

No. 868,189.

PATENTED OCT. 15, 1907.

J. KIEWICZ.

CLAMP ACTUATING MECHANISM FOR BUTTONHOLE SEWING MACHINES.

APPLICATION FILED JAN. 17, 1906.

5 SHEETS—SHEET 1.

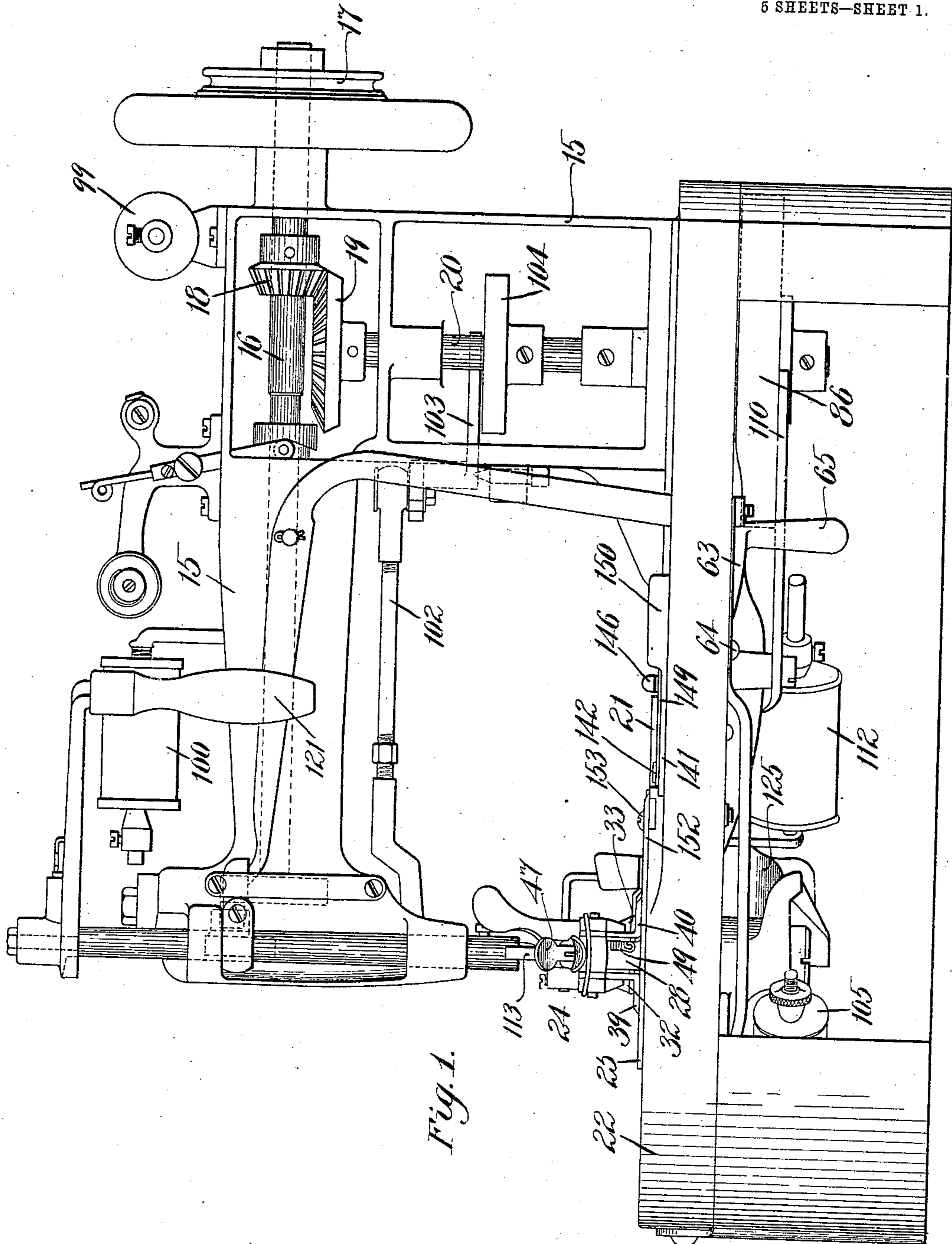


Fig. 1.

Witnesses

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Percy F. Wolfe.

Inventor:

John Kiewicz,
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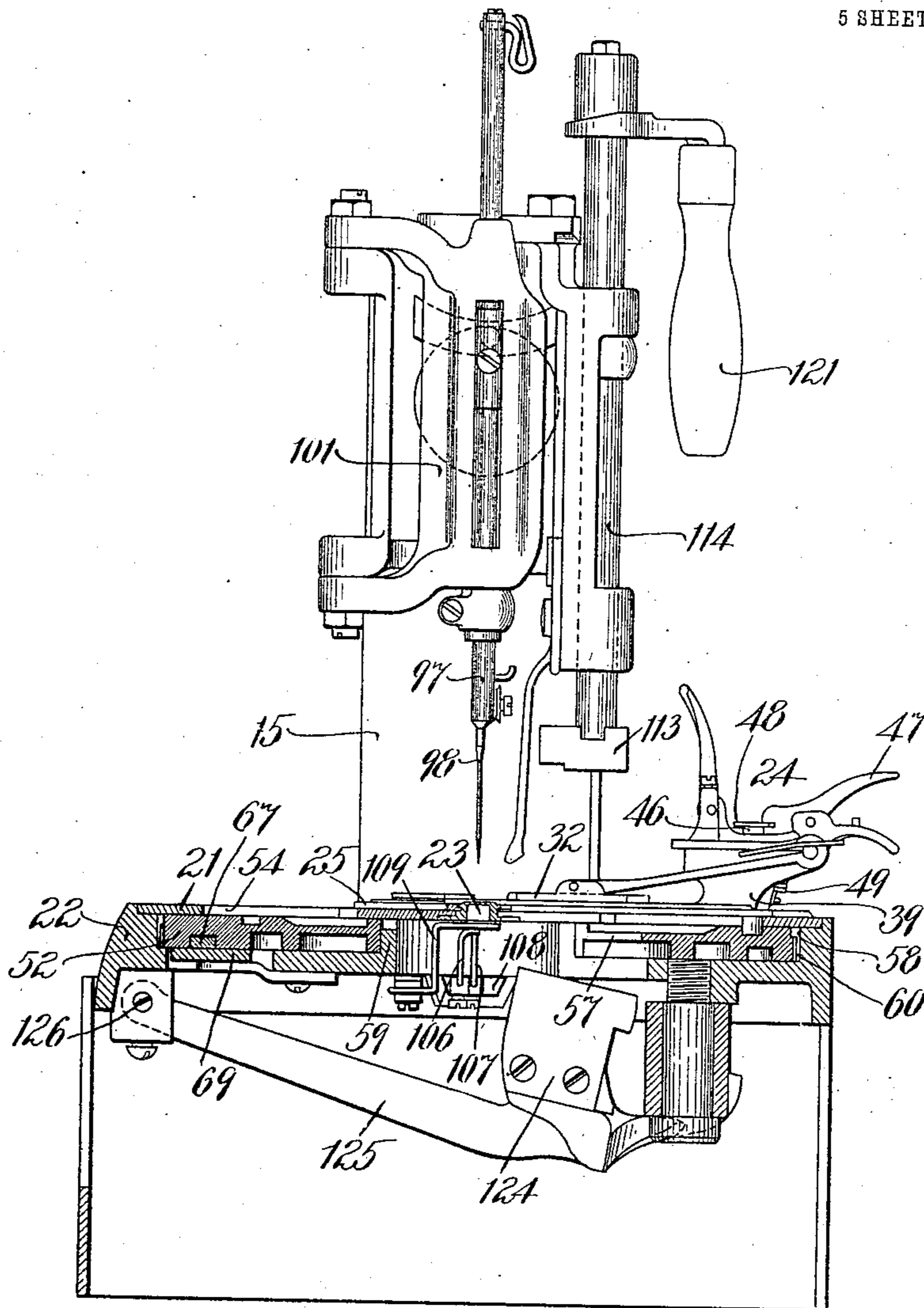


