

(Model.)

2 Sheets—Sheet 1.

J. FORBES.

FEEDING MECHANISM FOR SEWING MACHINES.

No. 414,203.

Patented Nov. 5, 1889.

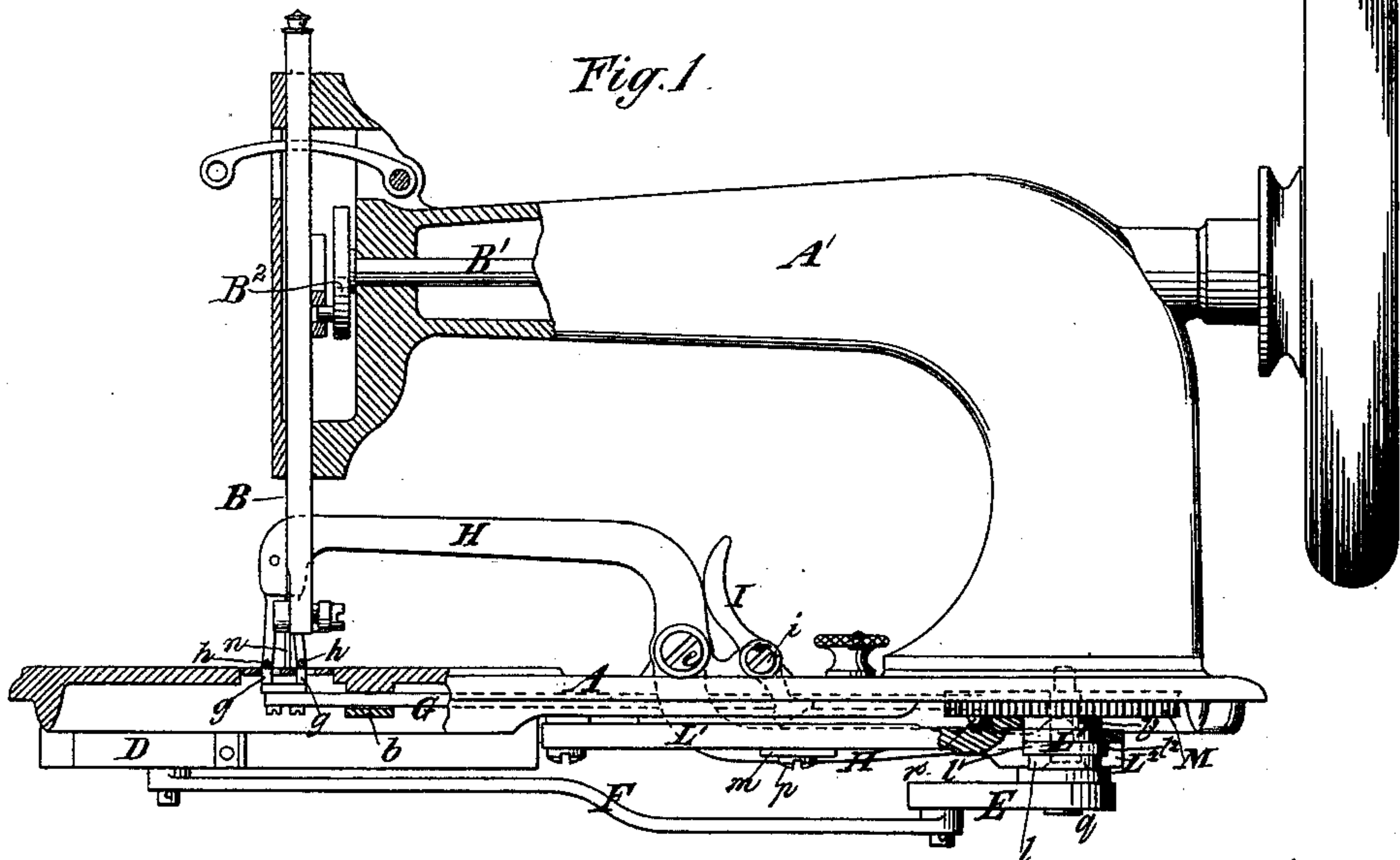


Fig. 2.

