No. 754,934. PATENTED MAR. 15, 1904.

D. NOBLE.

FEEDING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED APR. 29, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 10.

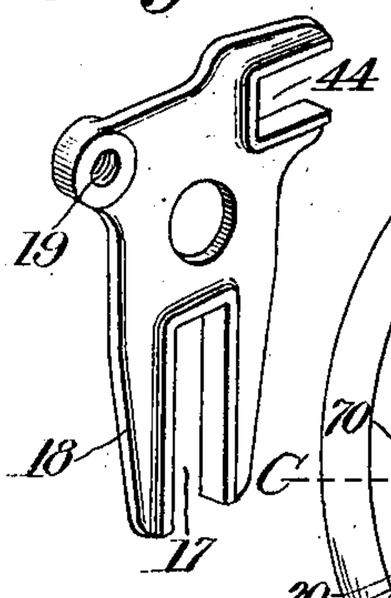

Fig. 1.

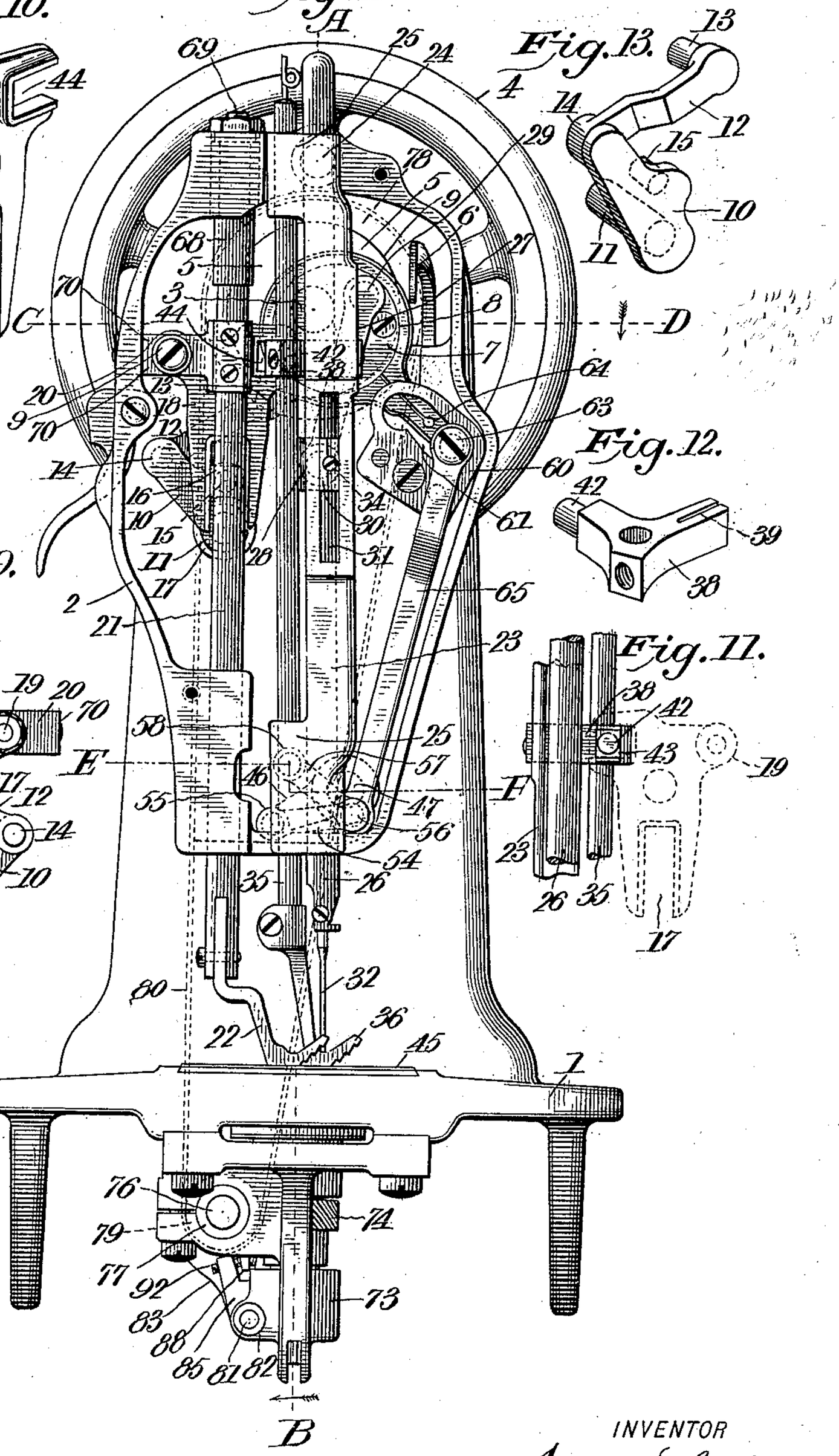

Fig. 13.

Fig. 12.

Fig. 9.

