No. 637,288. Patented Nov. 21, 1899.

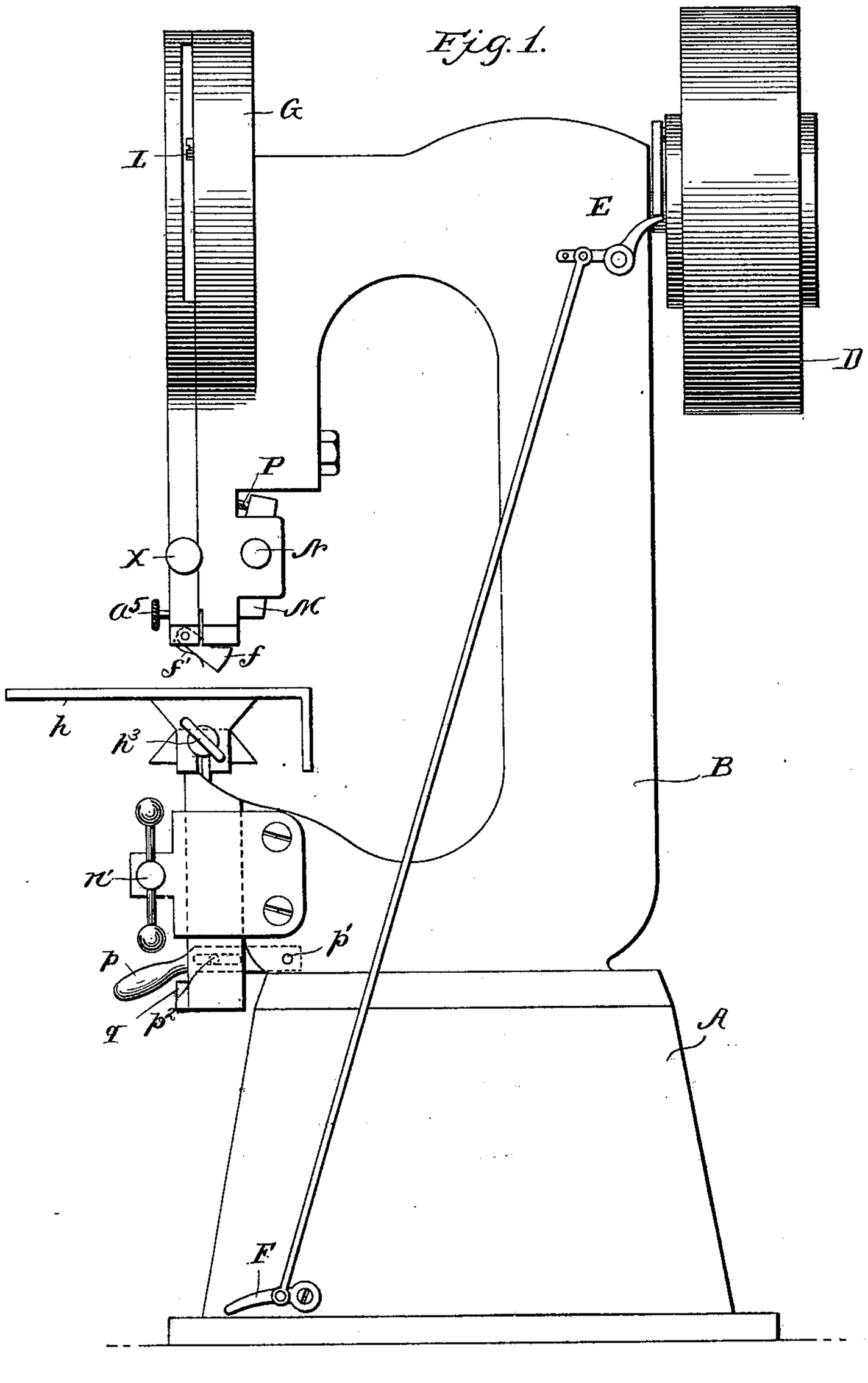
F. H. SANDER.

STAPLING MACHINE.