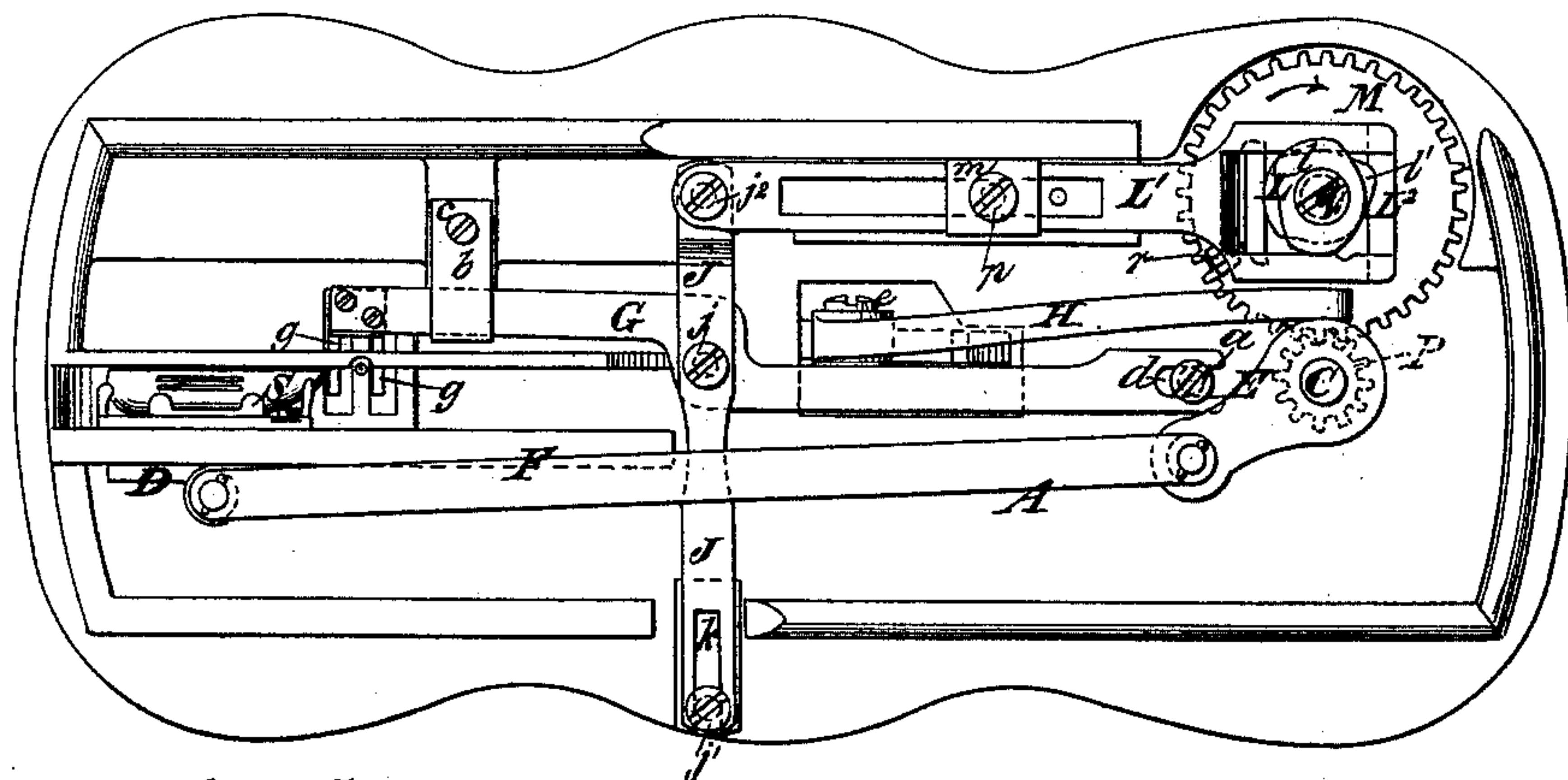


Fig. 3.

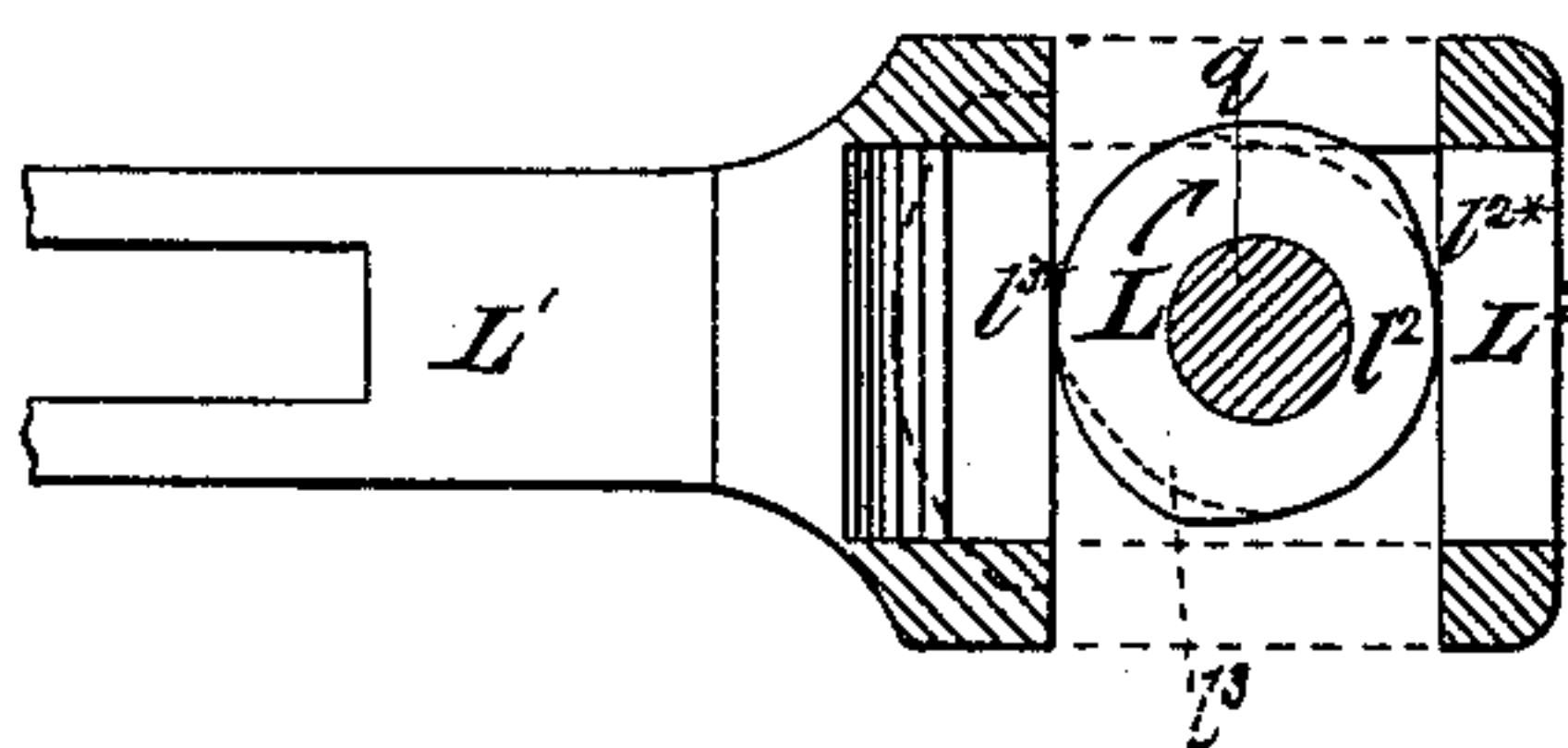


Fig. 4.