Fig. 2.

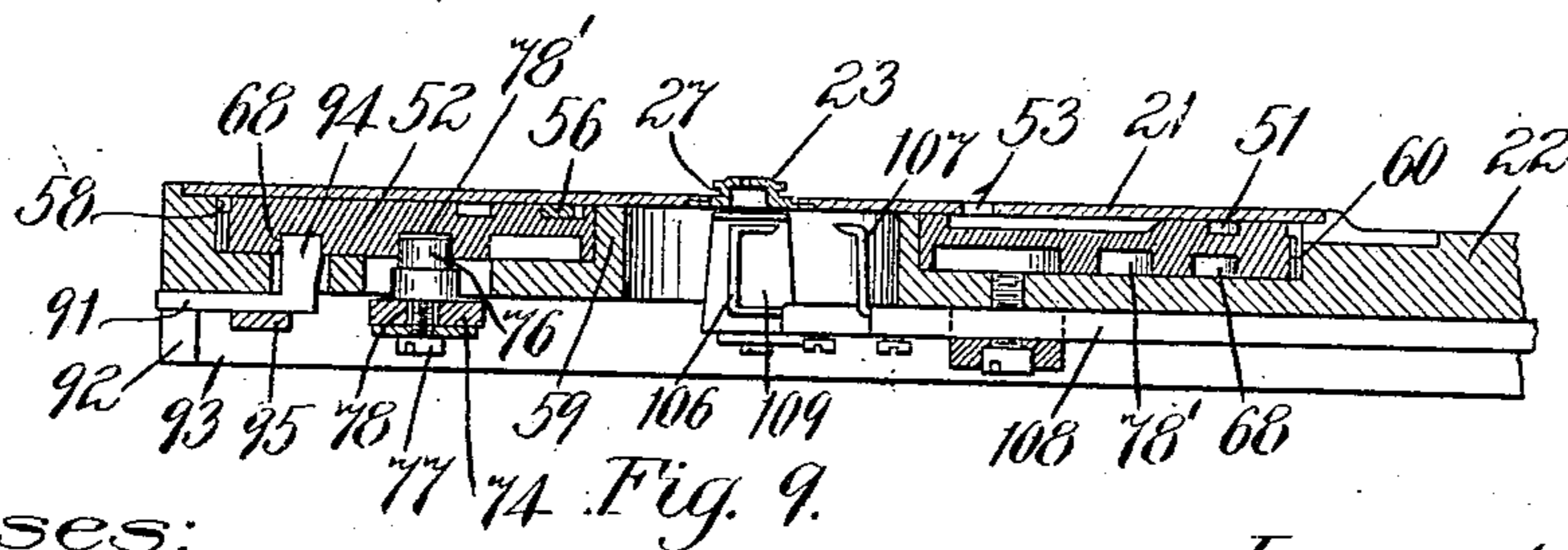


Fig. 9.

