(No Model.)

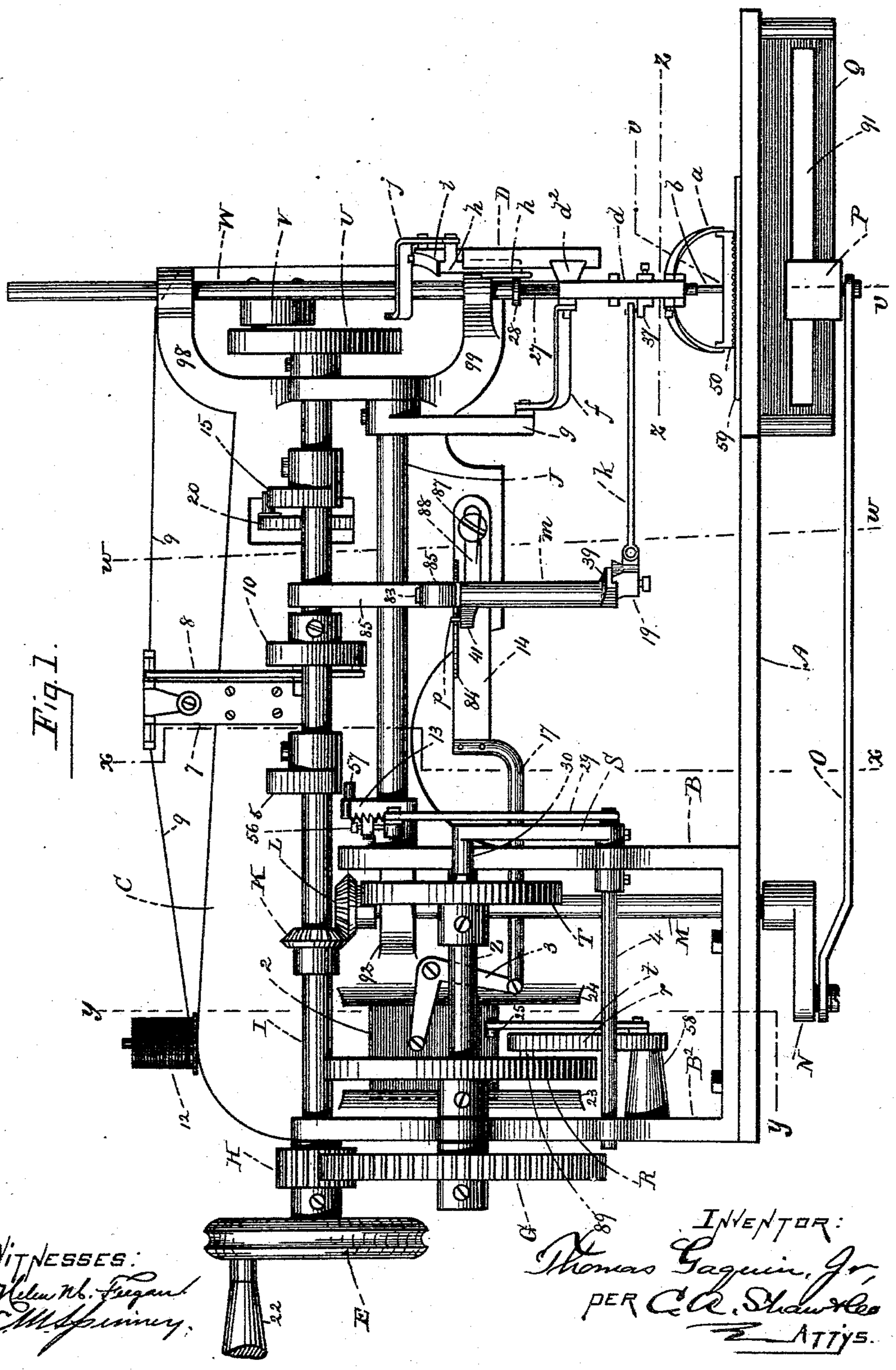
4 Sheets—Sheet 1.

T. GAQUIN, Jr.

SEWING MACHINE.

No. 414,514. Patented Nov. 5, 1889.

Fig. 1.



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SEWING MACHINE.

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Fig. 3.

