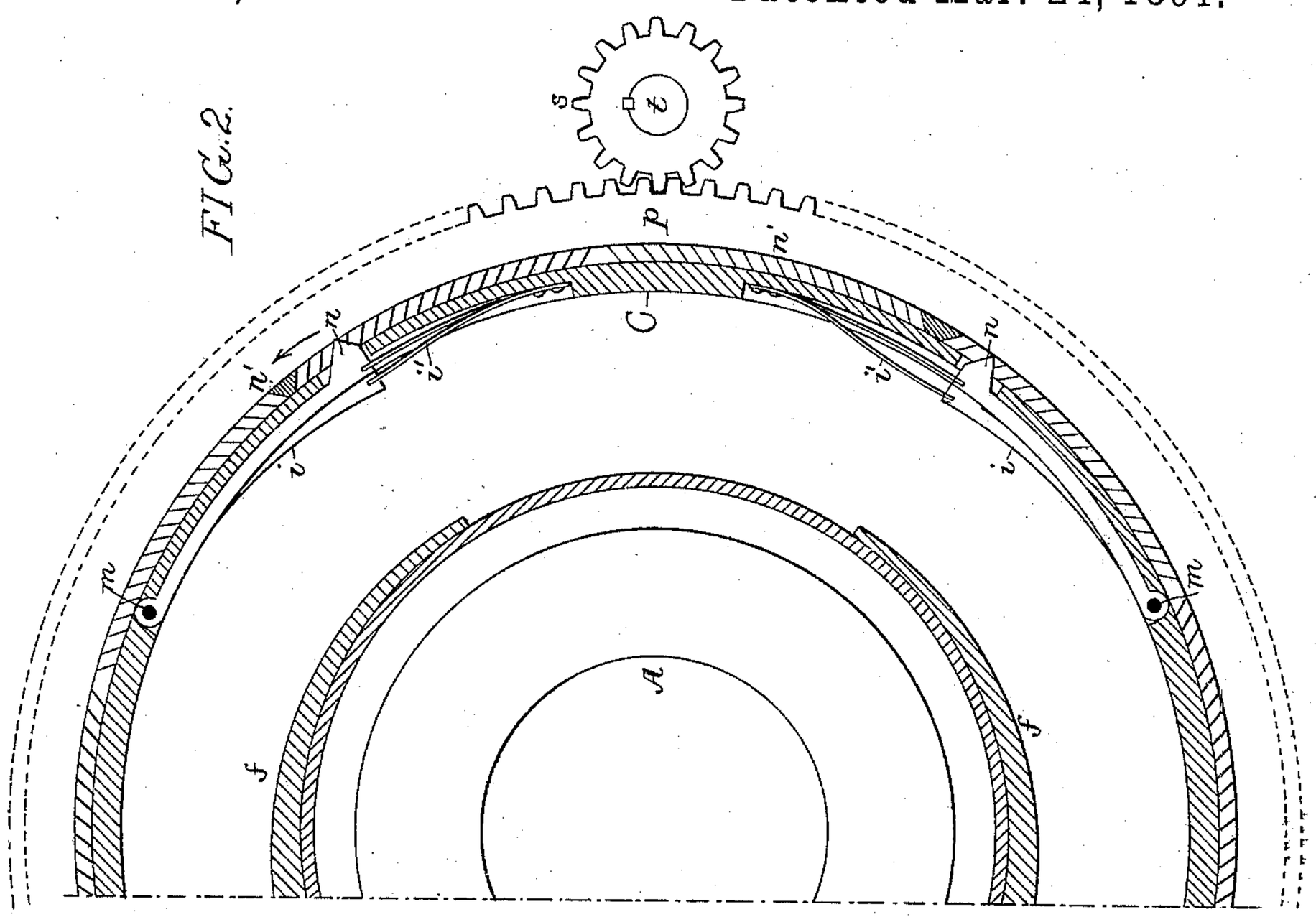

FIG. 3.