(Application filed Oct. 22, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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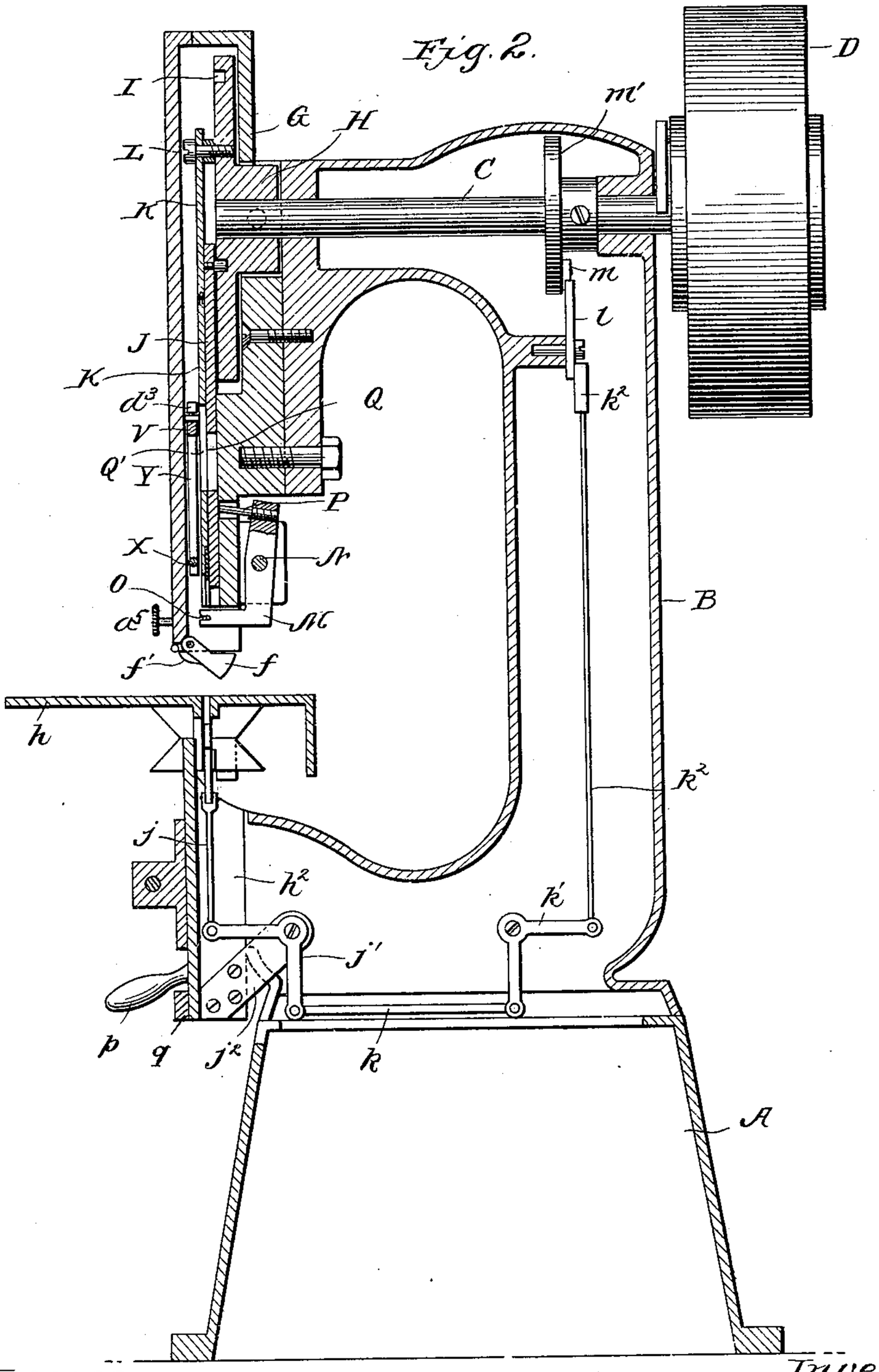
(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