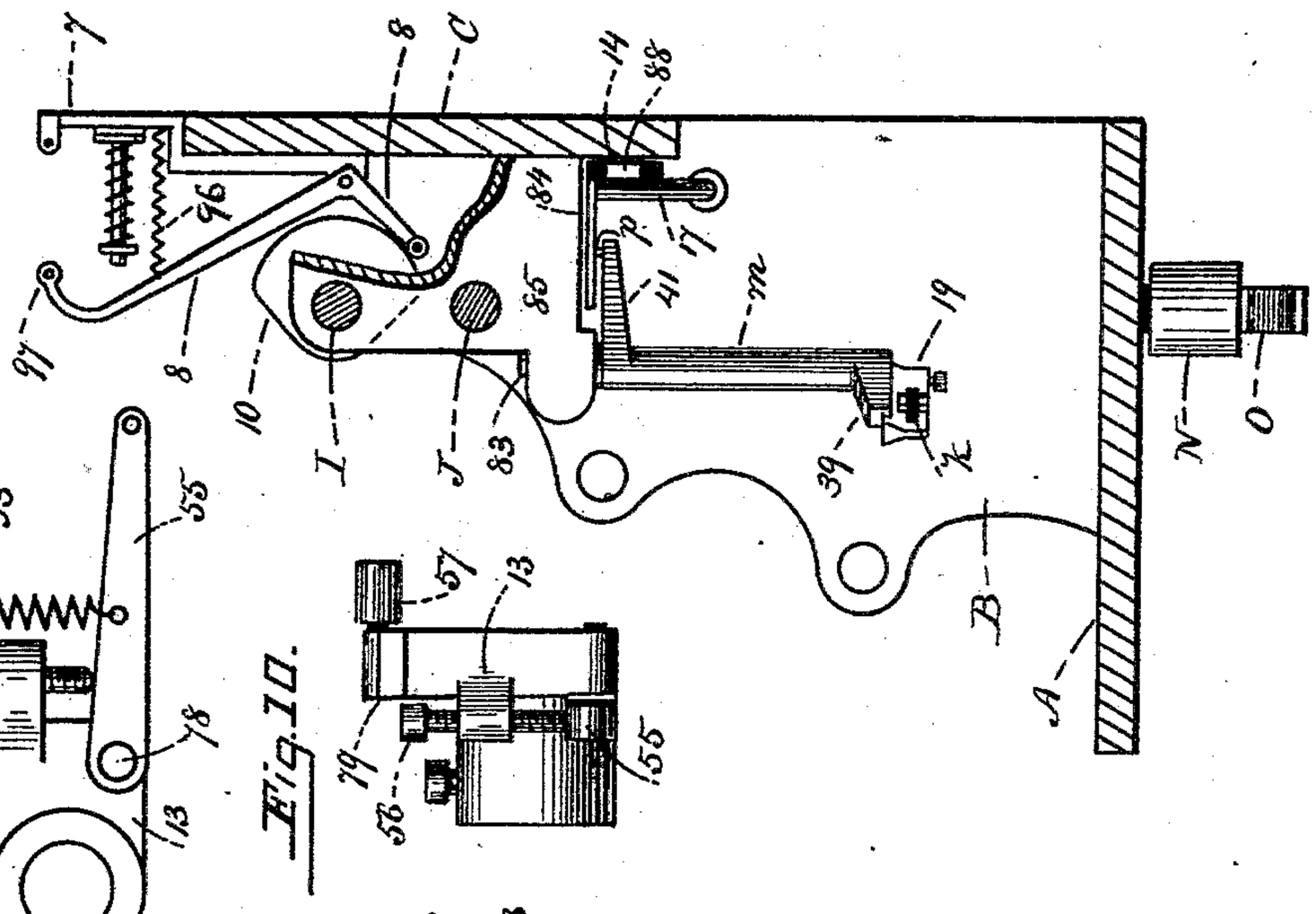


Fig. 9.