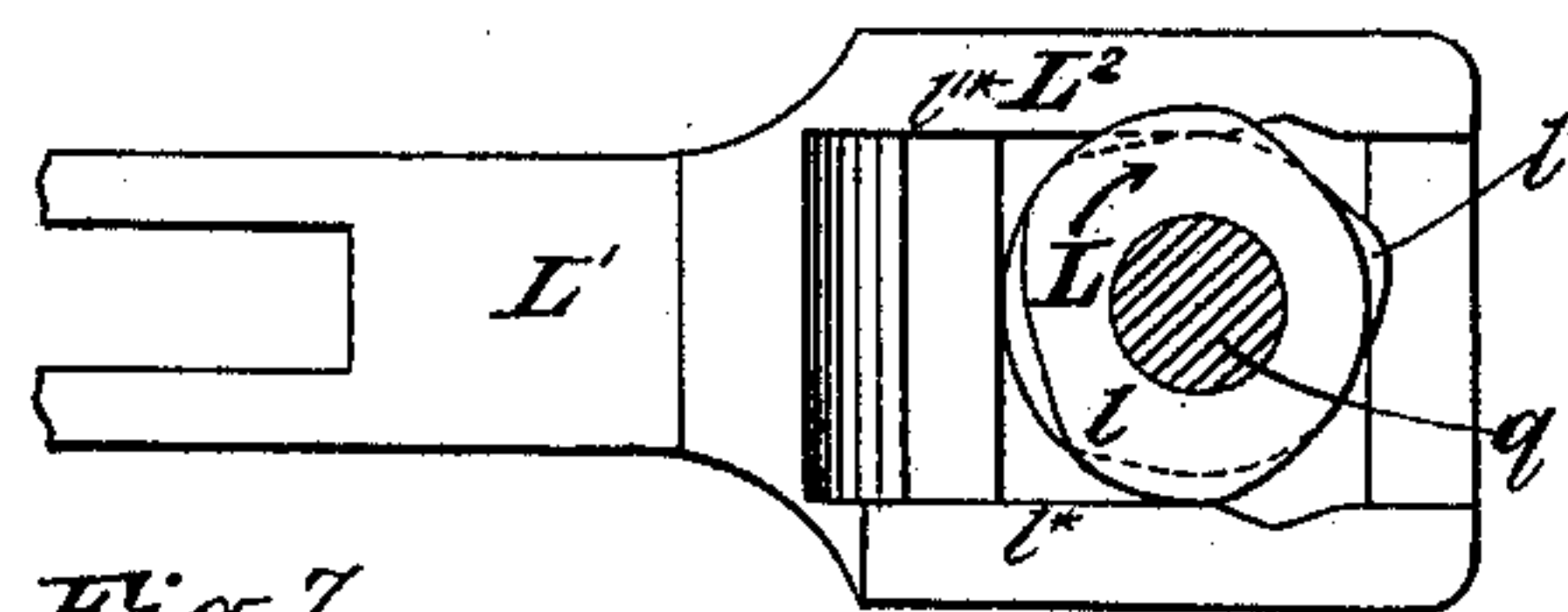
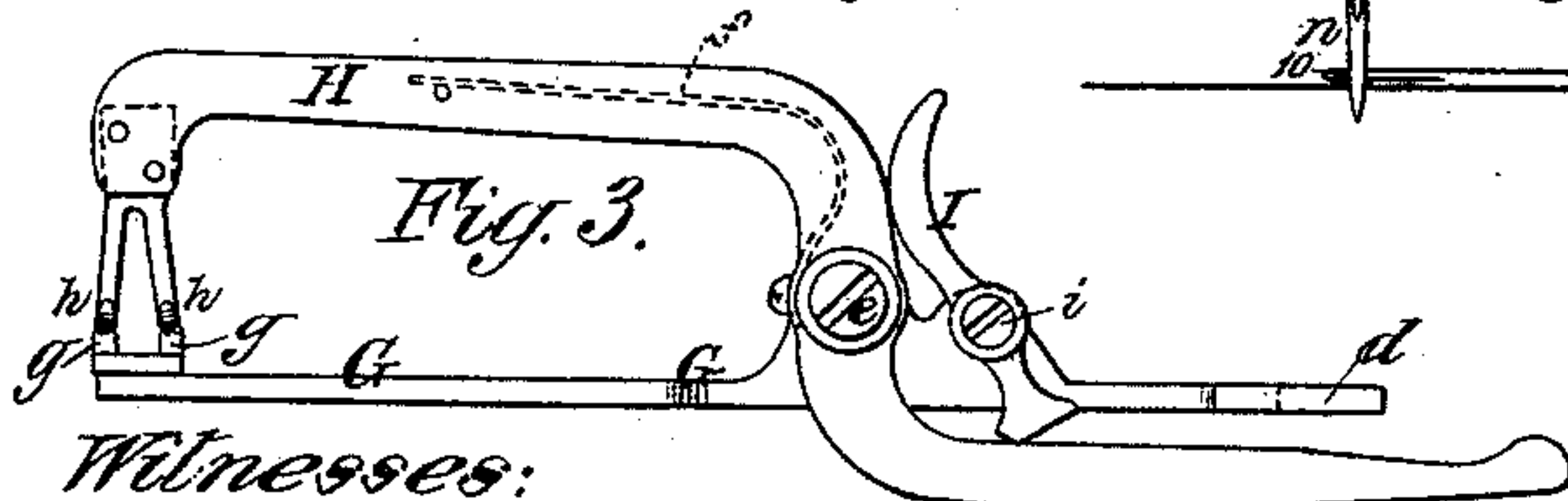