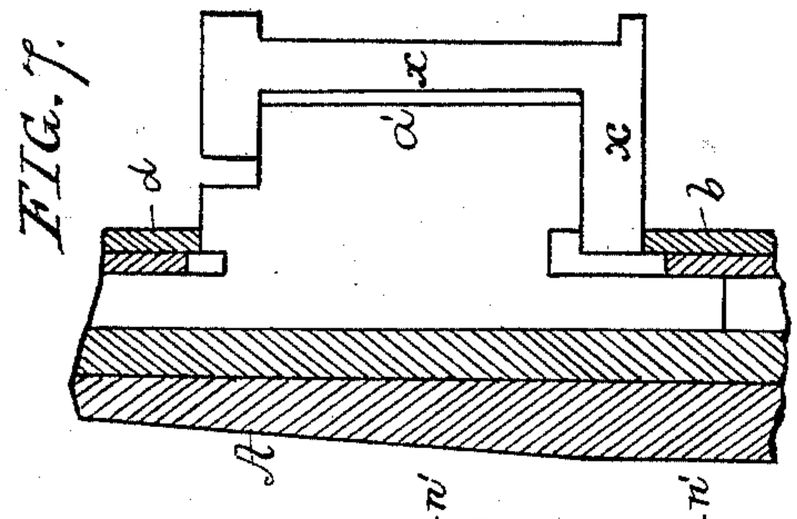

FIG. 1.

Witnesses:
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A. V. Groupe

Inventor:
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by his Attorneys
Howson & Howson

(No Model.)

2 Sheets—Sheet 2.

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FIG. 6.

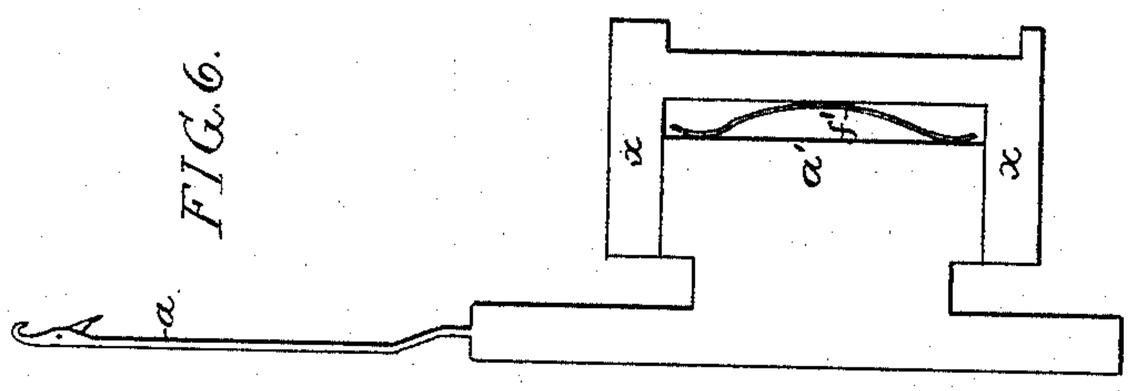


FIG. 5.

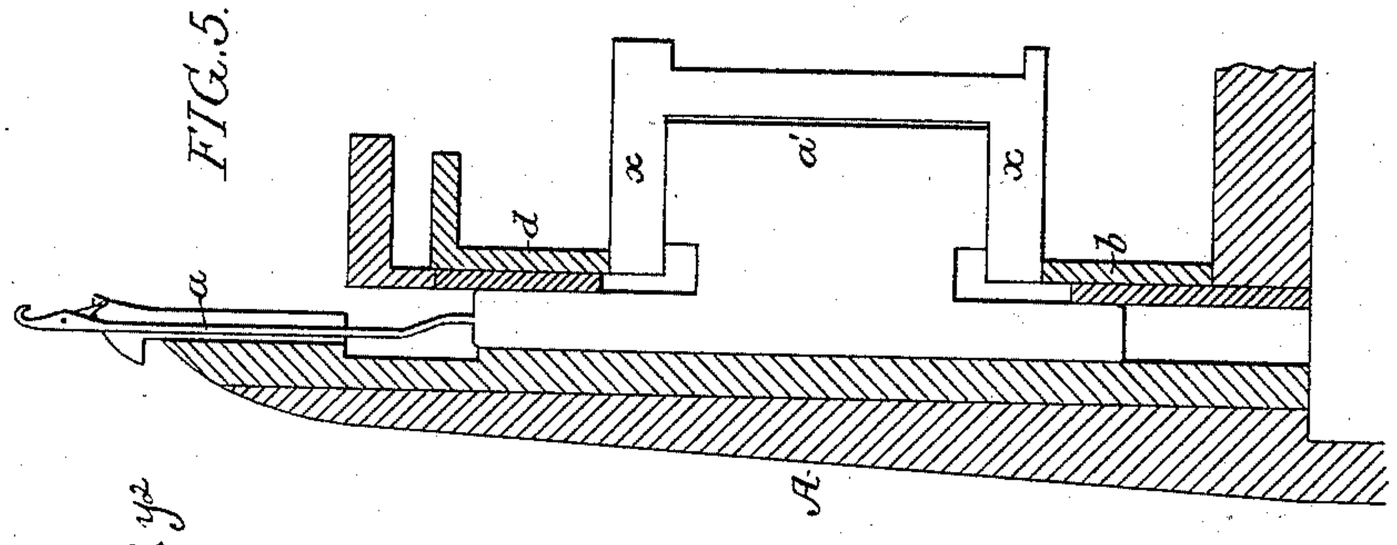


FIG. 4.