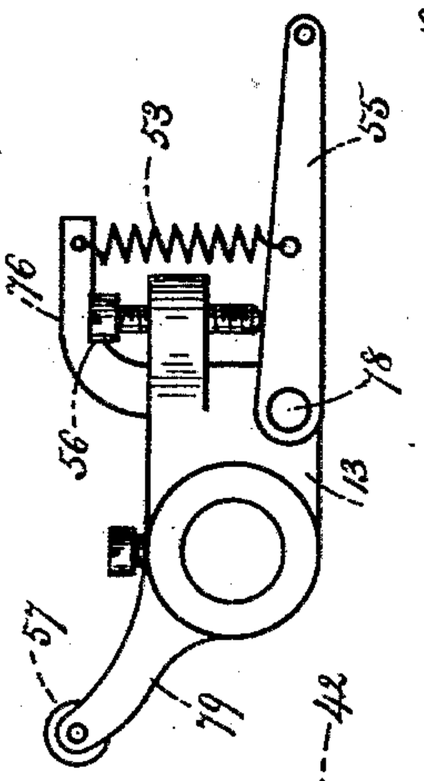
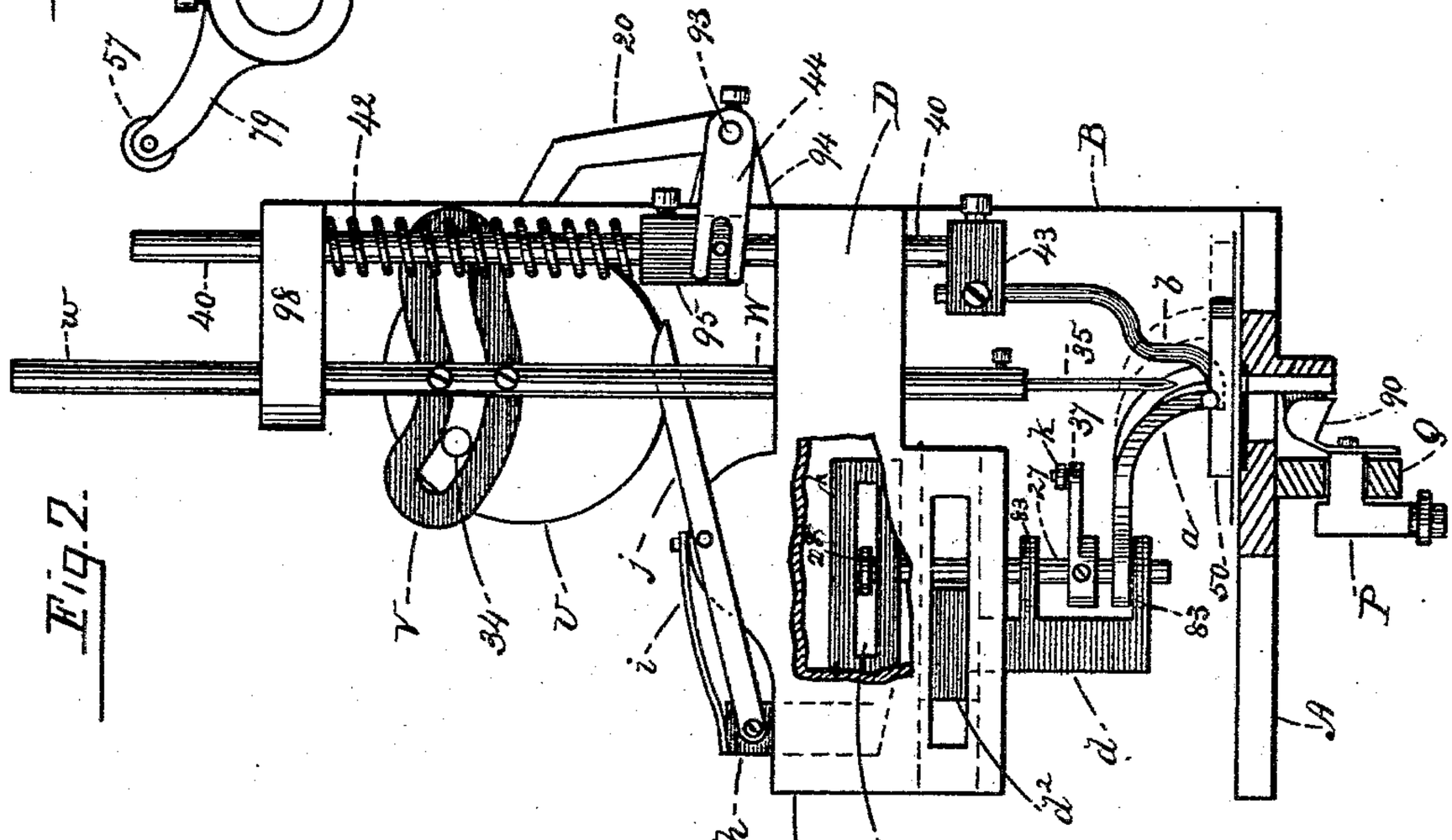


Fig. 10.

Fig. 2.



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SEWING MACHINE.

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Fig. 7.

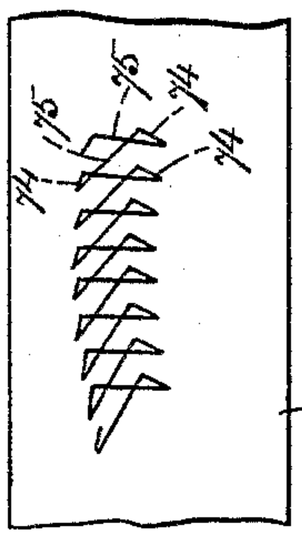

Fig. 8.

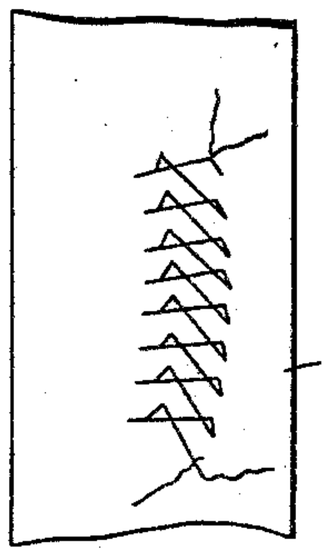

Fig. 6.