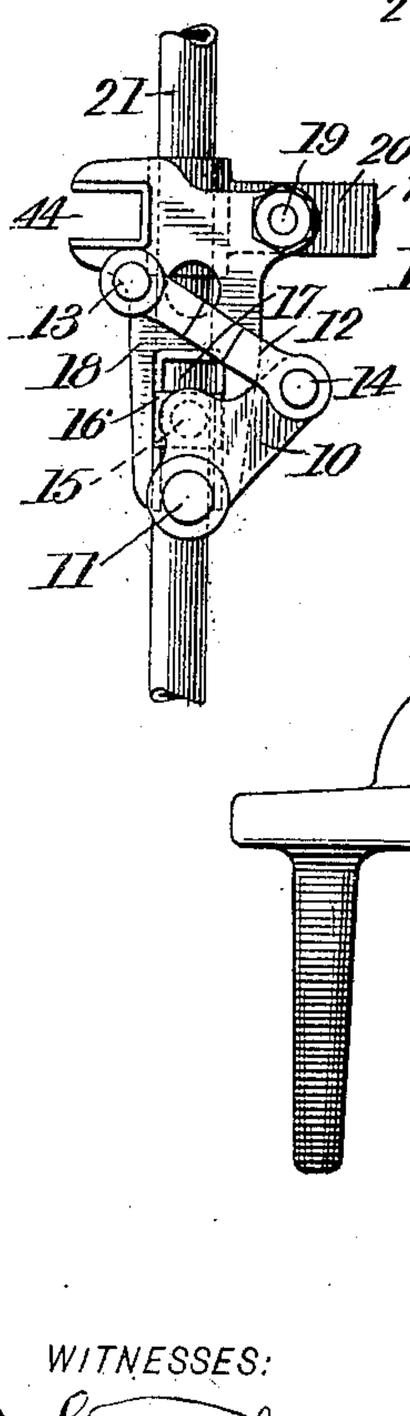

Fig. 11.

WITNESSES:

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E. C. Finckel.

INVENTOR

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BY Wm. H. Finckel

ATTORNEY

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.

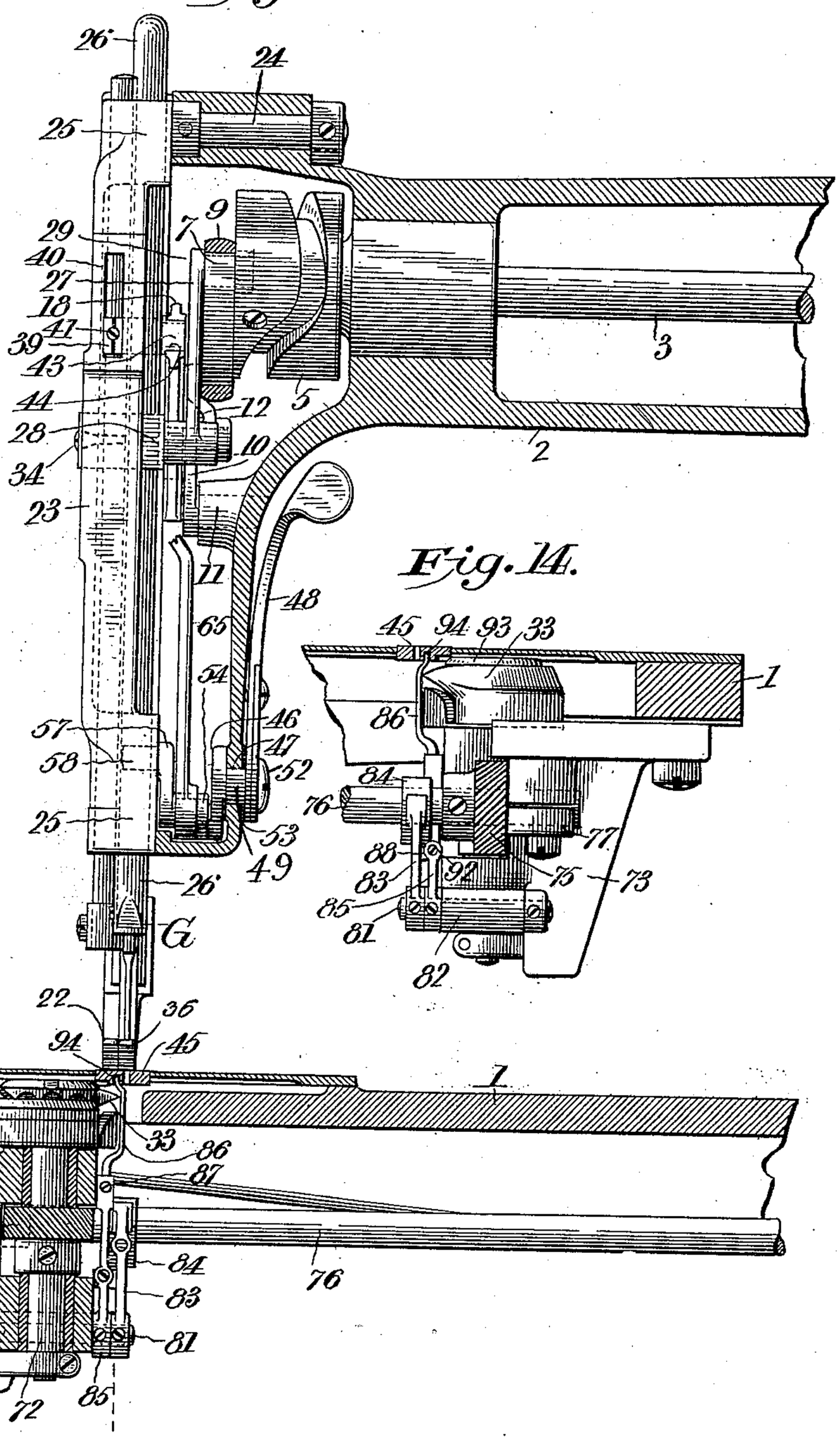

Fig. 14.

WITNESSES:

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

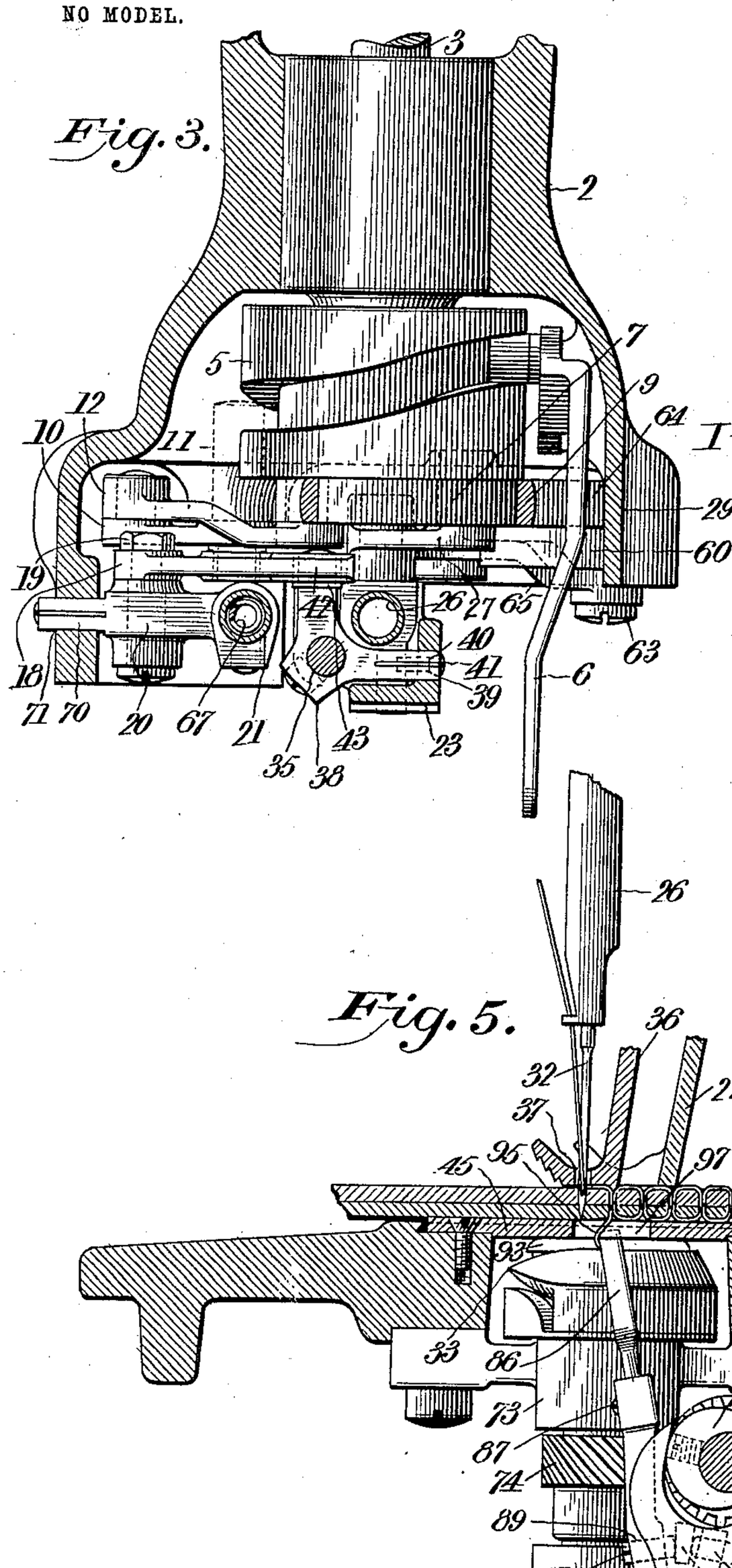


Fig. 4.

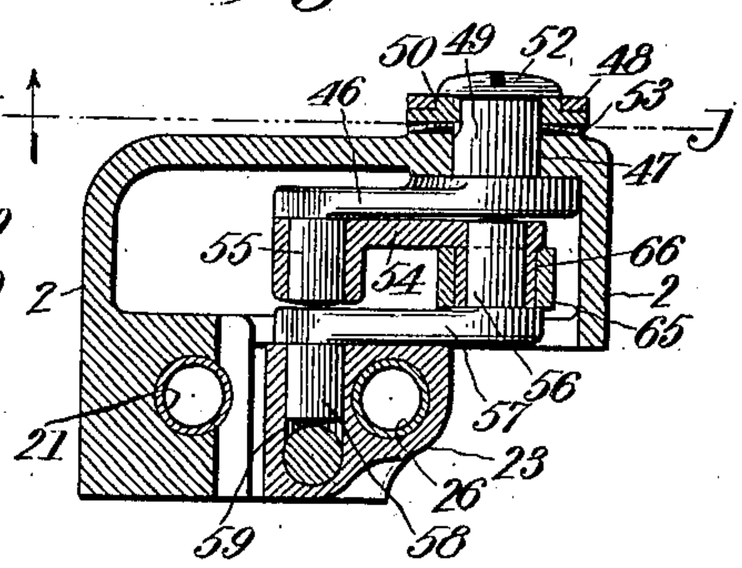


Fig. 8.