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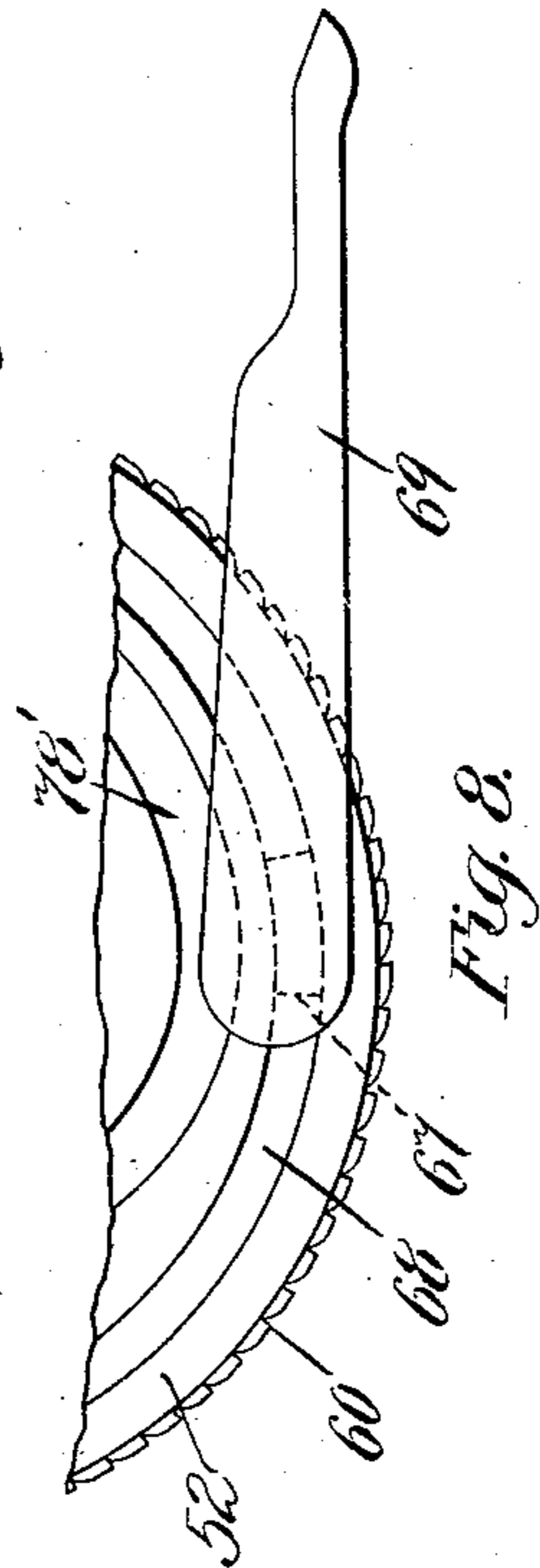
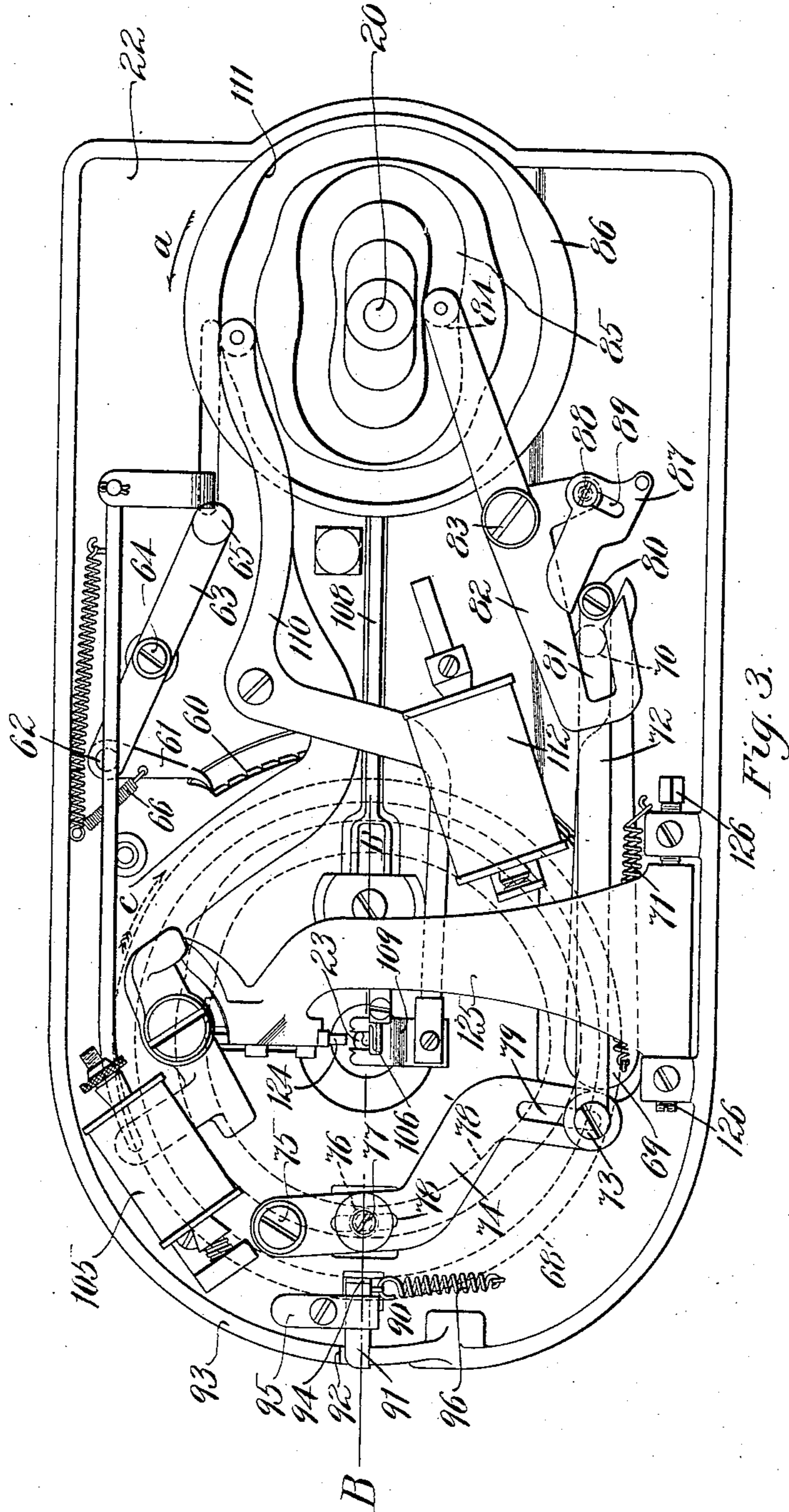
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5 SHEETS—SHEET 3.