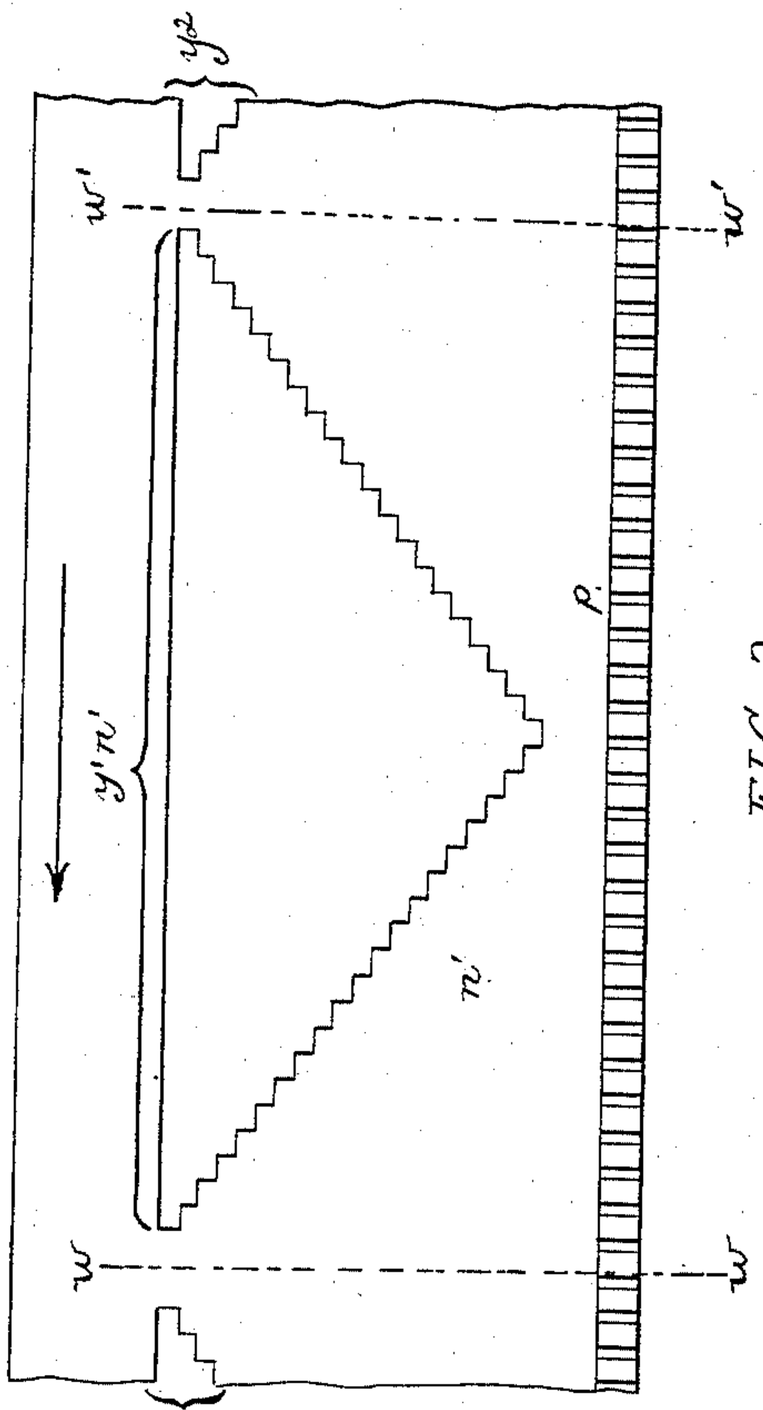
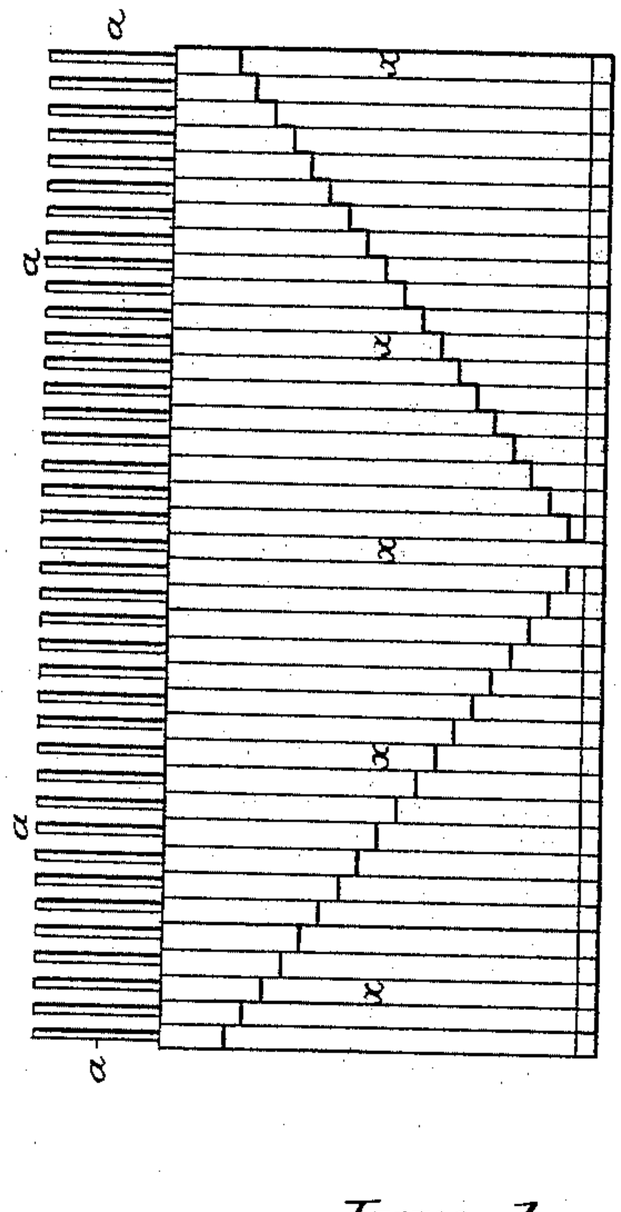