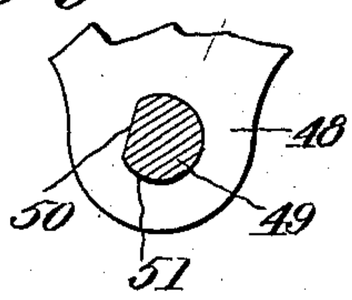
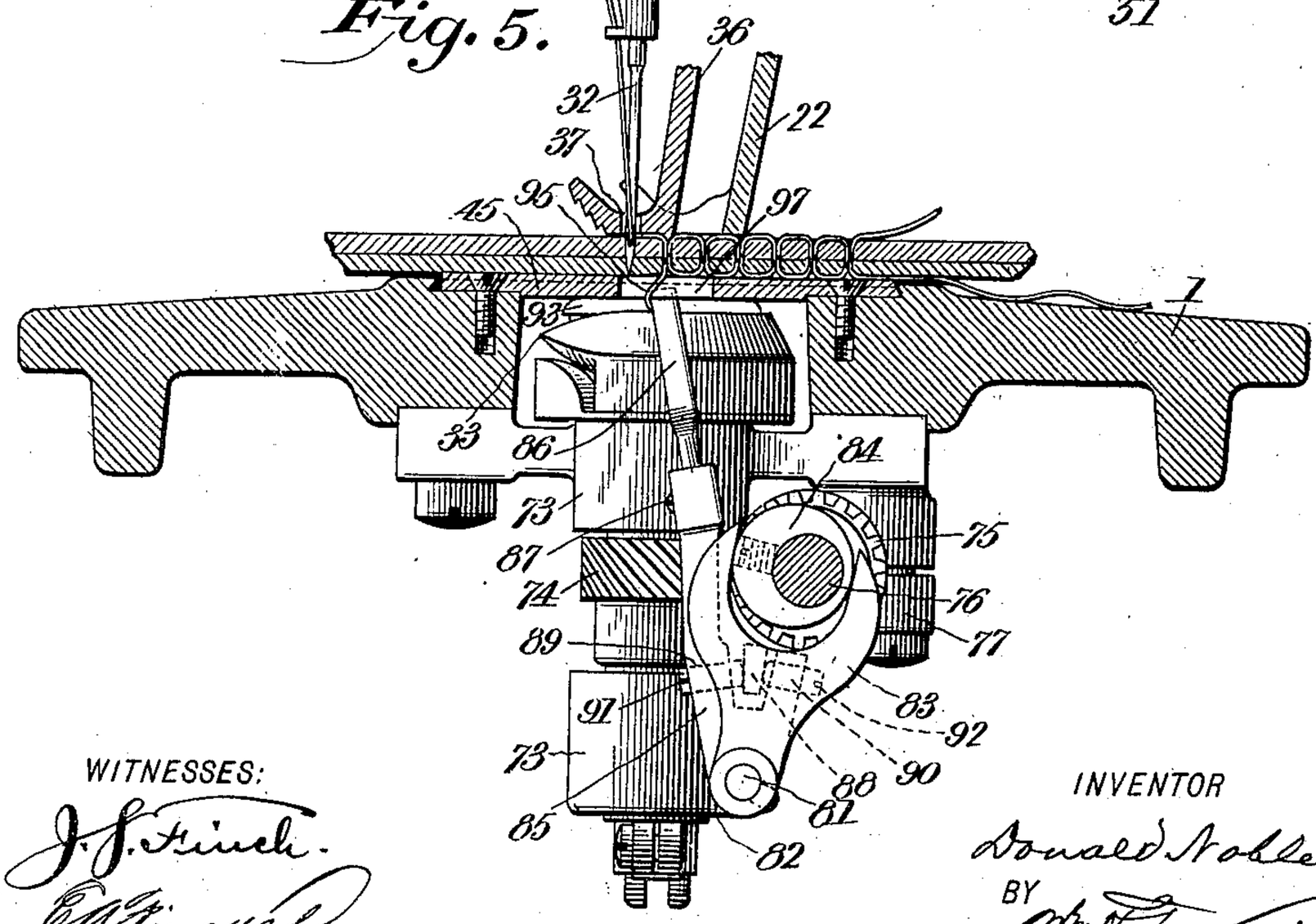


Fig. 5.



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 6.