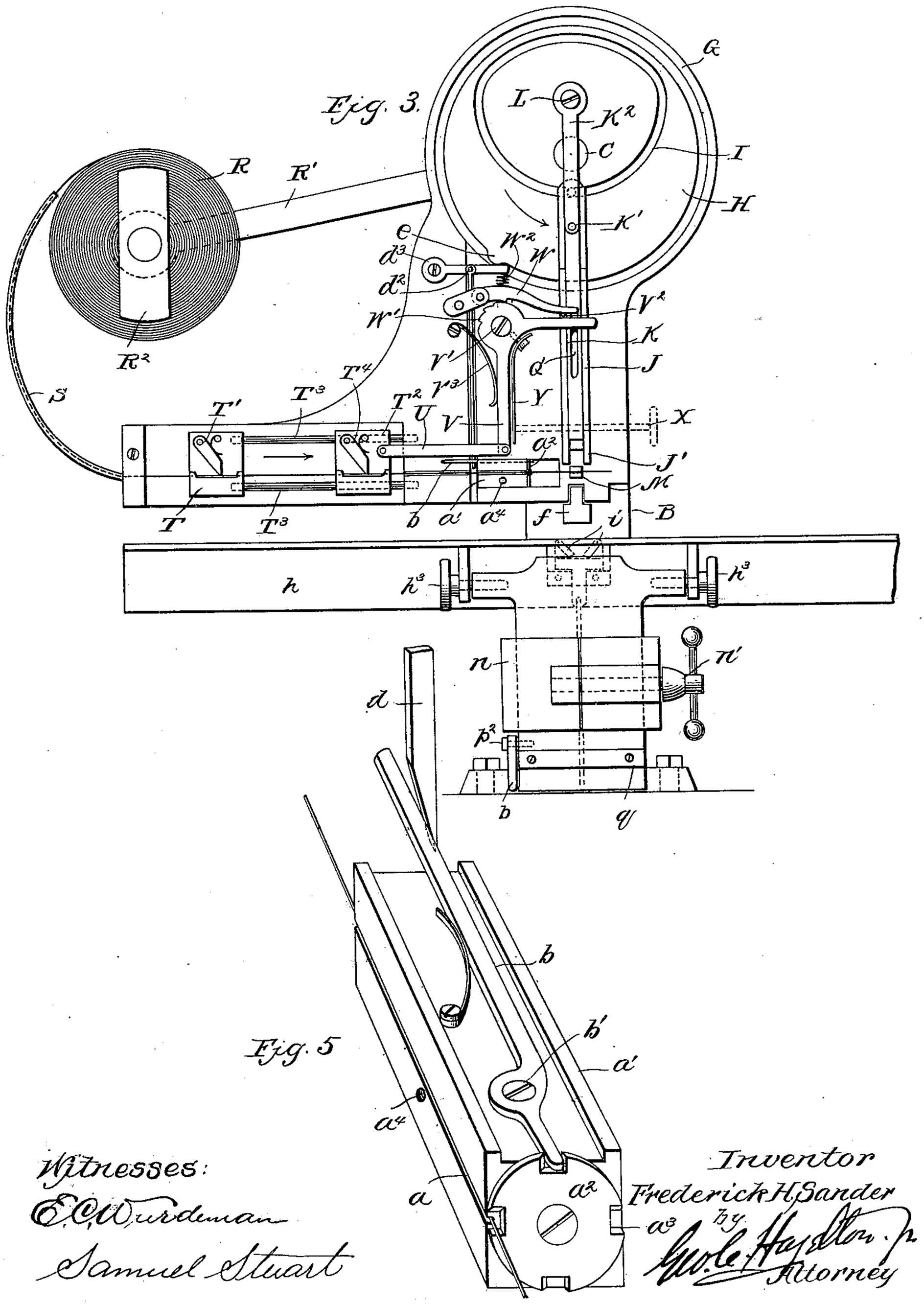

Fig. 5

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(Application filed Oct. 22, 1898.)

(No Model.)

4 Sheets—Sheet 4.

Fig. 4.