FIG. 3.



Witnesses:
Alex. Barkoff
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Inventor.
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by his Attorneys
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UNITED STATES PATENT OFFICE.

BENJAMIN HOLT, OF CAMDEN, NEW JERSEY.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 448,719, dated March 24, 1891.

Application filed March 31, 1890. Serial No. 345,958. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN HOLT, a citizen of the United States, and a resident of Camden, Camden county, New Jersey, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention consists of certain improvements in the knitting-machine for which I filed application for Letters Patent of the United States on the 7th day of October, 1889, Serial No. 326,185, the main object of my present improvements being to render more compact than before the means for throwing into and out of action the fashioning-needles of the machine—that is to say, the needles upon which the narrowing and widening operation is to be performed. This object I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a transverse section of sufficient of a knitting-machine to illustrate my present improvements. Fig. 2 is a sectional top view of the same. Fig. 3 is a view of the jacks of the fashioning-needles. Fig. 4 is a view of a part of a cam-operating plate or ring of the machine. Fig. 5 is a view of one of the fashioning-needles in action, and Figs. 6 and 7 show, respectively, an arrangement whereby certain cams may be dispensed with and a modified form of needle-jack used.

A represents part of the needle-cylinder of the machine, and *a* one of the needles, the latter being carried by a jack *a'*, which has a sliding portion *x*—that is to say, a portion guided upon the body of the jack, but free to move radially thereon to a limited extent. The body of the jack is recessed so that the lifting-cam *b* and depressing-cam *d* will not act upon the same when the slide *x* is moved outward on the jack; but if said slide is forced inward the cams will act upon the same and will therefore move the jack and its needle so as to knit. There are on the cam-cylinder C certain cams *f*, which, as a jack leaves the cams *b* and *d*, push outward the slide *x* of the jack, so that said jack will not be operated when it is again brought around to the cams *b* and *d* unless the slide has been pushed inward. Springs *f'* may, however, be used in some cases to effect this outward movement of the jack-slides, as shown, for instance, in Fig. 6.