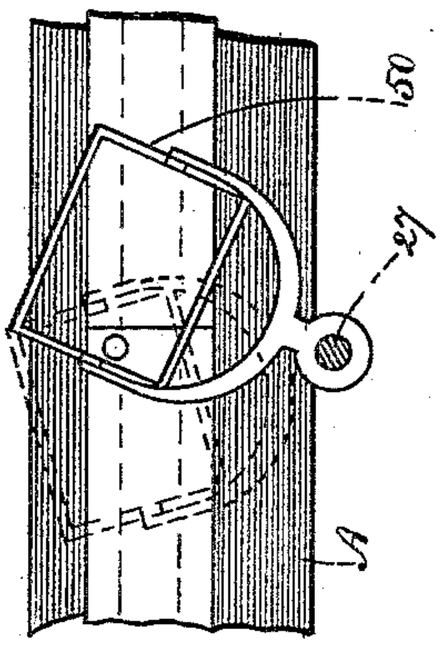

Fig. 5.

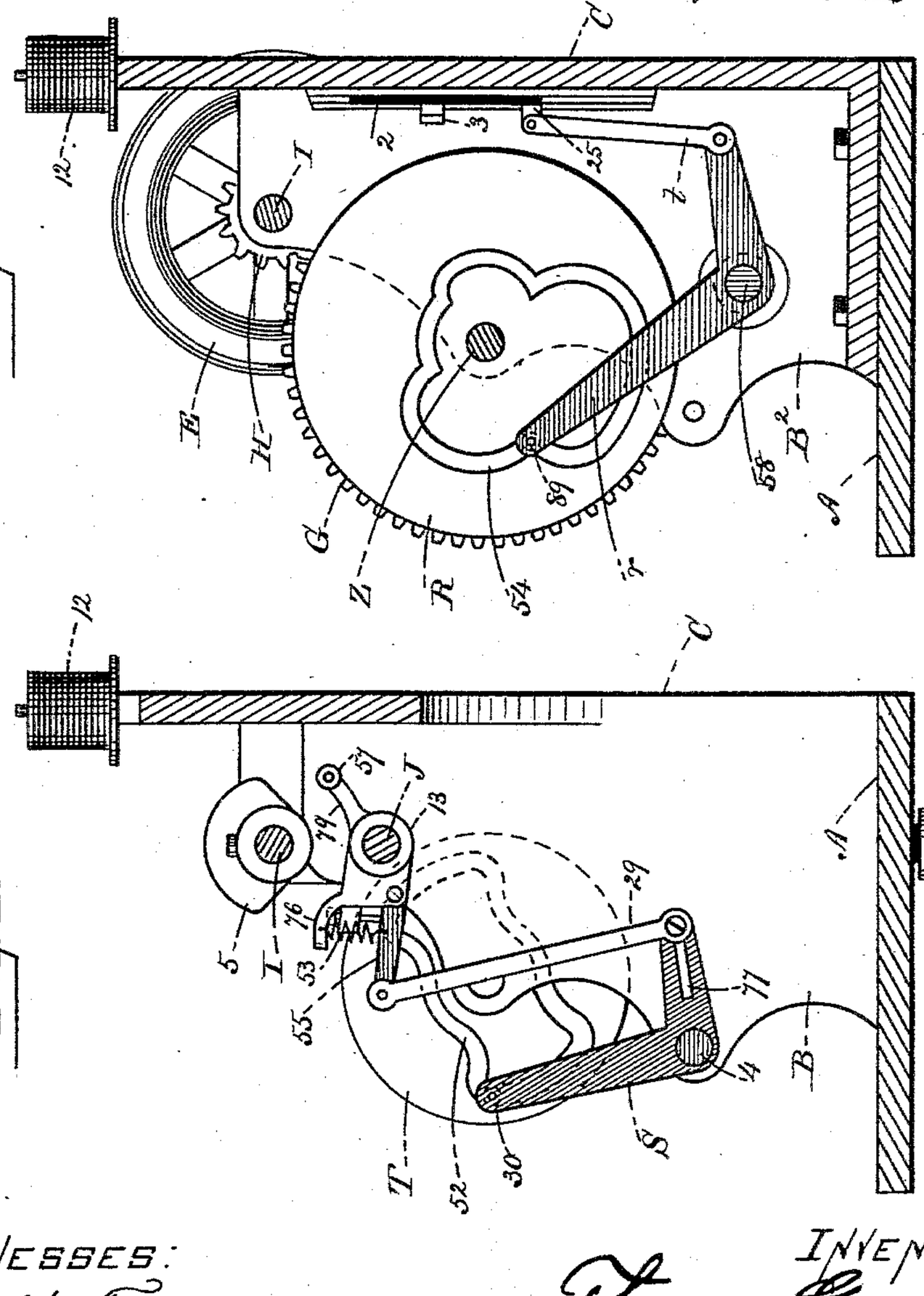

Fig. 4.