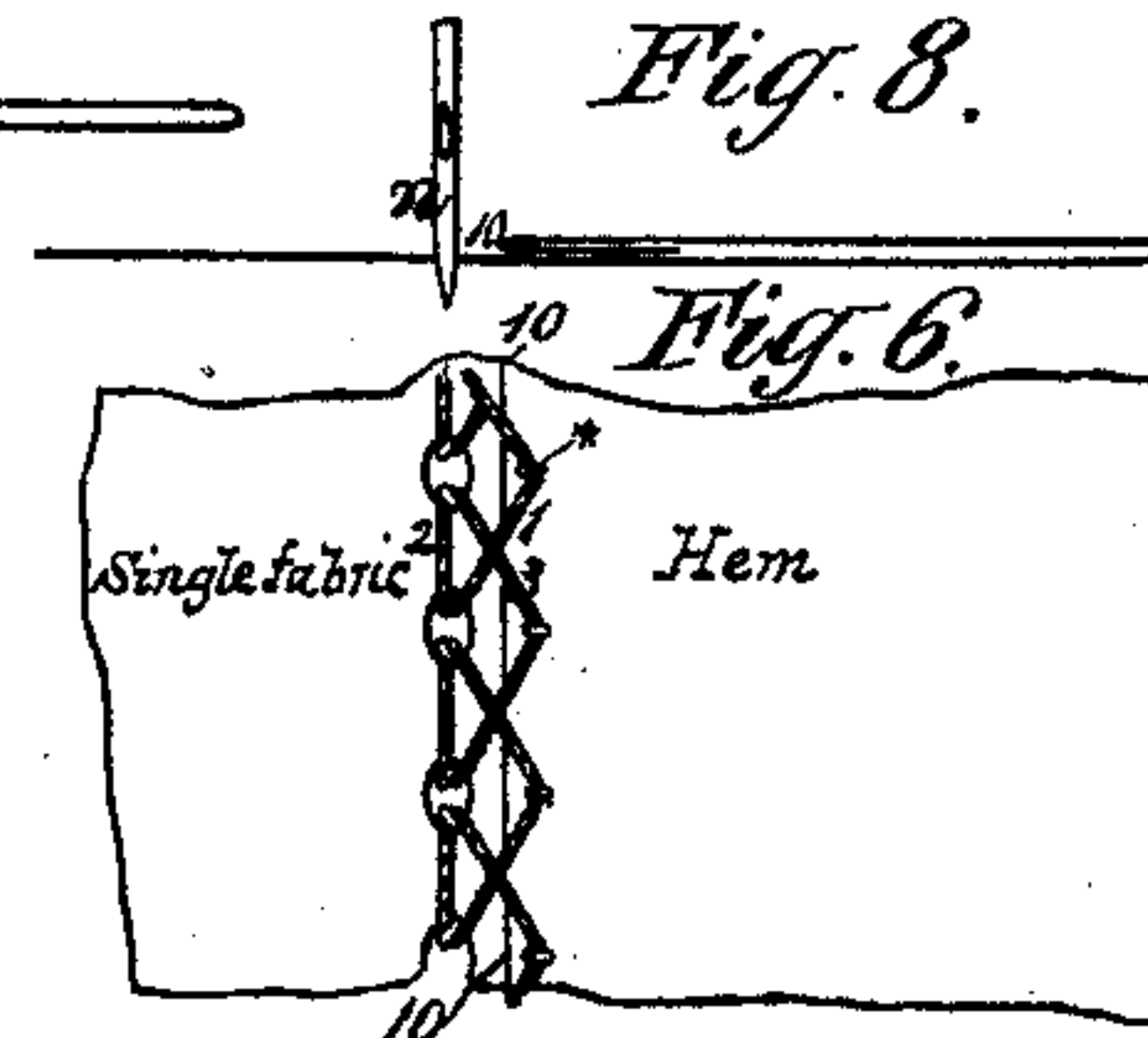