In order to effect the dropping of needles out of action and bringing of needles into action again to narrow and widen the web and form a pocket or bulge upon the knitted tube, I adopt a system of graduated bits and a sectional operating-cam coacting with said graduated bits in a manner similar, in general respects, to that set forth in my former application; but the sectional cam in the present machine is not the knitting or needle-lifting cam, and the graduated bits are in the present machine formed upon the slides *x* of the jacks, and said graduations are arranged in vertical lines instead of in a horizontal line, the sections of the cam being likewise arranged vertically instead of horizontally, to accord with this change in the bitting of the jacks. (See Fig. 1.)

The various cam-sections *i* are hung by means of pins *m* to the casing of the cam-box or cylinder C, two sets of these cam-sections being shown, one on each side of the lifting and drawing-down cams *b* and *d*, and each cam-section is acted on by a spring *i'*, tending to force it outward. Each cam-section also has a beveled head *n*, which is under control of a stepped plate *n'*, mounted on the cam-box and free to turn thereon to a certain extent, this plate having a flange *p*, with toothed periphery engaging with a pinion *s* on a shaft *t*, which may be rotated intermittently by means of a pawl-and-ratchet mechanism operated by projections on the knitting-cylinder in the manner set forth in my application before referred to, or in any other convenient way. The steps of the plate *n'* are so formed that as said plate is moved around the cam-cylinder one after another of the cam-sections *i* may be allowed to move outward, so as to fail to act upon the graduated bit of the jack-slide, and thus throw needle after needle out of action, the cam-sections being then successively pushed inward in reverse order to their outward movement, so as to bring needle after needle into action in an order the reverse of the dropping of the same out of action, in a manner substantially similar to that set forth in my former application, and which it will not therefore be necessary to dwell upon at length.

In carrying out my invention, it may be sufficient in some cases to use the movable slides *x* only for the action of the lifting-cams, the drawing-down cams acting on the main portions of the jacks of such needles as have been raised, (see Fig. 7;) but the use of movable jacks, acted upon both by the lifting and drawing-down cams, is preferred. The lifting-cams are preferably pivoted, as set forth in the application of Salisbury and Wrightson, filed January 14, 1889, Serial No. 296,303, so that they will be raised into operative position by contact with the bits of the jacks or jack-slides, and the stepped portions of the plate *n'* are preferably such as to extend from one row of cams *i* to the other, so that as soon as one stepped portion of the plate has ceased to act upon one set of cams *i* it is in position to act upon the set in advance on a further movement of the plate. Hence this movement can always be in the same direction, and complicated reversing devices are avoided. For instance, supposing that the dotted lines *w w'* in Fig. 4 represent the center lines of the projections *n* of the two rows of cams shown in Fig. 2, and that the plate *n'* is moving in the direction of the arrow in Fig. 4. It will then be noted that the stepped portion *y* of said plate *n'* has ceased to act upon the advance set of cams, that the stepped portion *y'* is in position to act upon the same upon further movement of the plate and has ceased to act upon the rear set of cams, and that the stepped portion y^2 is in position to act upon said rear set of cams upon such further movement of the plate.

It will be evident that my invention can be carried out in connection with a straight-knitting machine as well as with a circular machine, and in such case the stepped plate *n'* and the means for operating the same may be substantially similar to the stepped plate *h'* and actuating means shown in connection with the straight machine in my prior application before referred to.

The machine may also be employed for widening or narrowing fabrics only, instead of for both widening and narrowing, as will be readily understood.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. The combination, with the needle-carrier and cam-box of the machine, the needles, and their jacks, of movable slides on said jacks having graduated bits, a knitting-cam for acting upon said movable slides, means for moving the said slides out of range of the knitting-cam, and a sectional cam for throwing said movable slides into operative position, substantially as specified.

2. The combination of the needle-carrier and cam-box with the needles and their jacks, having movable slides with graduating bits, lifting and drawing-down cams for acting upon said movable slides, means for moving the said slides out of range of the knitting-cams, and a sectional cam acting on said movable slides to adjust them to operative position, substantially as specified.

3. The combination of the needle-carrier and cam-box with the needles and their jacks, movable jack-slides having graduated bits, means for moving said slides out of operative position, sectional cams for acting upon said slides to move them into operative position, springs acting upon each of said cam-sections to throw it outward, and a stepped plate acting on the cam-sections to throw them inward, substantially as specified.

4. The combination of the needle-carrier and cam-box with the needles and their jacks, having movable slides with graduated bits, cams for moving said slides out of range of the knitting-cams, sectional cams for moving the slides into range of said knitting-cams, and means for operating the sections of said cams, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN HOLT.

Witnesses:

EUGENE ELTERICH,

HARRY SMITH.