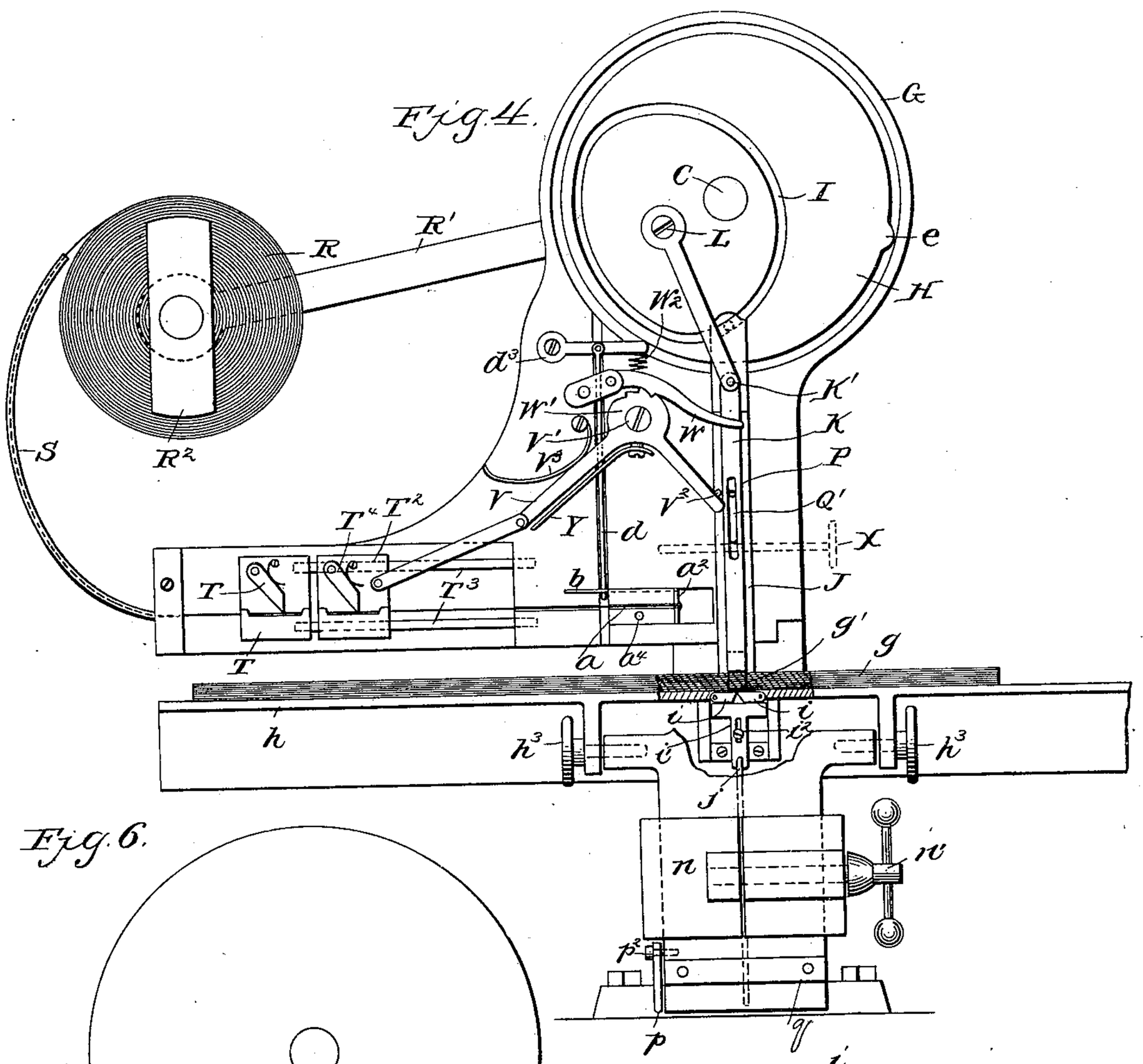


Fig. 6.