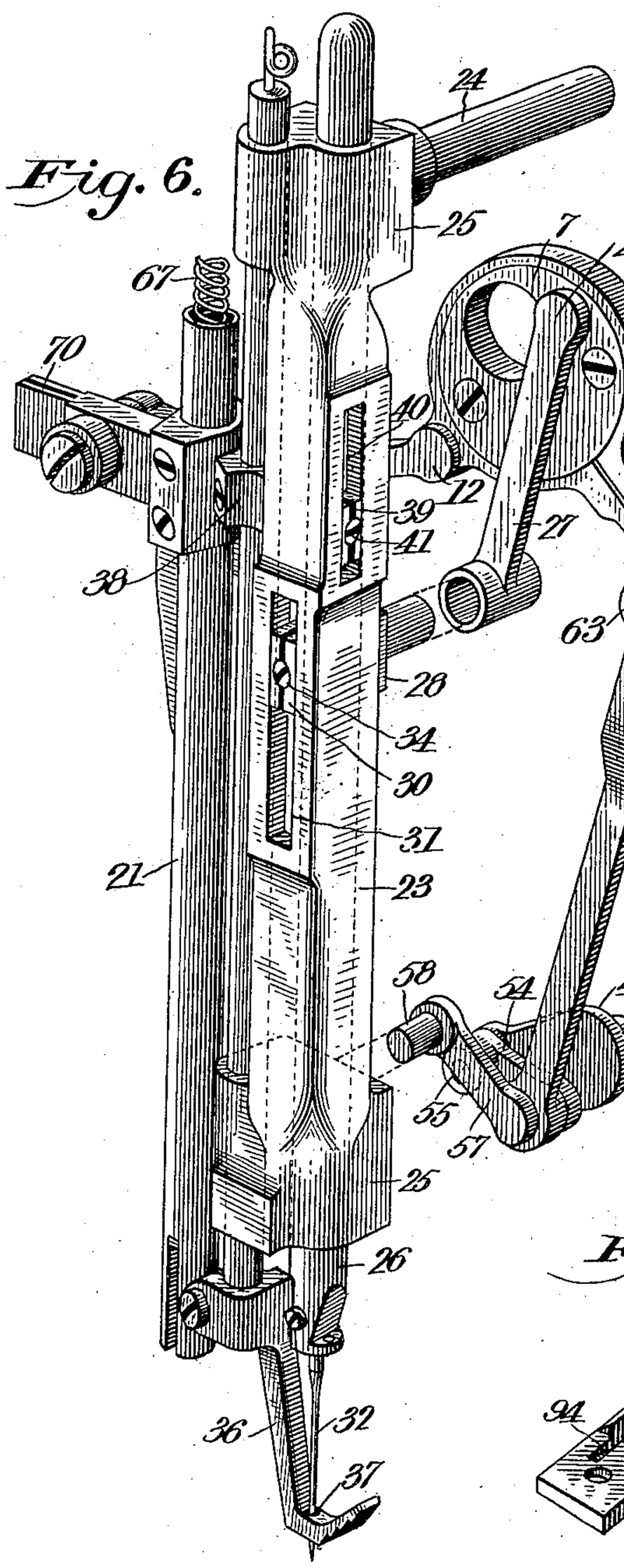


Fig. 15

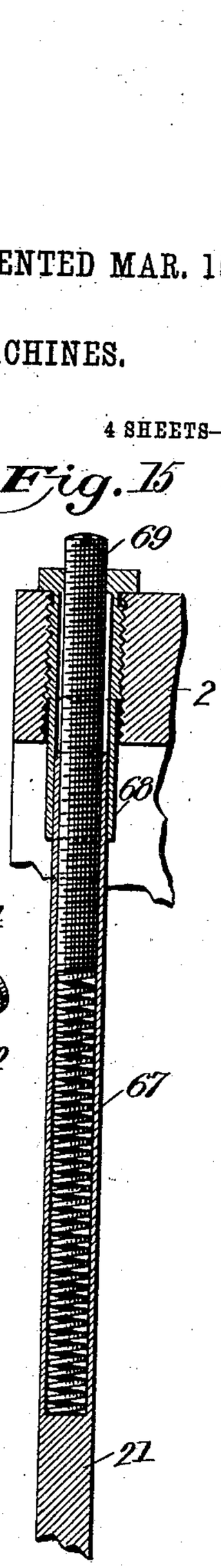
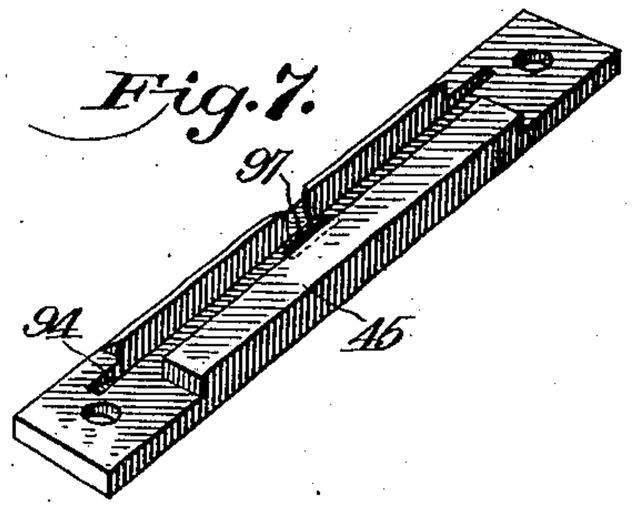


Fig. 7.



WITNESSES:

J. F. Finch.

E. A. Finch.

INVENTOR

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BY Wm. H. Finch

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No. 754,934. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

DONALD NOBLE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO WHEELER & WILSON MANUFACTURING COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

FEEDING MECHANISM FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 754,934, dated March 15, 1904.

Application filed April 29, 1903. Serial No. 154,879. (No model.)

To all whom it may concern:

Be it known that I, DONALD NOBLE, a subject of the King of Great Britain, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Feeding Mechanisms for Sewing-Machines, of which the following is a full, clear, and exact description.

This invention relates to sewing-machines of the type in which the feed of the material is effected by mechanism mounted above the work-support in the overhanging arm, as set forth in United States Patent No. 651,808, issued June 12, 1900, to me as assignor to the Wheeler & Wilson Manufacturing Company.

One object of the invention is to simplify and improve this class of machines, so as to gain increase of speed and durability and decrease of noise.

Another object of this invention is to automatically regulate the quantity of under or bobbin thread supplied at each successive stitch.

The first object is attained by a presser-bar and an oscillating frame, having mounted in it in independent bearings a needle-bar and a reciprocating feed-bar, the several movements of the presser-bar, the needle-bar, the feed-bar, and the oscillating frame being derived from the upper shaft and peculiar connecting mechanism.

The second object is attained by a peculiar under-thread take-off, coöperating with the alternating presser-feet.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is an end elevation, with the face-plate removed. Fig. 2 is a sectional elevation taken in the plane of line A B, Fig. 1. Fig. 3 is a horizontal section, on a larger scale, taken in the plane of line C D, Fig. 1. Fig. 4 is a horizontal section, somewhat enlarged, taken in the plane of line E F, Fig. 1, with the stitch-regulating parts at zero position or in such a position that no feed movement will be effected. Fig. 5 is a vertical cross-section taken in the plane of line G H, Fig. 2, and illustrating particularly the mechanism for regulating the length of bobbin-thread supplied at each successive stitch. Fig. 6 is a perspective view of the feed mechanism removed from the overhanging arm, in partly-assembled position. Fig. 7 is a perspective view of the throat-plate looking at the under side thereof. Fig. 8 is a section of the stitch-regulator, taken in the plane indicated by the line I J, Fig. 4. Fig. 9 is a rear view of parts which alternately raise and lower the presser-bar and feed-bar. Fig. 10 is a perspective view of the T-shaped rock-lever. Fig. 11 is a rear view of the feed-bar-lifting collar with its adjacent parts. Fig. 12 is a perspective view of the feed-bar-lifting collar. Fig. 13 is a perspective view of the bell-crank lever and its connecting-link. Fig. 14 is a rear elevation, partly broken, of the hook-driving and under-thread take-off mechanism, with the bed-plate in section. Fig. 15 is a longitudinal section of part of the presser-bar and connections.

1 is the bed-plate, having the overhanging arm 2, within which is journaled the driving-shaft 3, provided at its rear end with the usual balance-wheel and belt-pulley 4.

5 is a take-up cam fast on the forward end of the shaft 3, which engages a take-up lever 6, pivoted within the arm 2 in any suitable manner. 7 is an eccentric secured to the face of said cam by screws 8, and 9 is an eccentric-strap fitted around said eccentric and provided with means for its operative connection with the presser-vibrating and cloth-actuating mechanisms, respectively.

10 is a bell-crank lever pivoted at 11 within the overhanging arm 2, and 12 is a link, one end of which is pivoted at 13 to said eccentric-strap, while the other end is pivoted at 14 to the longer arm of said bell-crank lever. The shorter arm of said bell-crank lever has pivoted thereon at 15 a slide-block 16, which works within a vertical slot 17 in the lower end of a T-shaped lever 18. The lever 18 is pivoted at 19 to a collar 20, tight on a spring-depressed presser-bar 21, slidably mounted within the overhanging arm 2 in the

usual or any approved manner and provided at its lower end with a presser-foot 22.