Fig. 5.



Fig. 6.



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by his attorney
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(Model.)

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Fig. 9.

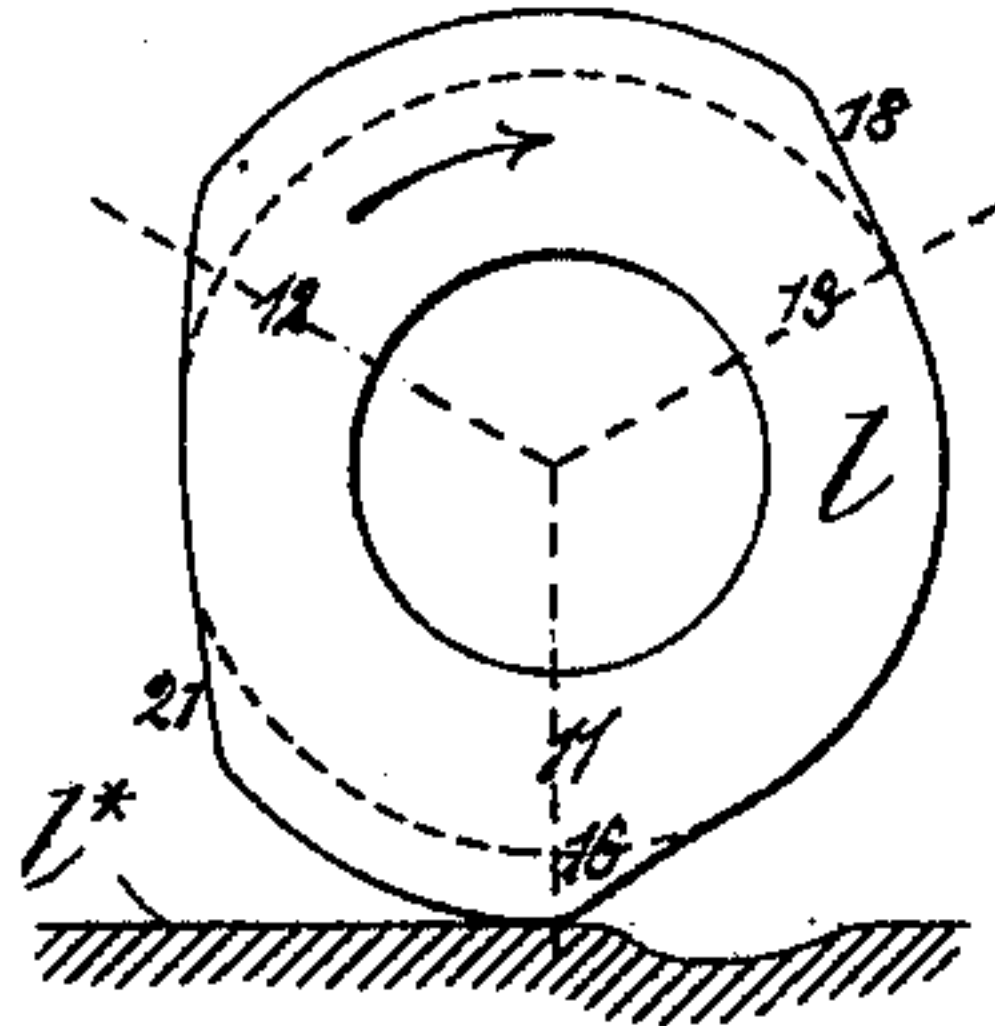


Fig. 10.

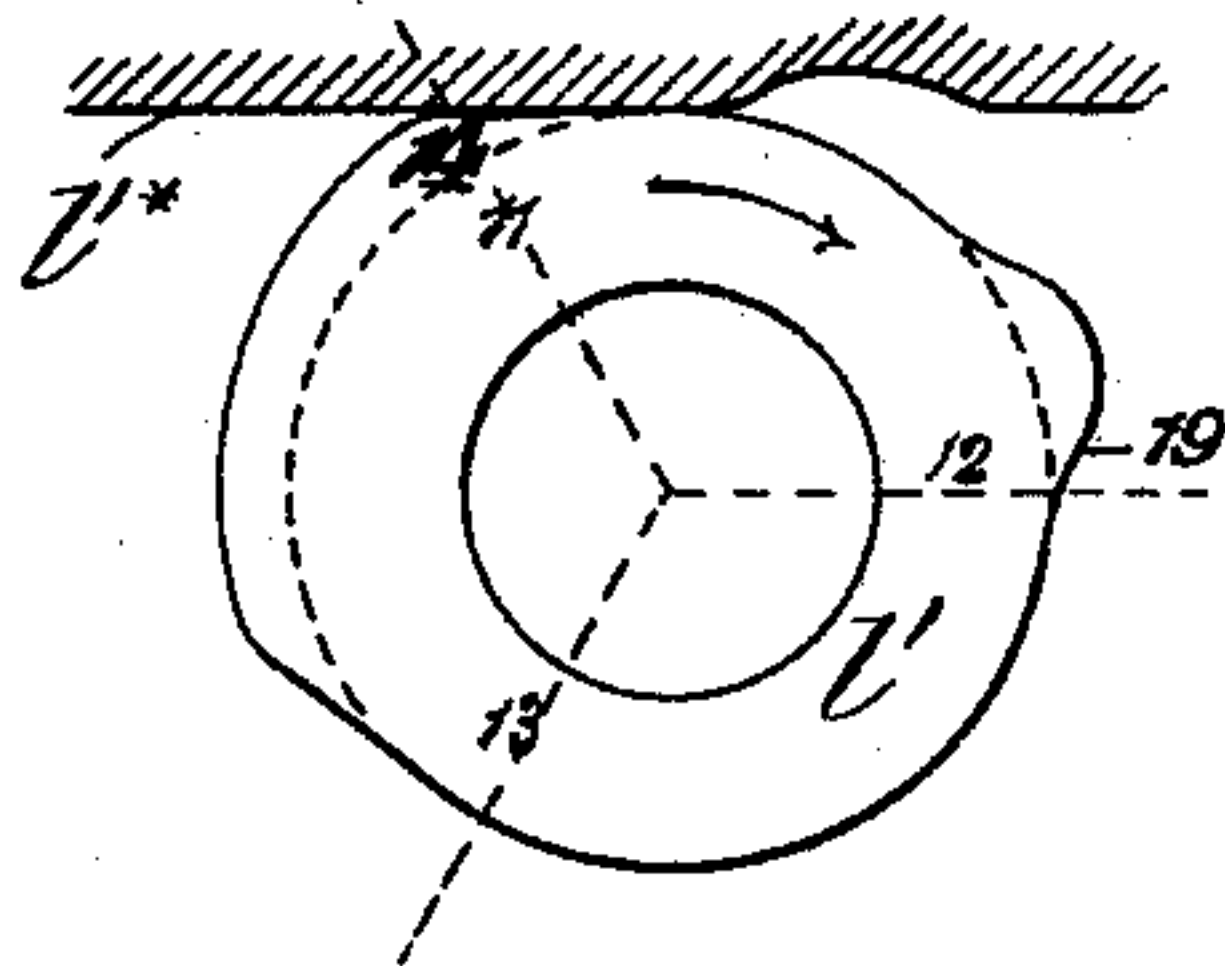


Fig. 11.