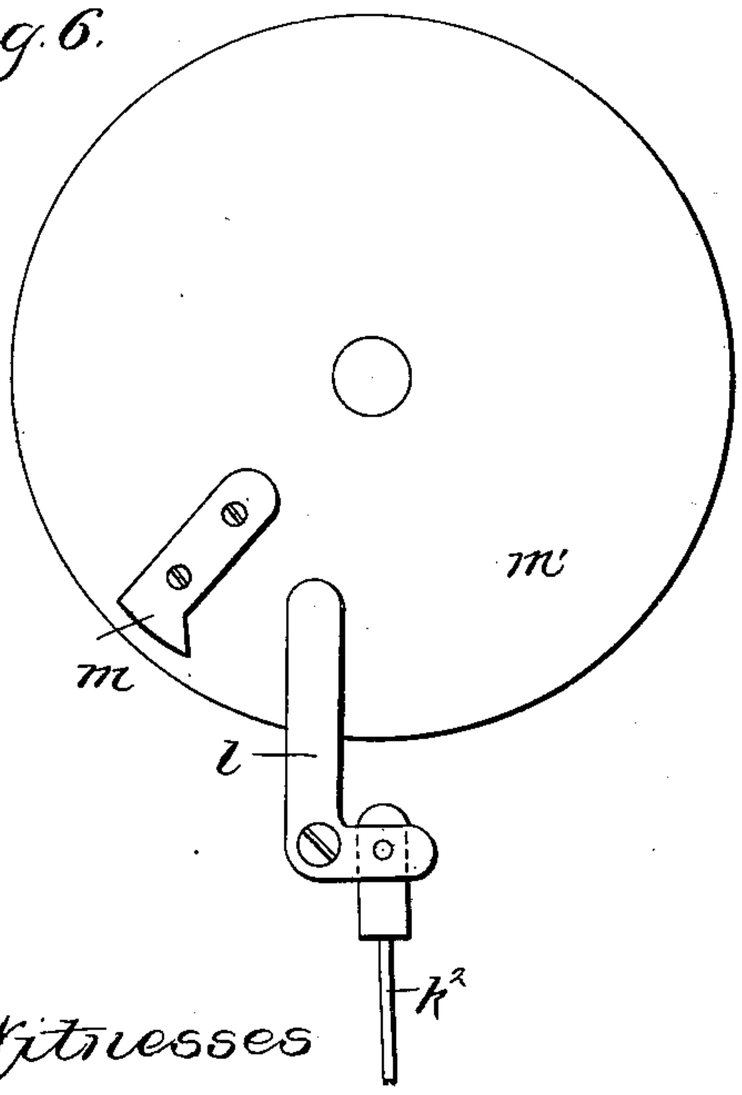
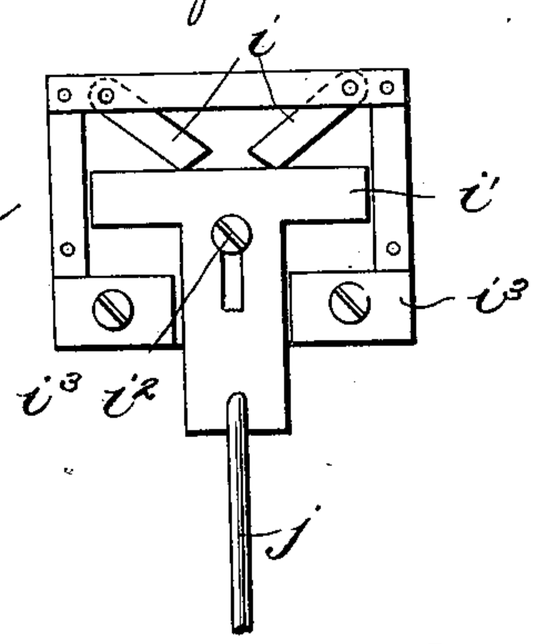


Fig. 7.



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UNITED STATES PATENT OFFICE.

FREDERICK H. SANDER, OF MALDEN, MASSACHUSETTS.

STAPLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 637,288, dated November 21, 1899.

Application filed October 22, 1898. Serial No. 694,337. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. SANDER, a citizen of the United States, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Wire Stapling or Stitching Machines, of which the following is a specification.

My invention relates to a new and useful improvement in wire stapling or stitching machines, and has for its object to so construct a machine of this description as to render the feeding of the wire more accurate and positive than has heretofore been the case, to provide means for keeping the wire from which the staples are made in proper position upon the spool, to provide an effective cutter and suitable adjustments therefor, to embody clenchers and mechanism for operating the same whereby a staple when driven will be firmly clenched upon the under side of the material, to so construct the anvil for holding the staple as to cause its operation to be positive, and generally to improve upon the construction of machine intended for this class of work.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of a machine made in accordance with my improvement. Fig. 2 is a vertical section of the machine, showing certain of the operative parts thereof; Fig. 3, a front view, the face plate being removed to expose to view the operative parts, the base being also omitted; Fig. 4, a view similar to Fig. 3, showing the mechanism in the position assumed in the driving and clenching of the staple; Fig. 5, a perspective of a cut-off mechanism; Fig. 6, an enlarged view of the cam for actuating the clenchers, and Fig. 7 a detail view of the clenchers and the sliding block for transmitting motion thereto.

In carrying out my invention as here embodied, A represents the base of the machine, which may be of any suitable design, and mounted thereon is the frame B, the latter being preferably hollow, as shown in Fig. 2, and having journaled in the upper portion thereof the shaft C. This shaft carries a drive-wheel or clutch-pulley D, which is thrown into or out of action by a suitable clutch mechanism E, which is under control of the foot-lever F, which arrangement enables the operator to stop and start the machine as occasion may require, it being understood that the clutch-pulley D receives its motion through a belt running to a suitable source of power.

G represents the head of the machine, in which is located the cam-disk H, said disk being secured upon the forward end of the shaft C, so as to turn therewith, and this disk has formed therein the cam-groove I for the operation of the plunger J, which is fitted to slide within the head and carries upon its lower end the benders J′. This plunger is grooved and has fitted therein the driver K, to which is pivoted at K′ the connecting-rod K^2, which latter is attached at L to the cam-disk, so as to give the driver a vertical reciprocation within the plunger, as will be readily understood.