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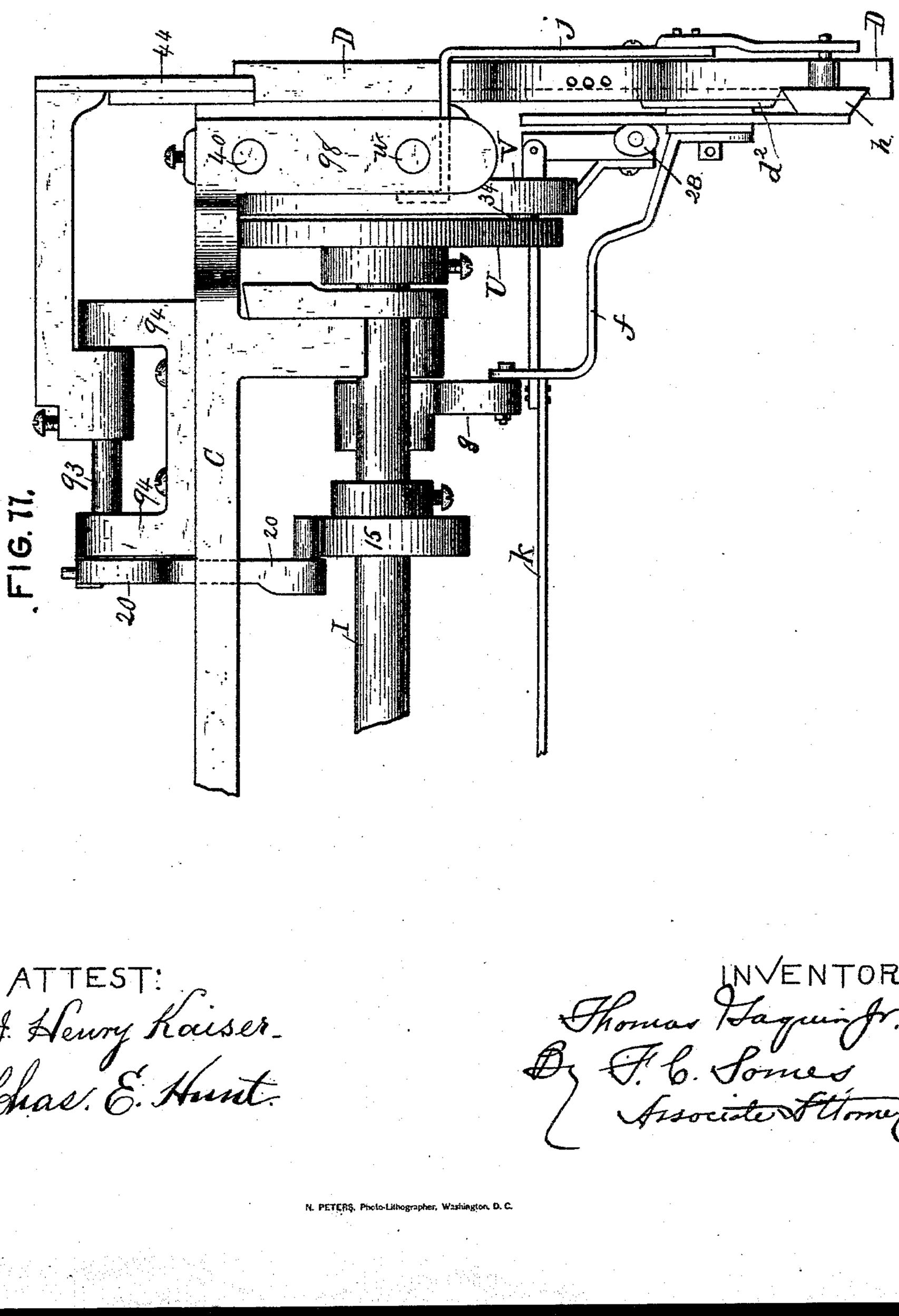

FIG. 11.

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UNITED STATES PATENT OFFICE.

THOMAS GAQUIN, JR., OF HAVERHILL, MASSACHUSETTS.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 414,514, dated November 5, 1889.

Application filed October 31, 1888. Serial No. 289,644. (No model.)

To all whom it may concern:

Be it known that I, THOMAS GAQUIN, Jr., of Haverhill, in the county of Essex, State of Massachusetts, have invented a certain new and useful Improvement in Sewing-Machines, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a rear elevation of my improved sewing-machine; Fig. 2, an end elevation of the same, certain parts being shown in vertical transverse section on line *v v* in Fig. 1; Fig. 3, a vertical transverse section taken on line *w w* in Fig. 1; Fig. 4, a like view taken on line *x x* in Fig. 1; Fig. 5, a similar view taken on line *y y* in Fig. 1; Fig. 6, a top plan view illustrating the movement of the feed, the bar being shown in section on line *z z* in Fig. 1; Figs. 7 and 8, respectively, top and bottom plan views showing the stitch; Figs. 9 and 10, side and end views enlarged, illustrating certain details of construction. Fig. 11 is a plan view of the head of the machine, omitting the spring on the top of the bracket-supporting portions of the feed-foot oscillating and reciprocating mechanism.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates especially to that class of sewing-machines known as "variable-stitch machines;" and it consists in certain novel features, as hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper, and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A represents the table of the machine, B B^2 the standards, and C the arm, the standards and arm being secured to the table in the usual manner. A longitudinally-arranged rotating shaft I is journaled horizontally in the top of the standard B^2 and the forward end of the arm C, said shaft bearing a driving-pulley E, provided with a crank 22 on its rear end. A horizontal shaft Z is journaled in the standards B B^2 and bears a gear-wheel G on its rear end, which intermeshes with a pinion on the shaft I. A horizontal rocking shaft J is journaled in the top of the standard B and forward end of the arm C, said shaft being preferably disposed directly under the shaft I. The needle-bar W is fitted to slide vertically in the arms 98 and 99 on the forward end of the arm C and is actuated by a disk U, secured to the forward end of the shaft I, said disk being provided with a crank-pin 34, which works in a cam-block V, secured to said needle-bar. The thread-spool 12 is disposed on a spindle at the rear of the arm C in the usual manner, the thread 9 passing through an ordinary tension mechanism 7 on said arm, thence through a slot in the arm 98 and into the needle 35 in the bar W. A "take-up" lever 8 (see Fig. 3) is pivoted to the lower end of the tension 7, the thread passing through an eye 97 in the upper end of said lever, which is connected with said tension by a coiled spring 96, and is actuated by a cam 10 on the shaft I, engaging the short arm thereof. A presser-bar 40 (see Fig. 2) is fitted to slide vertically in the arms 98 and 99, an ordinary presser-foot *b* being adjustably disposed in a block 43, secured to the lower end of said bar. The bar is depressed in the usual manner by a coiled spring 42, disposed around the same between the arm 98 and a block 95 on said bar. A forked lever 44, adapted to receive a pin on the block 95, is pivoted by a pin 93 in a bracket 94 on the front of the arm C, a crank-lever 20 (see Fig. 1) being secured to the opposite end of said pin and projecting through the arm C, where it is engaged by a cam 15 on the shaft I, by means of which it is actuated to elevate said presser-bar.

A vertical shaft M is journaled in the table A and a bracket 92 on the rear of the arm C, said shaft bearing a beveled gear L on its upper end, intermeshing with a similar gear K on the shaft I and provided on its lower end with a crank N. A horizontal link O is pivoted to the outer end of the crank N and to a shuttle-block P, which slides in a slot 91 in a guide-plate Q on the under side of the table, the shuttle-holder 90 being secured to said block. The action of the shuttle is the same as

in ordinary lock-stitch machines of this character. A cam-wheel R is secured on the shaft Z, near the standard B^2, and is provided in its face with an eccentric cam-groove 54, (see Fig. 5,) the purpose of said cam and its connecting mechanism being to impart a reciprocating longitudinal movement to the feed-foot 50, hereinafter described. A plate 2 is fitted to slide vertically in ways 23 and 24 on the arm C. A bell-crank lever *r* is pivoted to a horizontal arm 58, secured to the standard B^2, one end of said lever being provided with a roll 89, which projects into the cam-groove 54 of the wheel R, and the opposite end being pivoted to a link *t*, the upper end of which is pivoted to a stud 25 on said sliding plate. A bell-crank lever 3, pivoted to the arm C, has one arm pivoted to the sliding plate 2 and its opposite arm to the rear end of a rod 17, fitted to slide horizontally through the standard B. To the forward end of the rod 17 is secured a horizontal plate 14, (see Fig. 1,) provided with a slot 88 on its forward end to receive a guide-screw 87, secured in the arm C.

The arm C is provided, near the take-up lever 8, with a rearwardly-projecting bracket 85, through which the shafts I J pass, and in which a vertical stub-shaft 83 is secured in the outer end of said arm. A sleeve *m* (see Fig. 3) is fitted to rotate on said stub-shaft, and is provided on its lower end with a foot 39, provided with a horizontal dovetail groove, and on its upper end with an arm 41, having a vertical pin *p* on its outer end, which slides between the arms of a horizontal forked plate 84, secured to the sliding plate 14. The arm 99 on the arm C is provided with a rearwardly-projecting bracket D, (see Fig. 2,) and fitted to slide in the rear end of said bracket and in the direction of the feed by means of a dovetail block d^2 is a downwardly-projecting plate *d*, having horizontal arms 83, in which is journaled a vertical shaft 27.

The feed-foot 50 constitutes a skeleton frame preferably rectangular in form, as shown in Fig. 6, and is centrally pivoted between the arms of a downwardly-curved forked bracket *a*, the rear end of which is secured to a vertical shaft 27, said foot being so disposed that the presser-foot *b* and needle 35 will work within it.

A dovetail block 19 (see Fig. 1) is detachably secured in the dovetail foot of the sleeve *m*, and a horizontal rod *k* is pivoted to said block and to the outer end of a lever 37, secured on the shaft 27.