23 is an oscillating frame the upper end of which is pivoted at 24 to the overhanging arm 2, while the lower end is operatively connected with the stitch-regulating mechanism, hereinafter described. Slidably mounted in suitable bearings 25 at opposite ends of frame 23 is the needle-bar 26, which is actuated in the usual manner by a link 27, one end of which is pivoted to a collar 28, tight on said needle-bar, and the other end pivoted at 29 to the eccentric 7. The collar 28 is provided with a flattened extension 30, which projects and slides within a slot 31 in the frame 23, thereby preventing any axial or twisting movement of said needle-bar within its bearings and insuring the thread-loop being presented by the needle 32 to the loop-taker 33 always at the same angle, so that skipped stitches, which would result from a twisting movement of the needle-bar, are avoided. The extension 30 is split and has tapped in it a tapered head-screw 34, by means of which any wear or looseness of fitting may be compensated for.

35 is a feed-bar, also mounted in bearings at opposite ends of frame 23 and adjacent to the needle-bar. 36 is a presser-foot secured to the lower end of the feed-bar 35 and having a needle-hole 37, (see Figs. 5 and 6,) through which the needle passes. This presser-foot serves to strip the material from the needle as the latter rises to form a loop and also to assist in the feeding.

38 is a collar tight on the feed-bar 35 and provided with a split extension 39, which works within a slot 40 in the frame 23 to prevent the feed-bar 35 from twisting or turning within its bearings, thereby serving to retain the presser-foot 36 in proper alinement with the needle 32 and also the presser-foot 22, carried by the presser-bar 21. 41 is a tapered head-screw tapped in the extension 39, by means of which the split portions of said extension may be spread apart to take up wear.

Pivoted at 42 to the inner side of the collar 38 is a slide-block 43, which works within a horizontal slot 44 in the upper part of the T-shaped lever 18.

The operation of this portion of the invention is as follows: The eccentric 7, through the link 12, imparts a rocking movement to the bell-crank lever 10, which is transmitted to the T-shaped lever 18 by the slide-block 16, thereby alternately raising and lowering the presser-bar 21 and feed-bar 35 by reason of the pivotal connection between said T-shaped lever and the collar 20, fastened to said presser-bar and the sliding connection between the slide-block 43 and the feed-bar 35, the fulcrum-point of this mechanism changing alternately from one presser-foot to the other upon the throat-plate 45 or work-support, as will be readily understood by reference to Fig. 1, it being of course borne in mind that said presser-bar is pressed downwardly by a spring, which pressure when said presser-bar is lifted is communicated through these connections to the feed-bar.

The oscillatory movements of the frame 23 are effected as follows: 46 is the stitch-regulating lever, pivoted at 47 in the lower portion of the overhanging arm 2 and provided with an operating-handle 48, secured in any suitable manner to the pivot-stud 49, formed on said lever. In the present instance a wrench-hold 50 is formed on said stud by slabbing off one side thereof and shaping the hole 51 in the operating-lever to correspond therewith. A headed screw 52 is tapped in the end of said stud to hold on the handle, and a friction-washer 53 is interposed between the inner face of said lever and the outer side of the arm 2 to furnish sufficient friction to hold said stitch-regulating lever in any of the various positions in which it may be placed for long or short stitches. 54 is a link one end of which is pivoted around a stud 55, formed on the free end of the stitch-regulating lever 46, and the other end is pivoted around a stud 56, formed on one end of a link 57. The other end of said link 57 is provided with a stud 58, pivoted in a hole 59 in the inner face of the frame 23. (See Figs. 4 and 6.)

It will be observed that the links 54 and 57, pivoted as described, form, in effect, a bell-crank lever the fulcrum of which is around the stud 55, the arms of such bell-crank extending from said fulcrum to the point where said levers are joined together and to the stud 58 in the frame 23, respectively, and when the bell-crank thus established is rocked upon its fulcrum oscillatory movement will be imparted to said frame 23, the extent of such movement being governed by the distance separating said fulcrum and stud 58. As shown in Fig. 1, the stitch-regulating lever 46 is positioned for the longest stitch, and it will be clear that as the distance between the axis of the fulcrum-stud 55 and the axis of the stud 58 is shortened by adjusting the operating-handle 48, Fig. 2, so as to rotate the stitch-regulating lever on its pivot, the length of stitch will be correspondingly shortened until the fulcrum-stud 55 is concentric with the stud 58, as presently explained, in which event all movement of the frame 23 will be suspended, and consequently the feeding action discontinued. Should the stitch-regulating lever be further moved to position the fulcrum-stud on the opposite side of the stud 58 from that shown in Fig. 1, oscillatory movement of the frame 23 will occur as before, but in such manner as to feed the material backward.

The links 54 and 57 and stitch-regulating lever 46 are of equal length, and said lever 46 is pivoted within the arm 2 in such relation to the hole 59 in the frame 23 that the fulcrum-stud 55 may be swung past the pivot-stud 58

without the slightest cramping action between these parts.

60 is a cam-plate secured rigidly within the end of the overhanging arm in any suitable manner, and 61 is a cam-slot formed in said plate, within which works an antifriction-roller 62, journaled around a stud 63, carried by an arm 64, extending from the eccentric-strap 9. Pivoted at its upper end to the stud 63 is a link 65, whose lower end is pivoted around a hub 66, (see Fig. 4,) formed on the link 54 concentric with the stud 56, which passes therethrough.