M is an anvil pivoted at N to the lower portion of the head, and has formed therein a groove O for the reception of the wire to be formed into a staple, and the upper end of this anvil has adjustably secured therein a pin P, which normally presses against the back of the plunger J, thereby holding the lower end of the anvil in operative position, but when the plunger and driver are moved downward sufficiently for the slots Q and Q′ formed therein to register with the pin P the latter will swing therein, by which movement the slotted nose of the anvil will be swung rearward out of activity, and these slots are so placed that the benders first pass downward upon either side of the anvil before the latter is swung out of activity, thereby bending the staple, as will be hereinafter set forth, and putting it in position to be driven.

R represents the spool of wire from which the staples are to be made, and this spool is suitably mounted upon a support R′ and has a tension-strip R^2 arranged in contact there-

with, so that the wire will be properly coiled upon the spool while being fed to the machine.

A curved guideway S is attached to the machine and is adapted to guide the wire from the spool to the feeding mechanism. The feeding mechanism consists of a stationary guide-block T, having a pawl T′ pivoted thereto, held in normal position by a spring, and from this block passes the wire, the pawl engaging the same, so as to permit it to be drawn in the direction of the arrow, but holding it against retrograde movement. A second block T^2 is fitted to slide upon the rods T^3 and likewise has a spring-pressed pawl T^4, which acts upon the wire in the same direction as the pawl T′, so that when this last-named block is moved to and from the block T the wire will be gripped by the pawl T^4 and drawn forward step by step, as will be readily understood. The reciprocating movements of the block T^2 are brought about by the link U, which is pivoted to said block and to the right-angle lever V, said lever being pivoted at V′, having its horizontal member extending across the path of the pin V^2, carried by the plunger J. The result of this is that when the plunger moves downward this pin, through the mechanism just described, forces the block T′ outward, causing the pawl carried thereby to take a fresh hold upon the wire, and in order that the inward feeding of the wire may not take place until the plunger has reached its upward limit a latch-pawl W is arranged to engage with the teeth W′, formed upon the hub of the right-angle lever and pressed downward by the spring W^2. Thus the block T^2 will be held in the position last assumed against the action of the spring V^3 until the pin V^2 in its upward movement with the plunger comes in contact with the latch-pawl W and disengages the latter from the teeth W′ and permits the spring V^3 to return the right-angle lever V to its normal position, and in so doing the block T^2 will be drawn inward and with it the wire, thus accomplishing the feeding thereof.

The inward movement of the right-angle lever is limited and adjusted by the thumb-screw X, which is threaded through the head, and the spring Y, carried by the right-angle lever, serves to modify and cushion the contact between the lever and the end of this screw.

The wire in being fed inward to the anvil passes through the groove *a*, formed in the cutter-block *a*′, to one end of which the cutter a^2 is pivoted, said cutter consisting of a disk having notches a^3 formed therein, one edge of each notch being beveled and sharpened, so as to act in conjunction with the edge of the groove *a*, so as to shear the work at this point when the disk is oscillated. The disk is oscillated to bring about this cutting action by the lever *b*, which is pivoted at *b*′, one end thereof projecting into one of the notches a^3, while the other end extends rearward and is acted upon by the lower end of the vertical bar *d*, which is wedge-shaped, and therefore acts as a cam upon this lever.

The upper end of the bar *d* is pivoted at d^2 to the lever d^3, and the inner end of this lever extends into the field of travel of the cam projection *e*, formed or secured upon the cam-disk *h*, and the revolving of this disk will therefore move the lever d^3 downward against the spring W^2 and in so doing move the bar *d* downward, causing its wedge-shaped lower end to actuate the lever *b* and effect the cutting off of the wire, as before set forth.

The wire in passing over the groove *a* next passes into the groove O in the anvil and is thereby held in place, so that when this portion thereof is cut, as just described, it will be held against displacement until the benders have so acted thereon as to produce a staple, and this action consists in the downward movement of said benders around the anvil, which, as is obvious, will bend the protruding ends of the wire held by the anvil downward, suitable grooves being formed upon the inner surfaces of the benders, so as to accommodate the parallel members of the staple thus formed. In the formation of the staple by the downward movement of the benders the latter will pass over the staple-supporter *f*, which is of a width to occupy the same space previously occupied by the anvil, and thus hold the staple in position within the benders, so that it may be properly driven without liability of being bent. As the supporter *f* is held in an elevated position only by the action of a spring *f*′ the downward movement of the driver will gradually displace this supporter without in any manner interfering with the driving of the staple, yet holding the staple in the grooves of the benders, so as to prevent it from being bent during the driving operation, which is essential for this class of work, it being understood that the benders first form the staple, the anvil next being swung out of activity, and the benders finally coming in contact with the material to be stapled, as shown in Fig. 4, after which the driver is forced downward, ejecting the staple from the benders and driving it through the material indicated at *g*, *g*′ being the staple.