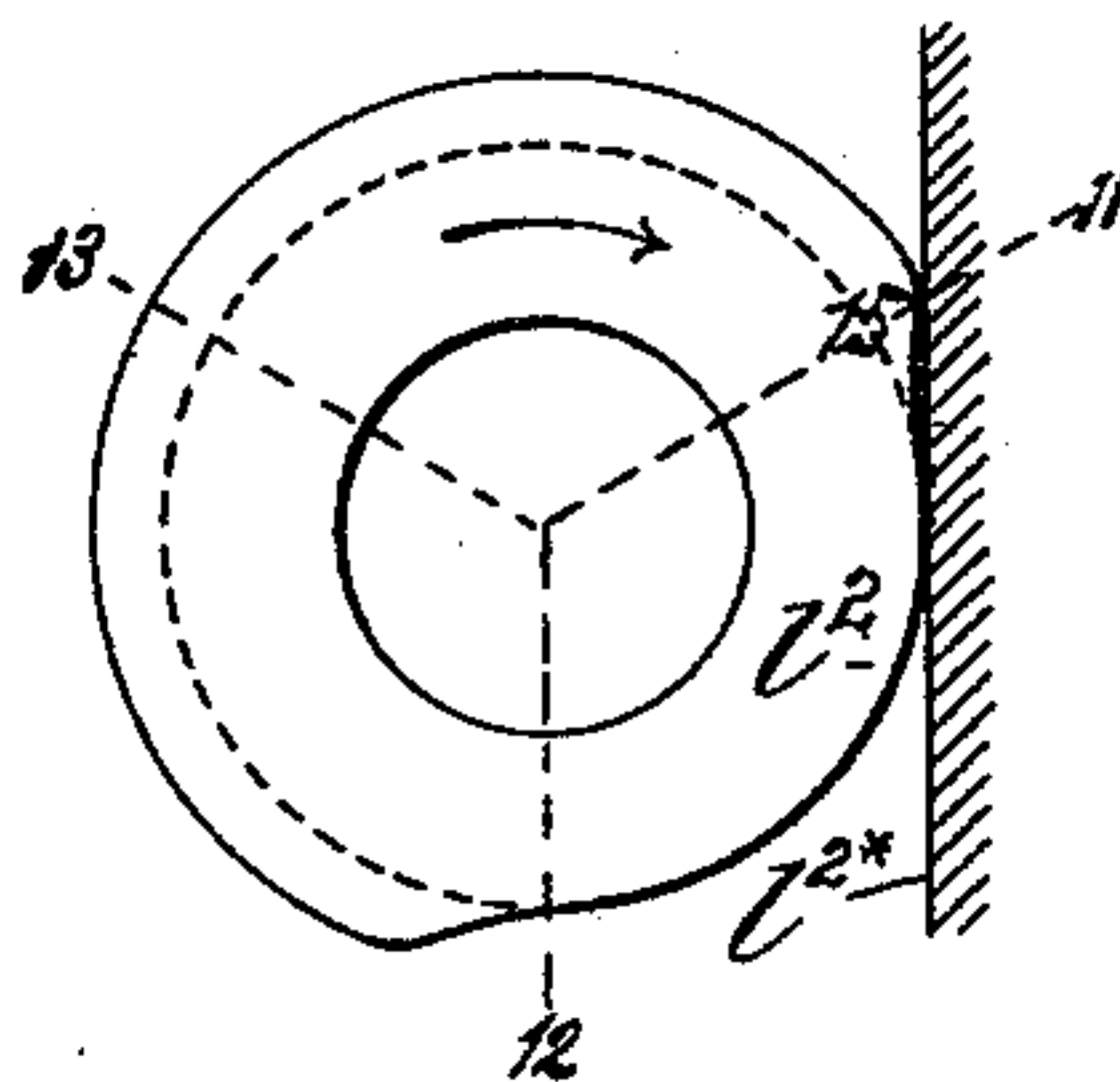
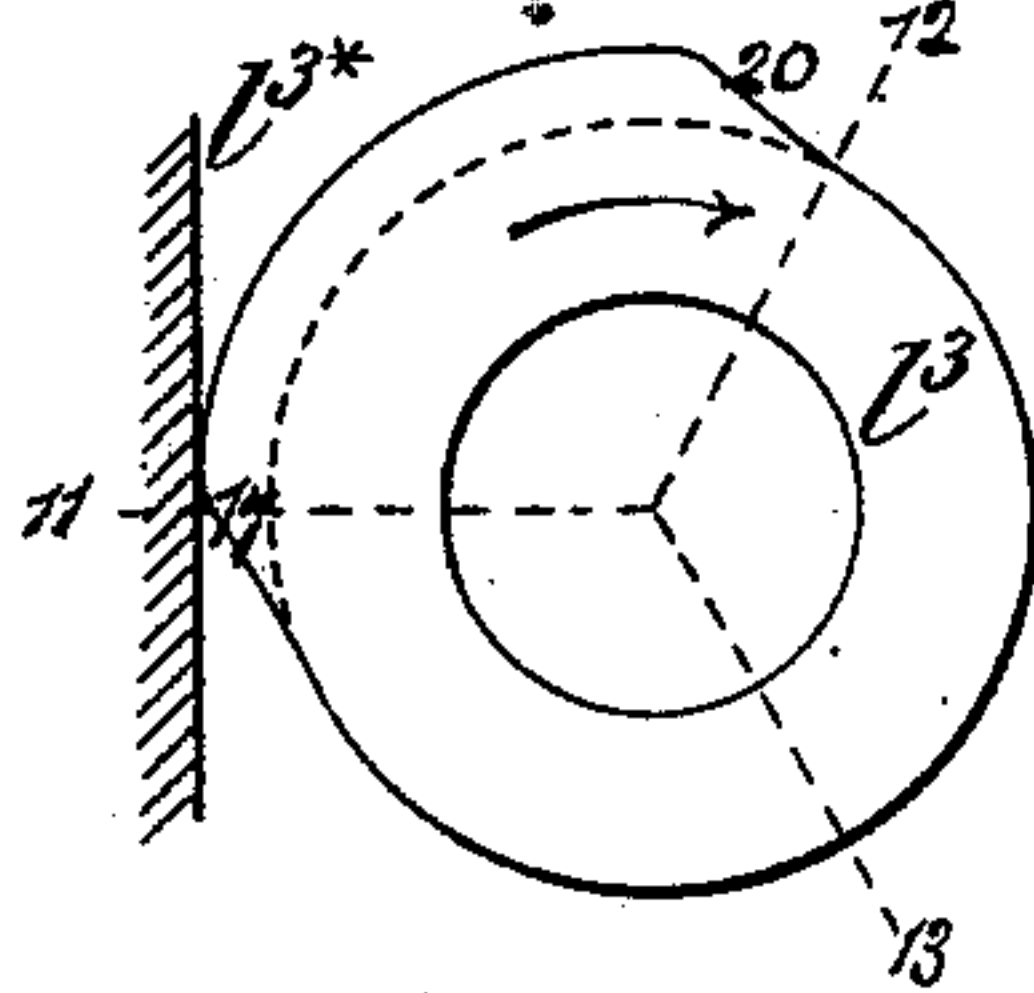


Fig. 12.