The operation of the feeding mechanism is as follows: The movement of the eccentric 7 causes the stud 63 and roller 62 thereon, carried by the eccentric-strap 9, to be shifted back and forth through the stationary cam-slot 61, and the shape of said slot is such that when said stud moves toward the driving-shaft 3 the link 65 will be drawn upward, thereby causing the links 54 and 57 to be rocked on the fulcrum-stud 55 and oscillate the frame 23. This upward movement of link 65 effects the feeding of the material, because the timing of said movement with respect to the mechanism for alternately lifting the presser-bar 21 and feed-bar 35 is such as to oscillate the frame 23 when the presser-bar 21 is raised and the foot 22 is off of the material, at which time the presser-foot 36, carried by the feed-bar 35, is firmly down upon the material and the needle-bar 26 is at or near the downward limit of its stroke with the needle penetrating the several plies of material and anchoring the same together, so as to insure the travel of each of the respective plies being the same and guard against the slipping of said plies with respect to each other.

As previously mentioned, the adjustment of the stitch-regulating lever 46 and its connected links serves to vary the length of stitch, and it is possible to carry this adjustment so far as to suspend oscillation of the frame, and consequently the feeding action, if these parts be moved from the position shown in Fig. 1 to a position where the links and the stitch-regulating lever are all in alinement, as shown in Fig. 4. In such case the pivot 55 will be moved upwardly toward the pivot 58 by rotation on the pivot 49 of the stitch-regulating lever, the link 65 being drawn upwardly by the cam 61, and thereby bringing the pivot 55 into concentricity with the pivot 49.

Referring to Figs. 1, 3, 6, and 15 particularly, the presser-bar 21 is tubular and has inclosed therein a coiled spring 67. 68 is a threaded sleeve tapped within the upper part of the arm 2, within which is fitted the upper end of said presser-bar, and 69 is a threaded rod tapped within the upper end of said sleeve and extending within the presser-bar against said spring 67, whereby a suitable downward pressure is exerted upon said presser-bar. A tongue 70, formed on the collar 20 and working within a vertical slot 71 in the arm 2, (see Figs. 3 and 6,) serves to hold the presser-bar 21 against turning and to keep the foot 22 and lifting mechanism in proper alinement.

In Figs. 2, 5, and 14 is illustrated in detail the take-off for the bobbin-thread. The loop-taker 33 is mounted on a vertical shaft 72 in any usual manner, preferably as in the well-known Wheeler & Wilson vertical-hook machine, said shaft being suitably journaled in a hanger 73, bolted to the under side of the bed-plate 1. 74 and 75 are intermeshing gears mounted, respectively, upon the hook-shaft 72 and a shaft 76, suitably journaled in bearings 77 beneath the bed-plate, by means of which said loop-taker is driven. 78 and 79 are pulleys fast on their respective shafts 3 and 76, and 80 is a belt running over said pulleys, (see Fig. 1,) by means of which said shaft 76 is driven. 81 is a short rock-shaft journaled at 82 in the hanger 73, and secured on said shaft is a rock-lever 83, the upper end of which straddles an eccentric 84, tight on the shaft 76. 85 is a lever also secured on said rock-shaft 81 adjacent to the lever 83, and 86 is a thread-drawing finger adjustably secured to the upper end of said lever 85 by a set-screw 87. 88 is a laterally-extending lug formed at one side of the rock-lever 83 and projecting between the forked sections 89 and 90 of said lever 85, and 91 and 92 are set-screws tapped in said sections 89 and 90, respectively, and bearing upon opposite sides of the lug 88, by means of which the position of the thread-drawing finger 86 may be altered, so as to cause it to take off more or less thread from the bobbin-case 93. The upper end of the thread-drawing finger 86 is sheltered within a groove 94 in the under side of the throat-plate 45, (see Figs. 2 and 7,) so that the under thread 95 in drawing from the bobbin-case 93 can never get over the top of said finger and become entangled or disarranged.

The needle-aperture 97 in the throat-plate exceeds in length the longest feed movement of the oscillatory presser-foot 36, and the movement of the finger 86 is so timed that its forward or effective drawing movement occurs when the foot 22 is down upon the material and firmly binding in place the previously-completed stitches, so as to prevent any puckering of the material. As shown in Fig. 5, the thread-drawing finger is just at the termination of its forward or effective stroke after having drawn the thread from the bobbin-case for the succeeding stitch with the foot 22 still upon the material and just previous to its being raised by the descent of the foot 36 thereon.

In machines of this type, as previously pointed out, the feed occurs when the needle is in the material and projecting through the throat-plate. Hence the needle-hole in said

throat-plate must be of sufficient length to accommodate the longest stitch, and unless some means is employed to automatically supply the proper length of bobbin-thread for each successive stitch, whether long or short, such elongation of the needle-hole will interfere with the proper location of the "locks" and the latter will be more or less imperfectly positioned within the material. This defect is entirely overcome by the bobbin-thread take-off of this invention, which by adjusting the position of the finger 86 to and from the line of the needle-puncture will cause the thread-locks to be located at any desired position within the material without readjustment for stitches of various lengths. The thread-drawing finger 86 is located at the rear of the needle 32 between the needle-aperture and the loop-taker, as shown in Figs. 2 and 5, so as to intercept the bobbin-thread in drawing from the bobbin to said aperture, and the stroke of said finger is sufficient for the longest stitch. When a long stitch is being used, as shown in Fig. 5, the take-off finger 86 will meet the bobbin-thread on its forward stroke at a point more distant from the needle than when a small stitch is being used and a corresponding shorter length of thread will be drawn off for the short stitch than for the long stitch, such difference in the length of thread supplied being proportional to the length of stitch employed, said finger always coming forward to the same point and the length of feed movement causing the more or less early contact of said finger with the bobbin-thread.

The mechanism described is susceptible of variations within the principle of the invention, and the claims are designed to cover it thus broadly as well as specifically. For example, other means than the rotary eccentric may be employed to transmit motion from the driving-shaft.