After the staple has been driven it is essential that it should be clenched upon the under side of the material, and this I accomplish in a peculiar and effective manner by the following mechanism:

h represents the table for supporting the work to be operated upon, and this table in turn is supported by the post h^2, to which it is swiveled, so as to be adjusted at any desired angle and held in its adjustment by the screws h^3. With a pocket formed in the table are pivoted the clenchers *i*, which normally stand at an angle, (shown in Fig. 7 and dotted lines in Fig. 3,) so that when the staple is driven through the material and passes into the slot in which these clenchers are piv-

oted the ends projecting below the material will be turned inward at an angle corresponding to the position of the clenchers, so that it is then only necessary to force the clenchers inward and upward against the under side of the material to effect the clenching of the projecting ends of the staple. For effecting this a vertical sliding block i' is fitted within the pocket and held in proper position by the screw i^2, so that these clenchers rest upon this block, and when the block is moved upward it forces the clenchers to a horizontal position, effecting the clenching of the staple. Guides i^3 are secured upon each side of the vertical partition of the plunger-block, so as to assist in guiding this block in its vertical movements.

A rod j is attached to the lower end of the block i' and, extending downward in the hollow post h^2, is attached to the horizontal member of the bell-crank lever j', which lever is pivoted to the bracket j^2, projecting from the post. The vertical member of the bell-crank lever j' is connected by the rod k to a corresponding bell-crank lever k', and the horizontal member of this last-named lever is connected by the rod j^2 to the cam-lever l. The upper end of the cam-lever projects within the field of action of the striker m, carried by the cam-disk m', so that when this disk is revolved the striker will come in contact with the cam-lever and actuate the mechanism just described to force the block i' upward to produce the desired result. The post h^2 is secured within the clamp n, formed with the frame of the machine, and this clamp is provided with the screw n', whereby the post may be held in any adjustment, and the object of the adjustability of the post is to vary the position of the table relative to the driving mechanism to accommodate various thicknesses of material to be operated upon, and the arrangement of the bell-crank lever j' is such as to permit the raising and lowering of the post and table without materially affecting the position of the clenchers. For convenience in raising and lowering the post I provide a hand-lever p, which is pivoted at p' to the frame of the machine, and is connected by slot and pin to the post, as indicated at p^2 in dotted lines, so that it is only necessary to loosen the clamp by the manipulation of the screw and draw upward or downward upon this hand-lever to bring the table to the proper position, after which the tightening of the clamp-screw will hold the table in this position.

A gage-strip q is secured to the lower portion of the post and so located relative to the table as to determine the proper location of the table relative to the thickness of the material to be used thereon by placing the material or a plug of equal thickness between this strip and the lower edge of the clamp n and moving the post upward until the strip and clamp bend the material or plug. This will greatly facilitate the adjustment of the table to various thicknesses of work.

From the foregoing description the operation of my improvement will be obviously as follows: When the material to be stapled is placed upon the table and the machine put in motion by the operation of the clutch mechanism E, the shaft C will then be revolved, and through the cam-groove I carry down the benders from the position shown in Fig. 3 to that shown in Fig. 4, thereby forming the staple, as before set forth, and this action will be followed up by the downward movement of the driver, which will drive the staple home, and immediately thereafter the clenchers will be forced upward by the action of the striker and clench the staple upon the under side of the work. While these operations are taking place the feed mechanism will have been actuated by the pin V^2, assuming the position shown in Fig. 4, taking a new hold upon the wire, and when the plunger J moves upward the wire will be fed inward by the release of the right-angle lever V, thus replacing a length of wire for the formation of a new staple, and this will be cut into the proper length by the actuation of the cutter a^2. All of these operations take place at every revolution of the shaft C, so that for every revolution of said shaft a staple is made, driven, and clenched, and the machine stops by reason of the clutch mechanism, so that the operator may move the material being operated upon for the proper location of the next staple and then again put the machine into operation with a like result.

Of course I do not wish to be limited to the exact details of construction here shown, as these may be varied to a considerable degree without departing from the spirit of my invention.

The cutter-block a' is made adjustable to determine the various lengths of staples and is held in place by a screw a^5, passing through a slot (not shown) in the face-plate and threaded in the aperture a^4 of the cutter-block.