It will be seen that the feed 50 is moved on the arc of a horizontal circle of which the vertical shaft 27 is the center by the mechanism thus far described, which is actuated by the cam-wheel R. A disk 28 (see Fig. 2) is secured to the top of the shaft 27 and is fitted to work in a horizontal slot 82, formed in a plate *h*, which is fitted to slide vertically in a groove (not shown) on the inner face of the bracket D. A rod *j* is pivoted centrally to the bracket D, and has one end pivoted to the top of the plate *h*, the opposite end of said rod being free and projecting into the path of the cam-block V on the needle-bar W. A flat spring *i* is secured at one end to the bracket D, its free end engaging the top of the plate *h* and tending to force the same downward. As the needle-bar descends the link V engages the inner end of the rod *j*, forcing it downward, and thereby raising the plate *h* and causing it to draw up the shaft 27 and elevate the feed-foot 50, the spring *i* forcing these parts back again as soon as released from said link. A cam-wheel T, provided with an eccentric cam-groove 52 (see Fig. 4) in its face, is secured to the shaft Z. A bell-crank lever S is pivoted to the standard B, one end of said lever being provided with a roll 30, which projects into the cam-groove 52 and is fitted to work therein, the purpose of said cam-wheel and lever and the connecting mechanism hereinafter described being to impart a reciprocating transverse or "forward-and-back" movement to the feed-foot 50. A lever 13 (see Figs. 4, 9, and 10) is secured to the rocking shaft J near the standard B, said lever having a rearwardly-projecting arm 79, provided with a roll 57 in its outer end, adapted to be engaged by a cam 5 on the rotating shaft I, (see Fig. 1,) for a purpose hereinafter specified. An arm 55 is pivoted at 78 to the lever 13, and a rod 29 is adjustably pivoted in a slot 77, (see Fig. 4,) formed in an arm of the bell-crank lever S, and to the outer end of the arm 55, the rocking shaft being actuated by said cam-wheel T and the connecting mechanism described. A curved arm 76 projects outward from the upper edge of the lever 13, and a coiled spring 53 (see Fig. 9) connects said arm with the center of the pivoted arm 55. An adjusting-screw 56 is disposed in the lever 13, its point being in engagement with the pivoted arm 55, the purpose of said screw being to regulate the tension of the spring 53, and thus adjust the engagement of the roll 57 with the cam 5 on the rotating shaft.

To the forward end of the rocking shaft J is secured a downwardly-projecting crank-rod *g*, (see Fig. 1,) and pivoted to the lower end of said rod and to the sliding plate d^2 is a bar *f*, by means of which the feed-foot is moved back and forward as said shaft rocks.

The feed-foot 50 is toothed or serrated on its lower edge to prevent it from slipping on the cloth 59 when in engagement therewith.

The mechanism herein described, or its equivalent, for imparting a horizontal reciprocation of the feed-foot back and forth may be called the "horizontal reciprocator." The mechanism herein described, or its equivalent, for imparting a horizontal oscillation in the arc of a circle may be termed the "horizontal oscillator;" and the mechanism herein described, or its equivalent, for imparting a vertical movement to said feed-foot may be termed the "vertical reciprocator."

In the use of my improvement the needle-bar and shuttle mechanism operate in the usual manner. As the shaft I rotates, the cam-wheel R sets in motion the sliding plate 2, causing the lever 3 to move the rod 17 and sliding plate 14 connected therewith. This sets in motion the sleeve *m* on the shaft 83, moving the rod *k* and rocking the vertical shaft 27, causing the feed-foot 50 secured thereto to commence a circular movement, carrying with it the cloth 59, and tend to assume the position shown by the dotted lines in Fig. 6, thus feeding the cloth to form a long stitch 75 (see Fig. 7) in a line running lengthwise of the machine. The cam-wheel T, however, being in motion at the same time, rocks the shaft J and causes the crank *g* and rod *k* to slide the feed-foot shaft 27 forward by means of the dovetail plate d^2, and thus cause the feed to move the cloth, so that the stitch 75 is formed diagonally, as shown in Fig. 7. The presser-foot lever 20 is now out of contact with the cam 15 on the rotating shaft, and the spring 42 has forced the foot *b* into engagement with the cloth as the needle-bar W is completing the downward stroke. At this point the cam-block V engages the lever *j* and elevates the feed-shaft 27 by means of the sliding plate *h*, thus disengaging the feed from the cloth, which meanwhile is held by the presser-foot. As soon as the needle begins to rise and the lever *j* is freed from the cam-block V the spring *i* forces the feed-shaft down again and the foot 50 into engagement with the cloth as the needle leaves it, at which point the cam-wheel R starts to move the feed-foot back again longitudinally in a straight line; but the cam-wheel T also commences to slide the feed-shaft backward, causing the stitch to be diagonal, as shown at 74 in Fig. 7. The horizontal reciprocator is provided with an adjuster by which the length of the stitch 74 is regulated. As shown, this adjuster comprises a screw 56 in the lever 13, and by turning said screw in or out the time at which the cam 5 on the rotating shaft engages the roll 57 on said lever may be adjusted, the effect of such engagement being to hold said lever 13, and hence prevent the movement of the rocking shaft and stop the transverse motion of the feed until the needle-bar link has elevated said feed out of contact with the cloth. As soon as this occurs and the cam 5 has left the roll 57 the spring 53 acts contractively to finish the movement of the rocking shaft and starts the feed forward to get a new hold on the cloth, with which it is forced into engagement by the flat spring *j*, as described, and begins to move the cloth to form a second stitch 75. The horizontal oscillator is provided with an arc-adjuster for regulating the length of the stitch 75. As shown, this arc-adjuster comprises a sliding block 19, which may be adjusted in the dove-tailed foot 39 of the sleeve *m*, thus increasing or diminishing the leverage of the rod *k* on the feed-foot shaft 27, whereby the arc through which said foot swings is adjusted.