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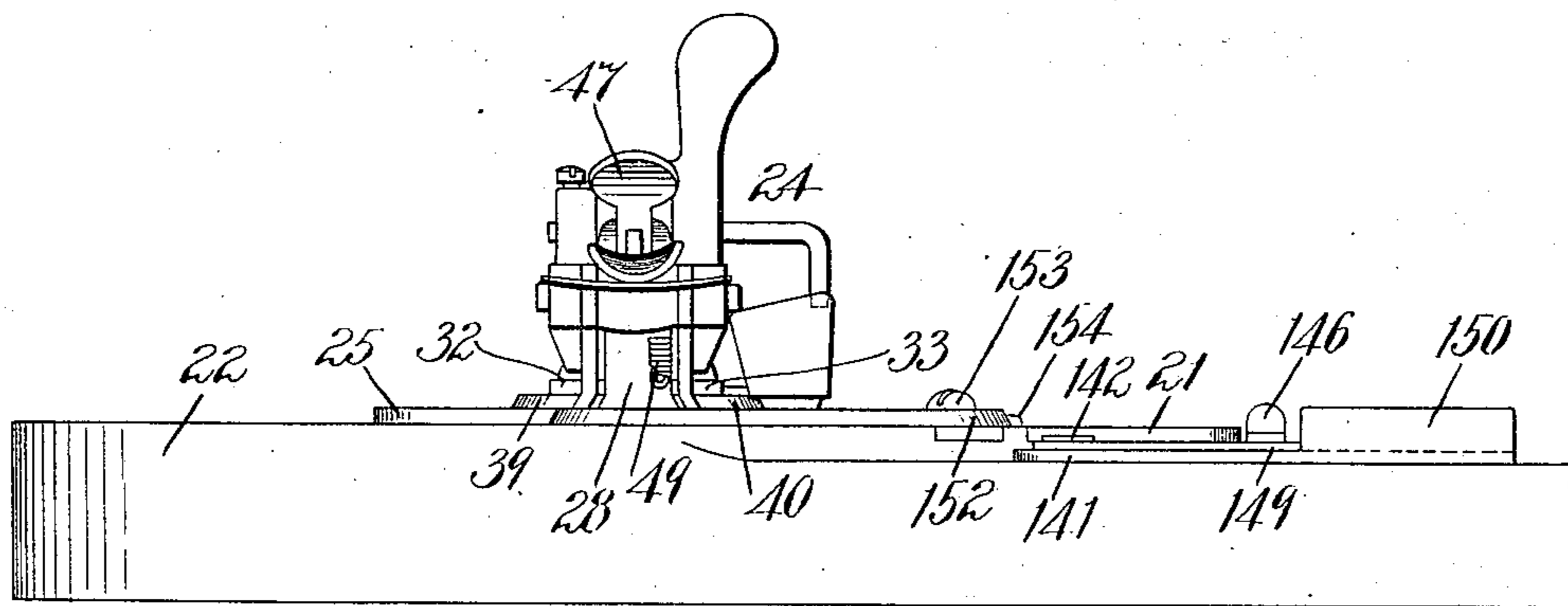
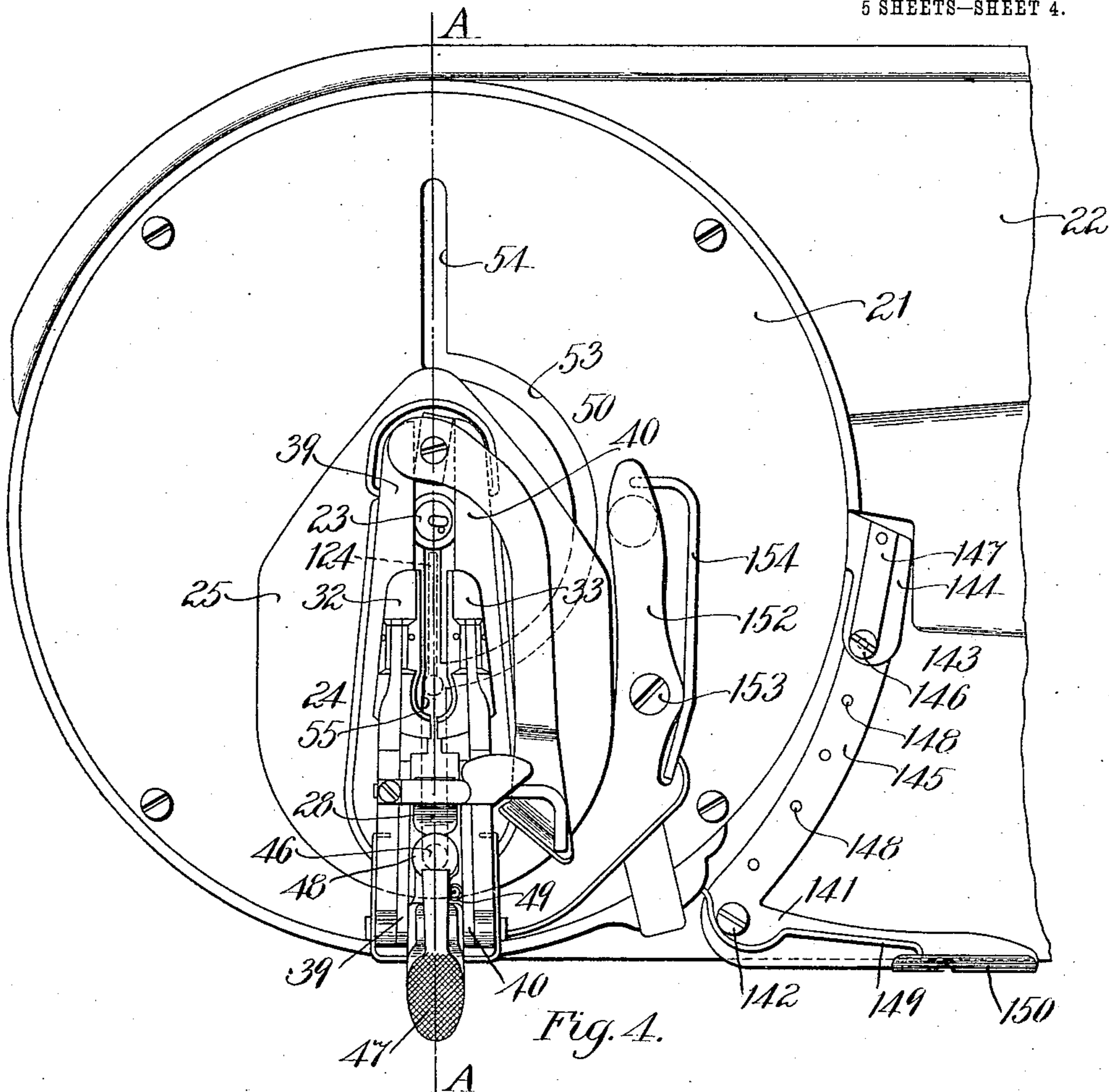
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5 SHEETS—SHEET 4.



Witnesses:

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Fig. 5.

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5 SHEETS—SHEET 5.