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JOHN FORBES, OF BROOKLYN, NEW YORK.

FEEDING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 414,203, dated November 5, 1889.

Application filed October 24, 1885. Serial No. 180,797. (Model.) Patented in England November 12, 1885, No. 13,830.

To all whom it may concern:

Be it known that I, JOHN FORBES, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and
5 useful Improvement in Sewing-Machines, (for which I have obtained British Letters Patent No. 13,830, dated November 12, 1885,) and of which the following is a specification.

This invention consists in the feed mechanism for sewing-machines hereinafter described and claimed, providing for the making of such stitches as require backward, forward, and lateral movements of the work, and especially for hem-stitching.

15 Figure 1 is a front elevation, partly in section, of a sewing-machine having my invention applied in a form for hem-stitching. Fig. 2 is an inverted plan of the same. Fig. 3 is a front view of the feed-bar and attached
20 presser. Figs. 4 and 5 are inverted plans (Fig. 5 being partly in section) of the cams and yoke for operating the feed-bar, on a larger scale than Figs. 2 and 3. Fig. 6 is a diagram of the face of a piece of work, showing the stitches. Figs. 7 and 8 represent
25 transverse sections through the fabric, showing the change of position relatively to the needle consequent upon its oblique forward movements in opposite directions. Figs. 9, 30 10, 11, and 12 are separate diagrams on a still larger scale than Figs. 4 and 5 of the several leaves of the feed-cam.

Similar letters of reference indicate corresponding parts in the several figures.

35 A A' designate the frame of the machine. B is the needle-bar, carrying the needle *n* and fitted to slide in a fixed guide in the head of the arm A'. B' is the horizontal main shaft of the machine, represented as furnished with
40 a crank B² for giving the needle a simple longitudinal reciprocating motion. S is the shuttle. D is the shuttle-carrier, driven by the rod F from the crank E on the upright shuttle-driving shaft C. These parts need no further description, because they resemble the
45 corresponding parts of sewing-machines in common use.

The take-up and tension-regulating devices are not shown, as they may be such as are
50 used in ordinary sewing-machines.

G is the feed-bar or feeder-carrier, having

rigidly attached to it the ordinary rough-surfaced feed-dog or feeder *g*. This feed-bar is supported below the bed-plate in a horizontal or nearly horizontal position by means of
55 a screw *a*, screwing into the bed-plate, and a plate *b*, secured to the said plate by a screw *c*, the said bar being capable of a vibratory or lever-like movement upon the screw *a* as a fulcrum, for the purpose of producing the
60 backward and forward movements of the fabric to be stitched, and being capable, also, of a longitudinal movement, which is permitted by its being slotted at *d*, where it receives the
65 screw *a*, the said longitudinal movement taking place simultaneously with the vibratory movement, for the purpose of producing a lateral movement of the fabric, which causes the forward movements to be produced
70 obliquely in opposite directions.

75 H is the presser, which, instead of being fitted to the head of the sewing-machine independently of the feed-bar or feeding device, is attached directly to and carried by the feed-bar. The said presser consists of a lever, which
80 is pivoted to the feed-bar by a fulcrum-pin *e*, and projects upward therefrom through an opening in the bed-plate. A spring *f*, attached to the feed-bar, presses upon the said presser H in such manner as to exert a constant tendency to press its foot *h* downward toward
85 the feed-dog *g*, for the purpose of clamping to the said dog the fabric placed between them. A cam-lever I is also pivoted to the feed-bar at *i*, for the purpose of operating
90 upon the presser to raise it from the feed-dog to permit the introduction of the fabric between them. The feed-bar G, thus supported and having the presser thus attached to it, is connected by a pivot *j* with a lever J,
95 which is arranged transversely to the said bar, and is slotted at one end, as shown at *k* in Fig. 2, to receive a fixed fulcrum-pin *j'*, secured in the bed-plate. The said lever J is pivoted at the other end by a pin *j*² to a yoke-
100 bar L', which is provided with a yoke L², which receives the feed-cam L, which will be presently described, the said yoke-bar being slotted to receive a guide-block *m*, which is pivoted to a fixed fulcrum-pivot *p*, secured in
the bed-plate, and being capable both of a longitudinal movement upon the said guide-

block and a vibratory or lever-like movement with the said guide - block upon the said pivot *p*.

The cam *L*, which operates in the yoke *L*² to produce all the movements of the feed-bar necessary for the production of the hem-stitch, is represented as carried by a horizontal spur-gear *M*, which is fitted loosely to a stud or fixed upright shaft *q*, firmly secured in the bed-plate, and which gears with a spur-gear *P*, of one third of its own size, fast on the upright shaft *C*, which carries the shuttle-driving crank *E*. The said cam therefore makes but one revolution for every three stitch-producing movements of the needle and shuttle. The said cam is composed of four leaves *l l' l² l³*, in different planes of revolution, operating on the four sides *l* l'* l^{2*} l^{3*}* of the yoke *L*², which are also in different planes to correspond with the cam-leaves, the leaf *l'* operating on the side *l'** of the yoke to produce the forward movements of the feeder, the leaf *l* operating upon the side *l** to produce the backward movements of the feeder, and the leaves *l²* and *l³* operating, respectively, on the sides *l^{2*}* *l^{3*}* to produce lateral movements of the feeder in opposite directions simultaneously with the successive forward movements, whereby the said forward movements are caused to take place obliquely in opposite directions to produce the diagonal portions of the stitching, as will presently be more fully described. Besides the said cam *L*, there is also carried by the spur-gear *M* a cam *r*, for lifting the foot *h* of the presser from the feeder at proper intervals, as will presently be explained. This cam *r* is represented as simply a small protuberance on the under face of the spur-gear, and it acts on the opposite end of the presser-lever to that on which the foot *h* is situated.