By changing the form of the grooves in the cam-wheels R T the character of the stitches may be varied, as desired, in a manner that will be readily understood by all conversant with such matters without a more explicit description.

It will be understood that the cam 15 is so adjusted that it will raise the presser-foot out of contact with the cloth as soon as the feed-foot engages said cloth and release the same, so that it may be acted upon by the spring 42 and be forced into engagement with the cloth as the needle-bar cam-block begins to act to raise said feed-foot. It will also be understood that the stitches are locked on the under side of the cloth by the shuttle-tread (see Fig. 8) in the usual manner.

Having thus explained my invention, what I claim is—

1. The lever 13, provided with the arms 76 and 79, pivoted arm 55, adjusting-screw 56, and spring 53, connecting the arms 76 and 55, substantially as and for the purpose set forth.

2. In a variable-stitch sewing-machine provided with the bracket D, the combination of the vertical sliding shaft 27, the pivoted feed-foot 50, secured to said shaft, the plate *h*, fitted to slide in said bracket and move said shaft, the lever *j*, pivoted to said plate and bracket and adapted to be engaged by a projection on the needle-bar and elevate said feed, and the spring *i*, for depressing said feed when released by said link, substantially as described.

3. In a variable-stitch sewing-machine, the combination of a vertical rocking shaft, as *m*, provided with a dovetail foot, as 39, a cam-wheel, as R, driven by the main shaft and actuating said rocking shaft, a pivoted feed-foot, as 50, secured to a vertical shaft, as 27, a dovetail block, as 19, adjustably disposed in the foot of said rocking shaft, and a rod *k*, pivoted to said block and feed-shaft, whereby a longitudinal reciprocating movement may be imparted to said feed and the length of said movement regulated, substantially as set forth.

4. In a variable-stitch sewing-machine, the combination of the rocking shaft J, the lever 13 on said shaft and provided with a pivoted arm, the shaft Z, geared to the main shaft I and bearing the cam-wheel T, provided with the groove 52, the bell-crank lever S, actuated by said cam-wheel and pivoted to the arm 55 of the lever 13, whereby the shaft J is rocked, the pivoted feed-foot 50, secured to the vertical shaft 27, disposed in a plate *d*, the plate d^2, fitted to slide in a bracket D, the crank *g* on said rocking shaft, and the rod *f*, pivoted to said crank and plate d^2, whereby a reciprocating transverse movement is imparted to the feed-foot as said cam-wheel is rotated, substantially as described.

5. The combination of the shaft Z, geared

to the main shaft I and bearing a cam-wheel R, provided with the eccentric groove 54, the sliding plate 2, the lever *r*, pivoted to said plate and provided with a roll working in said cam-groove, the horizontal rod 17 and plate 14, fitted to slide longitudinally on the arm C, the crank-lever 3, pivoted to said rod and the plate 2, the vertical rocking shaft *m*, having the dovetailed foot 39 and arm 41, actuated by the plate 14, the block 19, adjustably disposed in said foot, the vertical rocking shaft 27, journaled in the plate *d*, secured to the arm C, the pivoted feed-foot 50, secured to said shaft, and the crank 37 on said shaft and connected with the block 19 by the pivoted rod *k*, whereby said feed-foot may be moved longitudinally, substantially as set forth.

6. In a variable-stitch sewing-machine, the combination of a main rotating shaft, a needle-bar provided with a cam-block, a pivoted rectangular feed-foot, adjunctive mechanism actuated by said cam-block for elevating said feed-foot as the needle descends and a spring for returning the same, a cam-shaft geared to said main shaft, a cam-wheel on said cam-shaft provided with an eccentric groove, mechanism connecting said cam-wheel and feed-foot, whereby a reciprocating longitudinal movement is imparted to the feed while in engagement with the cloth, a second cam-wheel on said cam-shaft actuating a rocking shaft and mechanism connecting the same with said feed-foot, whereby a reciprocating transverse movement is imparted simultaneously with said longitudinal movement, adjusting mechanism on said rocking shaft for regulating said transverse movement, and a spring-actuated presser-foot adapted to be elevated by a cam on said main shaft when said feed-foot engages the cloth, substantially as described.

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