What I claim is—

1. In a sewing-machine, having an overhanging arm and a driving-shaft therein, an oscillating frame pivoted to said arm, a reciprocating needle-bar, a reciprocating feed-bar, independent bearings in said frame for said needle-bar and feed-bar, and a presser-bar, in combination with a T-shaped rock-lever pivotally connected at one end with said presser-bar and connected with the feed-bar, and connections between the other end of said rock-lever and driving-shaft for actuating the same, including a bell-crank lever pivoted to the overhanging arm.

2. In a sewing-machine, having an overhanging arm and a driving-shaft therein, an oscillating frame pivoted to said arm, a reciprocating needle-bar, a reciprocating feed-bar, independent bearings in said frame for said needle-bar and feed-bar, and a presser-bar, in combination with a T-shaped rock-lever pivotally connected at one end with said presser-bar and connected with the feed-bar, and connections between the other end of said rock-lever and driving-shaft for actuating the same, including a bell-crank lever pivoted to the overhanging arm, and a rotary eccentric on the driving-shaft.

3. In a sewing-machine, having an overhanging arm and a driving-shaft therein, an oscillating frame pivoted to said arm, a reciprocating needle-bar and a reciprocating feed-bar, independent bearings in said frame in which the needle-bar and feed-bar are respectively mounted, and a presser-bar, in combination with a T-shaped rock-lever pivotally attached at one end to said presser-bar and provided at its other ends with slots, a bell-crank lever pivoted to the overhanging arm, slide-blocks respectively applied to said feed-bar and to the bell-crank lever and engaging respectively the said slots, and connections between said bell-crank lever and said driving-shaft.

4. In a sewing-machine, having an overhanging arm and a driving-shaft therein, an oscillating frame pivoted to said arm, a reciprocating needle-bar and a reciprocating feed-bar, independent bearings in said frame for these bars, a presser-bar, a rotary eccentric on said shaft, and operative connections between said eccentric, feed-bar and presser-bar, including a bell-crank lever pivoted to the overhanging arm, whereby said feed-bar and presser-bar are alternately raised and lowered, in combination with a stitch-regulating lever adjustably secured to said overhanging arm, a pair of links pivotally joined together at one of their respective ends and having their opposite ends respectively pivoted to said stitch-regulating lever and said oscillating frame, and connections between said links and said eccentric.

5. In a sewing-machine, having an overhanging arm and a driving-shaft therein, an oscillating frame pivoted to said arm, a reciprocating needle-bar, a reciprocating feed-bar, independent bearings in said frame for said bars, a presser-bar, a rotary eccentric on said shaft, and connections between said eccentric, feed-bar and presser-bar, including a bell-crank lever pivoted to the overhanging arm, whereby said feed-bar and presser-bar are alternately raised and lowered, in combination with a stitch-regulating lever adjustably secured to said overhanging arm, a pair of links pivotally joined together at one of their respective ends and having their opposite ends respectively pivoted to said stitch-regulating lever and said oscillating frame, a stationary cam on the arm, a stud connected with said eccentric movably and also engaging said cam, and a link pivoted at its lower end to the joint of the pair of links and having its upper end pivoted to said stud.

6. In a sewing-machine, an oscillating frame, a reciprocating needle-bar, a reciprocating feed-bar, independent bearings in said

frame in which said bars are mounted, a presser-bar, a driving-shaft, a rotary eccentric on said shaft, connections between said eccentric, feed-bar and presser-bar whereby said feed-bar and presser-bar are alternately raised and lowered, and means between said eccentric and oscillating frame for actuating said frame, in combination with a work-support, a loop-taker mounted in bearings beneath the work-support, a take-off lever pivoted beneath the work-support and having its upper end sheltered within a groove in the work-support, a shaft journaled beneath said work-support, an eccentric on said shaft, and connections between said eccentric and said take-off lever including means to vary the position of said take-off lever.

7. In a sewing-machine, an oscillating frame, a reciprocating needle-bar, a reciprocating feed-bar, independent bearings in said frame in which said bars are mounted, a presser-bar, a driving-shaft, a rotary eccentric mounted on said shaft, connections between said eccentric, feed-bar and presser-bar, whereby said feed-bar and presser-bar are alternately raised and lowered, and means between said eccentric and oscillating frame for actuating said frame, in combination with a grooved work-support, a loop-taker mounted in bearings beneath the work-support, a take-off lever pivoted beneath the work-support and having its upper end sheltered within the groove in the work-support, a shaft journaled beneath said work-support, a rotary eccentric on said shaft, a lever adapted to engage said eccentric and pivoted concentrically with said take-off lever adjacent thereto, and means for adjustably connecting said take-off and lever, whereby the length of bobbin-thread supplied each stitch may be increased or diminished.

8. In a sewing-machine, a reciprocating needle, a work-support having an elongated needle-hole, a loop-taker suitably journaled beneath the work-support and provided with a bobbin, and a thread-take-off lever located at the rear of the needle between said loop-taker and the needle-hole in the work-support, in combination with a presser-bar and feed-bar, means to alternately raise and lower the same and means to reciprocate the feed-bar to feed the material while the needle is in it in a direction toward said take-off lever, means for moving the take-off lever in a direction opposite to the feed of the material while the presser-bar is down, and means to alter the position of the take-off lever, whereby a length of thread proportional to the length of stitch is drawn from the bobbin and the material is prevented from puckering.

9. In a sewing-machine, a work-support having an elongated needle-hole, a loop-taker journaled beneath the work-support and provided with a bobbin, a thread-take-off lever located at the rear of the needle between said loop-taker and the elongated needle-hole in the work-support and pivoted at its lower end, a rock-lever pivoted concentrically with said take-off lever, a shaft journaled in bearings beneath the work-support, an eccentric on said shaft with which the take-off lever coöperates, and means for adjustably connecting said rock-lever and take-off lever, in combination with means for feeding the material while the needle is in it.

In testimony whereof I have hereunto set my hand this 28th day of April, A. D. 1903.

DONALD NOBLE.

Witnesses:
F. W. OSTROM,
ABBIE M. DONIHEE.