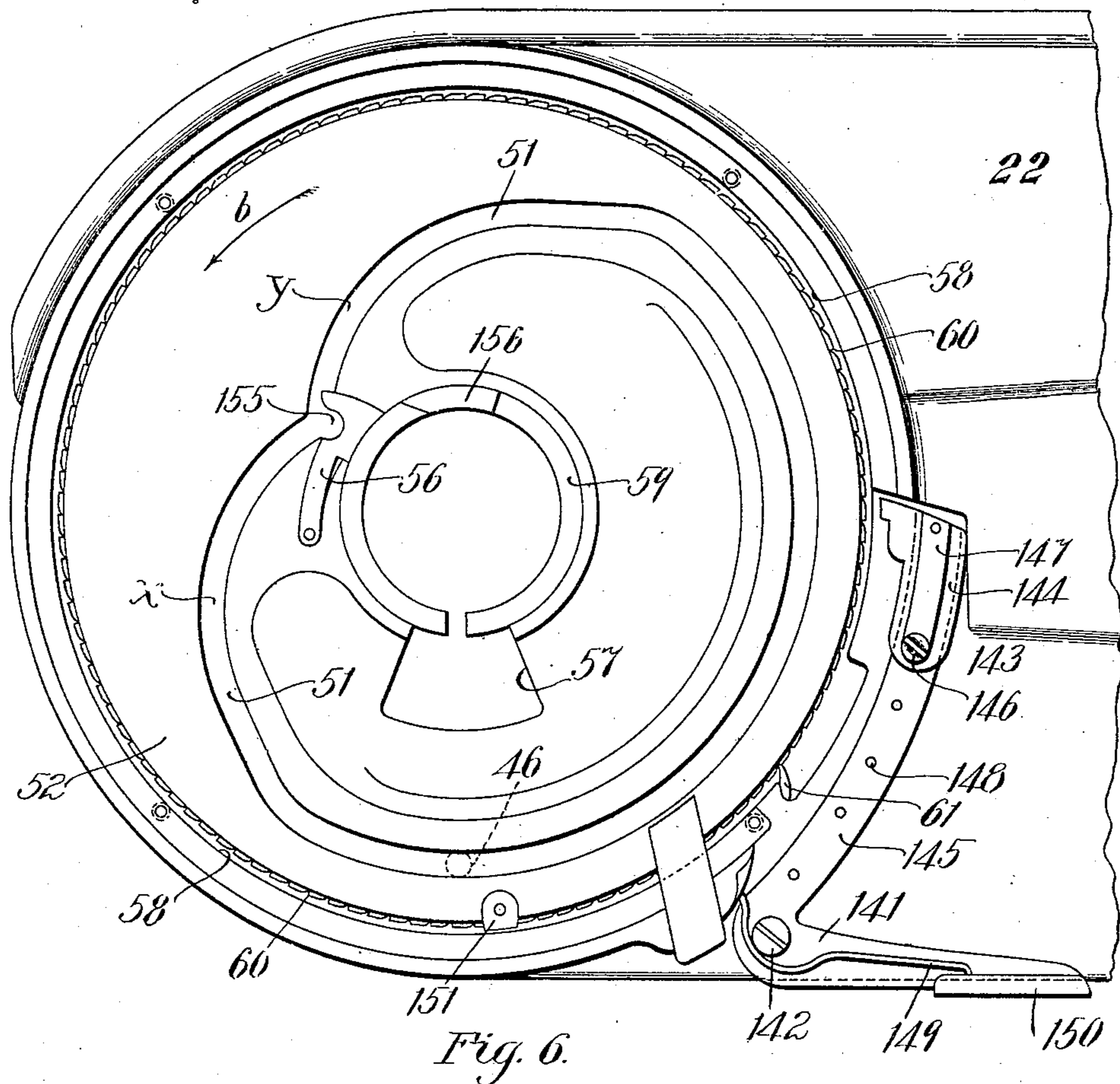


Fig. 6.

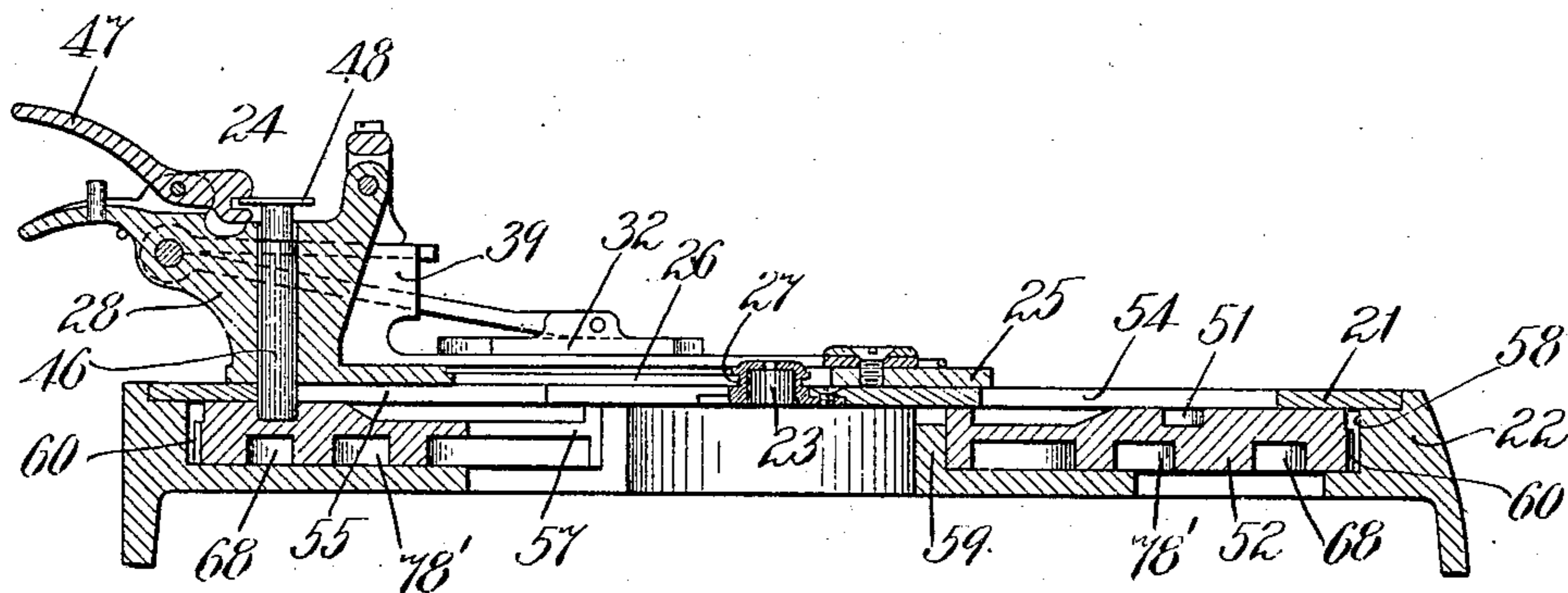


Fig. 7.

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UNITED STATES PATENT OFFICE.

JOHN KIEWICZ, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR TO WHEELER MANUFACTURING COMPANY, A CORPORATION OF MAINE.

CLAMP-ACTUATING MECHANISM FOR BUTTONHOLE-SEWING MACHINES.

No. 868,189.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed January 17, 1906. Serial No. 296,458.

To all whom it may concern:

Be it known that I, JOHN KIEWICZ, a subject of the Czar of Russia, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Clamp-Actuating Mechanism for Buttonhole-Sewing Machines, of which the following is a specification.

This invention relates to certain improvements in button hole sewing machines, the same relating especially to mechanism for actuating the fabric clamp.