Before describing in detail the action of the several cam-leaves *I* will explain the movements of the feeder and presser and of the fabric in making the three separate and successive stitches necessary to produce the hem-stitch with reference to Figs. 6, 7, and 8, in which the line 10 represents the inner edge of the hem, the single fabric being on the left of this line and the doubled fabric of the hem on the right.

I will first suppose the needle to have passed through the hem, as shown in Fig. 7, and returned from it at the point *, Fig. 6, and that a stitch has been completed at that point. The first movement of the fabric held by the combined feeder and presser is then forward and laterally to the right, and brings the single part of the fabric opposite the needle, as shown in Fig. 8, so that the next operation of the needle produces the diagonal stitch 1 from the hem to the single fabric. The second movement is directly backward, so that the next operation of the needle produces the stitch 2 entirely on the single part of the fabric. The third movement is forward and laterally to the left, so that the hem is again

brought under the needle, the next operation of which produces the diagonal stitch 3 from the single fabric to the hem. The three stitches thus produced make a complete hem-stitch, and this has been made while the fabric has been held between the feeder and presser. To prepare for a new hem-stitch, the cloth has to be released from the feeder, and hence, while the needle is in the hem in the act of forming the stitch 3, the presser is lifted by the action of the cam *r* to liberate the fabric, and the feeder and presser move back to take a new hold of the fabric for a repetition of three stitches, like 1 2 3; but the presser comes down again and secures the fabric to the feeder before the needle leaves the fabric, and then, after the needle has left the fabric, the latter is again moved forward and to the right to enable the needle to pass again through the single part of the fabric and make a new diagonal stitch, like 1. The next backward movement to make a new stitch, like 2, in the thin part of the fabric brings under or very nearly under the needle that point in the fabric where the first-mentioned stitch 1 was finished and the first-mentioned stitch 2 was commenced, and hence the needle passes twice through the single fabric in or near every hole therein, and the result is the making in the thin part of the fabric of very large holes, which are further enlarged by the drawing tight of the stitches.

The construction of the cam-leaves *l l' l² l³* to produce the hereinabove-described movements of the feed is clearly represented in Figs. 9, 10, 11, and 12, which are diagrams of the separate leaves and of the sides *l l'* l^{2*} l^{3*}* of the yoke, upon which they respectively operate. The radial lines 11 12 13 indicate the correspondingly operative portions of the three leaves at intervals of one hundred and twenty degrees, or one-third of a revolution, apart. The positions represented are those occupied at the time of the withdrawal of the needle preparatory to making the stitch 1. The step 14 of the leaf *l'* is now about to operate upon the side *l'** of the yoke to produce the forward movement, while the step 15 on the leaf *l²* is about to operate upon the side *l^{2*}* for the purpose of producing the movement to the right, the steps 16 17 of the leaves *l* and *l³*, respectively, moving away to permit the said movements for the production of the diagonal stitch. After the completion of the stitch 1, and the cam having made a third of a revolution, the step 18 of the leaf *l* will come into operation on the side *l** of the yoke to produce the backward movement for making the stitch 2. After the completion of the last-mentioned stitch, when the cam will have made another third of a revolution, the step 19 of the leaf *l'* will come into operation on the side *l'** of the yoke to produce another forward movement, while the step 20 of the leaf *l³* comes into operation on the side *l^{3*}* of the yoke to produce the

lateral movement for producing the diagonal stitch 3. As soon as the needle has entered the fabric after the forward movement produced by the said step 19, and the cloth is thus held by the needle, the cam *r* comes into operation on the presser to lift the foot *h* of the latter from the feeder and release the fabric, so that the feeder and presser may move back together independently of the fabric to take a new hold thereof preparatory to the next movement forward and to the right to produce a repetition of the diagonal stitch 1. This backward movement of the feeder and the raised presser is produced by the step 21 of the cam-leaf *l*. As the said backward movement and the last-preceding forward movement have to be performed during the one-third of a revolution of the cam, during which the parts of the circumference of the leaves *l* and *l'* between the lines 11 12 are operative on the sides *l** *l'** of the yoke, the offsets of the leaves *l'* and *l* behind the steps 19 and 21 are quite short, both having to be included within sixty degrees of the circle of the cam.

It will be observed that the offsets behind the steps 14 and 20 are each nearly equal to one-third the circumference of the cam, so that after having moved the cloth to the positions, respectively, for producing the stitches 1 and 2, they will so hold it in the proper position forward or backward; and it will also be observed that the offset behind the step 15, which moves the feeder to the right, occupies nearly two-thirds of the circumference, in order that it may hold the feeder in the

position in which it has been moved to the right, while the two stitches 2 and 3 are made by the operation of the needle in the single part of the fabric.

I am aware that stitching precisely similar to that produced by my invention has been produced by a sewing-machine in which forward and backward movements were given to the feeder and a lateral movement was given to the needle; but my invention much simplifies the machine by dispensing with the cam and the other mechanism for producing the lateral movement of the needle, and producing by the feeder alone all the movements necessary to make the needle operate in two lines. By making the feeder produce all those movements I am enabled to apply my invention to any sewing-machine without changing any of its parts but the feeding mechanism.

What I claim as my invention, and desire to secure by Letters Patent, is—

The combination, with the upright shuttle-driving shaft, the feed-bar, and the feed-cam *L*, geared with said shaft to make one revolution and produce three feeding operations for every three revolutions of said shaft, of the presser attached to the said feed-bar and the presser-lifting cam *r*, attached to the said feed-cam, for lifting the presser at every third feeding operation, substantially as herein described.

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Witnesses:

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