Having thus fully described my invention, what I claim as new and useful is—

1. In a wire-stapling machine, a feed mechanism consisting of a stationary block, a pawl pivoted thereto holding the wire against retrograde movement, a sliding block, a pawl carried thereby for gripping and feeding the wire inward, a right-angle lever, a link for connecting the movable block with this lever, means carried by the bending-plunger for actuating the right-angle lever in one direction, a latch-pawl for holding the lever against retraction until the plunger has returned to its highest position, and means for effecting these movements, as specified.

2. In a machine of the character described, the combination of a spool-holder having a tension-strip, a curved guideway through which the wire is drawn, a feed mechanism for drawing the wire step by step, a right-

angle lever actuated by the machine, a latch-pawl engaging the rectangular lever and means on the driver for lifting the latch-pawl and a connection between the lever and one block of the feed mechanism, substantially as described.

3. In a machine of the character described, a plunger, benders carried thereby, an anvil in conjunction with which the benders operate, means for feeding wire step by step, a partially-rotating cutter, a guide-block on which the cutter is pivoted, a lever for actuating the cutter, a bar having a cam-surface for actuating the lever, and a cam projection on the cam-wheel for depressing the bar, substantially as described.

4. In a stapling-machine of the character described, a plunger having benders on its lower end, a driver fitted in a groove of the plunger, means for actuating these devices, coinciding slots in the plunger and driver, an anvil, an adjustable pin in the end of the anvil, said pin being arranged to enter the slots in the plunger and driver, substantially as described.

5. In a machine of the character described, a clenching mechanism consisting of a pair of pivoted clenchers, a block against which the ends of the clenchers rest normally at an angle, a series of bell-crank levers and connecting-rods operated by a cam-wheel for elevating the block and clenchers after the ends of the staple have received their initial inward bend, substantially as described.

6. In a machine of the character described, a cutting mechanism consisting of a block having a groove formed therein, a cutter-disk pivoted to said block, said disk having notches with sharpened edges, a lever pivoted to the block and projecting into a notch, a bar having a cam end for actuating the lever and means for reciprocating the bar, substantially as described.

7. In a machine of the character described, feeding mechanism, a right-angle lever for actuating said mechanism, means for operating the right-angle lever, a spring secured to said lever, and an adjusting-screw adapted to act as a stop for the lever and to regulate the throw of the lever, its inner end coming in contact with the spring, as specified.

8. In a machine of the character described, an anvil pivoted to the head of the machine having a groove formed in its nose, a pin adjustably secured in the upper end of the anvil, a plunger carrying benders for forming the staples, a driver fitted in said plunger, the plunger and driver having coinciding slots said pin bearing against the back of the plunger and adapted to register with the slots formed in the plunger and driver whereby the anvil is thrown out of activity, as and for the purpose set forth.

9. In a stapling-machine of the character described, a plunger adapted to reciprocate in the head of the machine and carrying benders upon the lower end, a driver sliding in said plunger, the plunger and driver having coinciding slots, an anvil pivoted to the head and having a groove in its nose, a pin adjustably secured in the upper end of the anvil and adapted to bear against the back of the plunger whereby it is held in activity, said pin being also arranged to register with the slots in the plunger and driver so as to swing therein and permit the nose of the anvil to move out of activity, and means for actuating the plunger, as specified.

10. In a machine of the character described, a power-shaft having cam-disks secured thereon for the actuation of the operating parts of the machine, a plunger fitted to slide in the head, benders carried by the lower end of the plunger, a driver fitted to slide within the plunger, an anvil pivoted to the head and having a slot in its nose, means for bringing said anvil into activity and removing it therefrom when a staple has been formed thereover, a staple-support for entering the benders and holding the formed staples in place while being driven, feed mechanism dependent upon the downward movement of the plunger for its actuation in one direction, means for holding said mechanism in its retracted position until the limit of the upward movement of the plunger is reached, a spring for actuating the feed mechanism in the opposite direction, an adjustable table, means for holding the table in various adjustments, mechanism for clenching the staple after being driven through the work, and a series of levers and rods for conveying motion from the power-shaft to the clenching mechanism, as shown and described.

11. In a machine of the character described, suitable feed mechanism for carrying the wire inward, a right-angle lever connected with said feed mechanism, a latch-pawl for engaging the lever, means on the plunger for raising the latch-pawl and for actuating this right-angle lever, as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

FREDERICK H. SANDER.

Witnesses:

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