The object of the invention is to provide a simple, durable, efficient and easily operated mechanism whereby the fabric clamp may be actuated to feed the fabric during the operation of sewing a button hole, said mechanism being capable of adjustment whereby button holes of different lengths may be sewed and said clamp fed, together with the fabric held thereby, to a certain predetermined position before the sewing mechanism is put into operation, so that the operator, without the exercise of special skill or accuracy, may begin the sewing of the button hole at the proper point, whatever the length of said button hole may be.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings: Figure 1 is a front elevation of a button hole sewing machine, with my improved clamp-actuating mechanism embodied therein. Fig. 2 is a side elevation thereof, partly in section. Fig. 3 is an underneath plan of the same. Fig. 4 is a plan view of the work-plate and fabric clamp, together with a portion of the frame, broken away to save space in the drawings. Fig. 5 is a front elevation of the parts shown in Fig. 4. Fig. 6 is a plan view of the fabric clamp actuating cam in connection with a portion of the frame, broken away to save space in the drawings, the same being a view similar to Fig. 4 with the work-plate and fabric clamp removed. Fig. 7 is a section, partly in elevation, taken on line A—A of Fig. 4, looking toward the left in said figure. Fig. 8 is an underneath plan of the friction clamp arm by means of which the clamp actuating cam is rotated and a portion of said cam. Fig. 9 is a section, partly in elevation, taken on line B—B of Fig. 3.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 15 is the frame of the machine, 16 the main driving shaft journaled in suitable bearings in said frame and rotated by a pulley 17. A bevel pinion 18, fast to the shaft 16, meshes into a bevel gear 19 fast to the vertical cam-shaft 20. A work-plate 21 is fastened to the bed-plate 22 of the frame 15 and to said work-plate is fastened a cylindrical needle throat 23.

The fabric clamp 24 may be of any suitable construc-

tion, the particular form shown in the drawings being the same as that illustrated and described in an application for Letters Patent made by me Serial No. 257,683, filed April 27, 1905, patented March 6, 1906, No. 814,216. Said fabric clamp 24 consists of a base-plate 25 having a longitudinal slot 26 extending therethrough, the edges of said slot fitting into an annular groove 27 formed in the periphery of the needle throat 23. The base-plate 25 of said clamp has a bracket 28 extending vertically upward from the rear end thereof and is provided with a fabric support in two parts 39 and 40 and with presser feet 32 and 33, said parts 39 and 40 of the fabric support and the presser feet 32 and 33 being so arranged that a piece of fabric may be clamped between said presser feet and fabric support and fed by said base-plate to the sewing mechanism in a manner well known to those skilled in the art.

A vertical pin 46 is slidably mounted in the bracket 28 and is moved longitudinally thereof by means of a lever 47 pivoted to said bracket 28 and engaging the flange 48 formed upon the top of said pin 46. A spiral spring 49 fastened at one end to said lever 47 and at the other end to the base-plate 25 holds the pin 46 normally down in the position illustrated in Fig. 7, the lower end of said pin projecting through a slot 50 in the work-plate 21 and into a cam-groove 51 formed in the upper face of the clamp-actuating cam 52. The slot 50 is of the usual form in machines of this class and consists of a semi-circular portion 53 and two radial portions 54 and 55, arranged diametrically opposite each other at the opposite ends, respectively, of the semi-circular portion 53. A latch 56 is pivoted to the clamp-actuating cam 52 (see Fig. 6) and projects partly across the cam groove 51 when said cam is in the position illustrated in Fig. 6, and an opening 57 extends entirely through said cam 52. The cam 52 rotates in an annular recess 58 formed in the bed-plate 22 and is journaled upon a hub 59 formed upon said bed-plate (Fig. 7.) The cam 52 may be rotated either automatically by a friction clamping mechanism actuated from the cam-shaft 20, or said cam may be rotated by hand by means of a pawl and ratchet mechanism, consisting of ratchet teeth 60 formed in the periphery of said cam and a pawl 61, pivoted at 62, to a pawl lever 63 which is pivoted at 64 to the bed-plate 22 and is provided with a handle 65 by means of which said pawl lever may be rocked and said pawl communicate a rotary motion to the cam 52. A spiral spring 66 holds the pawl 61 in engagement with the ratchet teeth 60, (see Fig. 3).

The power driven mechanism by means of which the cam 52 is rotated through frictional clamping contact therewith consists of a friction block 67 curved to loosely fit a concentric groove 68 formed in the bottom face of the cam 52. The friction block 67 is rigidly

fastened to an arm 69 (Figs. 3 and 8) which extends from said friction block toward the right in said figures, the upper right hand edge of said arm being held in contact with a roll 70 by a spring 71, one end of which is fastened to the frame of the machine and the other to the arm 69 at a point located at the rear of said friction block. The roll 70 is rotatably mounted upon the upper side of a link 72 which is pivotally connected by a stud 73 to a cam lever 74, said cam lever being pivoted at 75 to the bed-plate of the machine and having adjustably fastened thereto a roll 76 by means of a stud 77, which stud extends through a slot 78 provided in said cam lever 74. The roll 76 is located in a cam groove 78' formed in the under face of the clamp-actuating cam 52. The stud 73 is also adjustably connected to the lever 74, the same being clamped to said lever and extending through a slot 79 provided therein.

A roll 80 is rotatably mounted upon the under side of the link 72 at the right hand end thereof and projects into a slot 81 formed in a cam lever 82 pivoted at 83 to the bed-plate 22, a rocking motion being imparted to said cam lever by a roll 84 which projects into a cam groove 85 provided in the under face of a cam 86 fast to the lower end of the vertical shaft 20. A portion of the upper edge of the slot 81 is formed by a plate 87, which is adjustably fastened to the cam lever 82 by a clamp screw 88 which projects through a slot 89 formed in said plate and has screw-threaded engagement with the lever 82.

The operation of the mechanism hereinbefore specifically described for actuating the clamp cam 52 by means of the power driven shaft 20 is as follows: The cam 86 rotates in the direction of the arrow *a* (Fig. 3) and rocks the lever 82 upon its pivot 83, thus moving the cam roll 80 forward and back, the link 72 rocking upon the pin 73 to allow of this movement, and at the same time the cam roll 70 on the back side of said link pushes the right hand end of the arm 69 backwardly, cramping the block 67 in the groove 68 and moving the cam 52 in the direction of the arrow *b* (Fig. 6) or in the direction of the dotted arrow *c* (Fig. 3). As the left hand end of the lever 82 rocks in the opposite direction or toward the front of the machine the rolls 80 and 70 are carried toward the front of the machine and the right hand end of the arm 69 is held by the spring 71 in contact with the roll 70; so that said arm moves toward the front of the machine and is also carried toward the right in said Fig. 3 by the spring 71, thus moving the friction block 67 toward the right to recover the amount which it had previously been moved toward the left by the downward motion of the left hand end portion of the lever 82. Said friction block slides in the groove 68 formed in the cam 52 during this latter motion, said cam being held against rotation in the direction opposite to the arrow *c* by a friction clamp 90 (Figs. 3 and 9). Said clamp consists of a plate 91, the left hand end of which (Fig. 3) projects into a slot 92 formed in the vertical rib 93 of the bed-plate 22, and a friction block 94 fast to said plate and projecting upwardly therefrom into the concentric groove 68. Said clamp is held from falling out of said groove by a plate 95 fast to the bed-plate of the machine. A spiral spring 96 is fastened at one end thereof to the plate 91 and at its opposite end to the bed-plate 22. The action of this friction clamp is as

follows: When the cam 52 is rotated in the direction of the arrow *c*, the friction block 94 allows said cam to rotate without cramping in the groove 68, but if the cam 52 is turned in the direction opposite to the arrow *c* said friction block cramps in the groove, being drawn toward the rear of the machine by the spiral spring 96, the plate 91 being, in effect, pivoted in the slot 92 upon the rearward edge of the same and upon the rib 93, so that while the cam 52 is free at all times to be rotated in the direction of the arrows *b* and *c*, it is impossible to rotate it in the opposite direction on account of the friction clamp 90 binding and preventing said rotation and, therefore, said cam is held against rotation when being actuated by the pawl and ratchet mechanism, as the pawl 61 slides over the periphery of the ratchet in a direction opposite to the arrow *c* and is also held against rotation when the friction block 67 is drawn backwardly in the groove 68 by the spring 71, as hereinbefore described.

The plate 87 may be adjusted to change the shape of the slot 81 by loosening the clamp-screw 88 and moving said plate longitudinally of the slot 89, so that a different time and extent of throw may be imparted to the roll 80, and through the link 72 and roll 70, a different time and extent of throw imparted to the arm 69, thus changing the time of feed or extent of angle through which the cam 52 is rotated at each rotation of the shaft 20. The extent of rotation of said cam at each rotation of the shaft 20 is further adjusted by moving the stud 73 laterally of the slot 79 and clamping it in its new position, and the extent of said feed is further increased during each rotation of the cam 52 while the circular portion of the button hole is being stitched, by the cam groove 78' and lever 74 which is moved by said cam groove toward the left (Fig. 3), thus drawing the roll 80 toward the left in the slot 81 and locating it at a greater distance from the pivot 83 of said lever, thus increasing the throw imparted to the arm 69 at each rocking movement of the lever 82 and consequently increasing the length of each step in the intermittent rotation of the cam 52.

The stitch forming mechanism forms no part of this invention and is substantially the same as the stitch forming mechanism illustrated in the patents to William Raeuchle No. 574,166, dated December 29, 1896, button hole sewing machine, and No. 341,168, dated May 4, 1886. Briefly stated, however, said stitch forming mechanism consists of an upper needle bar 97 and needle 98 to which thread is fed from a spool 99, an upper gimp thread being fed to the upper side of the fabric from a spool 100. The upper needle bar 97 slides in ways formed in the rocker frame 101 pivoted to the frame of the machine, said rocker frame being rocked upon its pivot by a link 102, cam lever 103 and cam 104, thus bringing the needle alternately into alinement with the button hole and out of alinement therewith, so that the stitch first passes over one edge of the goods and then through the goods. The under thread is led from a spool 105 to the lower needle 106 which, together with the looper 107, is carried upon the reciprocatory slide bar 108 actuated by a cam (not shown) on the shaft 20. The spreader 109 is rocked at the proper time in the formation of the stitch by a cam lever 110 to which it is fastened, said cam lever being actuated by a cam groove 111

formed in the under side of the cam 86. The lower gimp thread is led by suitable guides to the under side of the fabric from the spool 112.

The button hole is cut in the fabric by means of two cutters and mechanism to move said cutters toward each other. The upper cutter 113 is fastened to a reciprocatory slide 114 and the lower cutter 124 is fastened to an arm 125 pivotally supported upon two studs 126, 126 on the frame of the machine (Fig. 3). These cutters are moved toward each other by suitable mechanism which forms no part of this invention and which forms the subject matter of a separate application for Letters Patent Serial No. 257,682, filed April 27, 1905.

In order to adjust the machine to sew different lengths of button holes and to feed the clamp to a certain predetermined position before putting the sewing mechanism into operation, I provide a lever 141 pivoted at 142 to the bed-plate 22, said lever having a stop 143 adjustably connected thereto (Fig. 6). Said stop consists of a plate 144 slidably supported upon the arm 145 of the lever 141 preferably formed on a curve concentric with the cam 52 and locked to said curved arm by a pin 146 connected to the plate 144 by a flat spring 147. Said pin projects through any one of the holes 148 provided in said curved arm preferably concentric with the cam 52 and thus locks the stop 143 to said arm at different distances from the pivot 142. A spring 149 holds the curved arm 145 normally in the position illustrated in Fig. 6, but when it is desired to set the clamp actuating cam 52 in the position where it is ready to commence the sewing of the button hole, the operator presses upon the arm 150 of said lever 141, thus bringing the upper left hand portion of the stop 143 into the path of rotation of a projection or block 151 fast to the periphery of the clamp-actuating cam 52.

When the cam 52 is rotated by the pawl and ratchet mechanism 61 and 60, as hereinbefore described, the block 151 will abut against the upper left hand corner of the stop 143 and the rotation of the cam 52 will thus be stopped at a predetermined point, and the operator then starts the sewing mechanism, as hereinafter described. This predetermined point is adjusted or regulated according to the length of the button hole which has been cut and which is to be sewed, by changing the location of the stop 143 upon the arm 145, and this change is made by lifting the pin 146 out of the hole 148, in which it is located, against the action of the spring 147, then sliding the stop 143 longitudinally of said arm and allowing the pin 146 to drop into one of the other holes 148, according to the length of the button hole which has been cut, the different lengths of button holes each having a corresponding hole 148 in which to locate the pin 146, and thus to locate the position of the stop 143 and consequently to locate the position in which the cam 52 will stop when rotated by the pawl and ratchet mechanism, as hereinbefore described, and by the position in which the cam 52 is stopped the location of the fabric clamp 24 is determined. During the rotation of the fabric clamp and the clamp actuating cam, hereinafter described, the base-plate 25 of said fabric clamp is held against the needle throat 23 to take up any lost motion by means of a lever 152 pivoted at

153 to the work-plate 21 and held against the periphery of said work-plate by a spring 154.

Having thus specifically described my invention, I will now proceed to describe the general operation of the same: Assuming the parts to be in the position illustrated in Figs. 1, 4 and 6, the fabric is inserted in the fabric clamp 24 between the presser feet 32 and 33 and the fabric supporting parts 39 and 40 and clamped between said presser feet and the fabric supporting parts 39 and 40. The operator then grasps the handle 121 and carries the same downwardly, causing the slide 114 and the upper cutter 113 attached thereto to move downwardly toward the fabric, while the lower cutter 124 is carried upwardly by suitable mechanism and the button hole is cut, the lower cutter 124 passing through the fabric in the cutting operation and cutting a slot in the fabric of the correct shape to form a button hole. Assuming the stop 143 to be in the correct location upon the arm 145 to correspond with the length of button hole which has been cut, the operator now presses upon the arm 150, throwing the stop 143 into the path of rotation of the block 151 upon the cam 52. This operation of locating the stop is performed by the operator pressing with the thumb of his right hand upon the finger-piece attached to the arm 150 and then with the fingers of the same hand rocking the pawl 61 by means of the pawl lever 63 with its handle 65. This rocking movement of the pawl lever causes the clamp-actuating cam 52 to be rotated in the direction of the arrow (Fig. 6) until the block 151 comes in contact with the stop 143.

When the cam is in the position illustrated in Fig. 6, the pin 46 projects into the groove 51 in the position illustrated by the dotted circle (Fig. 6), but as the cam is rotated in the direction of the arrow hereinbefore referred to, said pin 46 is carried by the throw x of said cam toward the needle throat or center of the cam and is guided in its path in a straight line by the radial portion 55 of the slot 50 in the work-plate 21, until the clamp and the fabric are located in the proper position to correspond with the length of button hole cut. The operator now releases the lever 141, thus removing the stop 143 from the path of rotation of the block 151, and starts the machine by throwing into action the proper clutch (not shown in the drawings) for the rotation of the main driving shaft 16. The sewing mechanism now begins its action and the needle alternately enters the button hole which has been cut and passes through the fabric at one side of said button hole, while the fabric clamp carries the fabric forward in a straight line for one side of the button hole until it has fed forward far enough to perform the sewing about the circular portion of the button hole at one end thereof. At this time the cam 52 will have been rotated by the friction feeding mechanism, hereinbefore described, until the pin 46 enters the semi-circular notch 155 formed in the edge of the latch 56, and at this time in the operation of the machine the pin 46 will have reached the inner end of the radial portion 55 of the slot 50. The pin 46 is now carried by the cam around the circular portion 53 of the slot and the circular portion of the button hole is stitched, when the latch 56 arrives in position for the outer end thereof to drop into the notch 156, cut through the hub 59, thus releasing the pin 46 from said latch 56, and upon further

rotation of the cam 52 the pin 46 will be carried by the throw y of said cam along the radial portion 54 of the slot 50, thus finishing the stitching of the button hole. The operator stops the rotation of the main shaft by throwing out the clutch.

The point at which the operator stops the stitching of the machine is regulated by the eye—that is, it is stopped at a point on one side of the button hole opposite that at which the stitching was commenced, as hereinbefore described, and this point of commencement is located, as hereinbefore described, by means of the lever 145, the stop 143 thereon and its engagement with the block 151 carried by the cam 52. The operator having finished the sewing of the button hole now presses downwardly upon the lever 47, removing the pin 46 from the cam slot 50 and gives the fabric clamp a half rotation around the needle throat to bring said fabric clamp back to the point of commencement and to the position illustrated in Fig. 4.

The advantages secured by my improved power driven feed mechanism, hereinbefore described, consist, among others, in the fact that the mechanism is so arranged that there is practically no mechanism located upon the base-plate and projecting above the work-plate between the needle and the vertical portion of the head of the frame, so that the work-plate and bed-plate are open and clear of obstruction for the fabric to be carried through in the sewing operation. The advantage of positively locating the point of commencement of the sewing operation is also apparent. Furthermore, the power driven feed mechanism, hereinbefore described, is very positive and accurate in its operation and convenient for the purpose of obtaining different lengths of feed in each of the step-by-step operations of said feed.

Having thus described my invention, what I claim and desire by Letters Patent to secure is:

1. In a button hole sewing machine, a fabric clamp, a clamp actuating cam therefor provided with a concentric groove and a cam groove in one face thereof, a friction block in said concentric groove, an arm fast to said block, a link engaging said arm, a roll journaled upon said link, a cam lever provided with a slot into which said roll projects, a cam to operate said cam lever, and another cam lever pivotally connected to said link and engaging said clamp-actuating cam groove, whereby the position of said roll in said slot may be varied for the purpose specified.

2. In a button hole sewing machine, a fabric clamp, a clamp actuating cam provided with a concentric groove and a cam groove in one face thereof, a friction block in

said concentric groove, an arm fast to said block, a link engaging said arm, a roll journaled upon said link, a cam lever provided with a slot into which said roll projects, a cam to operate said lever, a plate adjustably fastened to said lever and forming one side of said slot, and another cam lever pivotally connected to said link and engaging said clamp-actuating cam groove, whereby the position of said roll in said slot may be varied for the purpose specified.

3. In a button hole sewing machine, a fabric clamp actuating cam provided with a groove in one face thereof, a work-plate provided with a slot extending therethrough, a clamp slidable upon said work-plate, a pin fast to said clamp, projecting through said slot and into said cam groove, a lever provided with a series of holes therein, a stop slidably mounted on said lever, and a spring-actuated pin mounted on said stop adapted to engage said holes, said stop adapted to engage said cam and stop its rotation at a predetermined point.

4. In a button hole sewing machine, a fabric clamp actuating cam provided with a groove in one face thereof, a work-plate provided with a slot extending therethrough, a clamp slidable upon said work-plate, a pin fast to said clamp, projecting through said slot and into said cam groove, a lever having a curved arm concentric with said cam when in operative position and having a series of holes therein also concentric with said cam, a stop slidably mounted on said arm, and a spring actuated pin mounted on said stop adapted to engage said holes, said stop adapted to engage said cam and stop its rotation at a predetermined point.

5. In a button hole sewing machine, a fabric clamp actuating cam provided with a groove in one face thereof, a work-plate provided with a slot extending therethrough, a clamp slidable upon said work-plate, a pin fast to said clamp, projecting through said slot and into said cam groove, a lever having an arm adjacent to said cam and outside of said work-plate, and a stop adjustably fastened to said lever adapted to engage said cam and stop its rotation at a predetermined point.

6. In a button hole sewing machine, a bed-plate, a fabric clamp actuating cam journaled to rotate on said bed-plate and provided with a groove in one face thereof, a work-plate provided with a slot extending therethrough fast to said bed-plate and extending over said cam, a clamp slidable upon said work-plate, a pin fast to said clamp projecting through said slot and into said cam groove, a lever pivoted to said bed-plate, one arm of said lever located on the upper face of said bed-plate adjacent to said cam and outside said work-plate, and a stop adjustably fastened to said lever adapted to engage said cam and stop its rotation at a predetermined point.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN KIEWICZ.

Witnesses:

CHARLES S. GOODING,
ANNIE J. DAILEY.