

No. 658,604.

Patented Sept. 25, 1900.

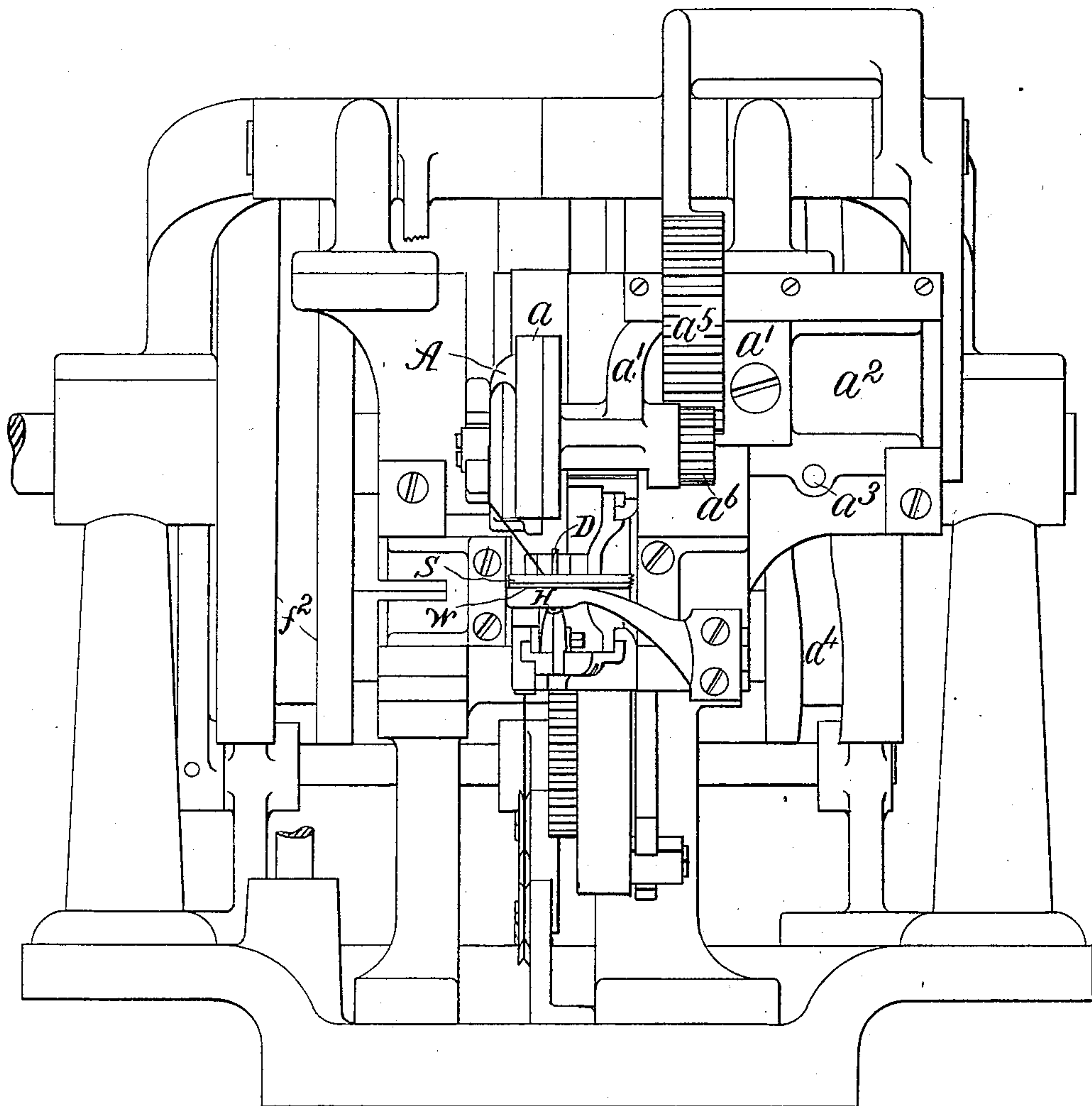
G. E. WARREN.
SHOE SEWING MACHINE.

(Application filed Oct. 12, 1896.)

(No Model.)

6 Sheets—Sheet 2.

Fig. 2.



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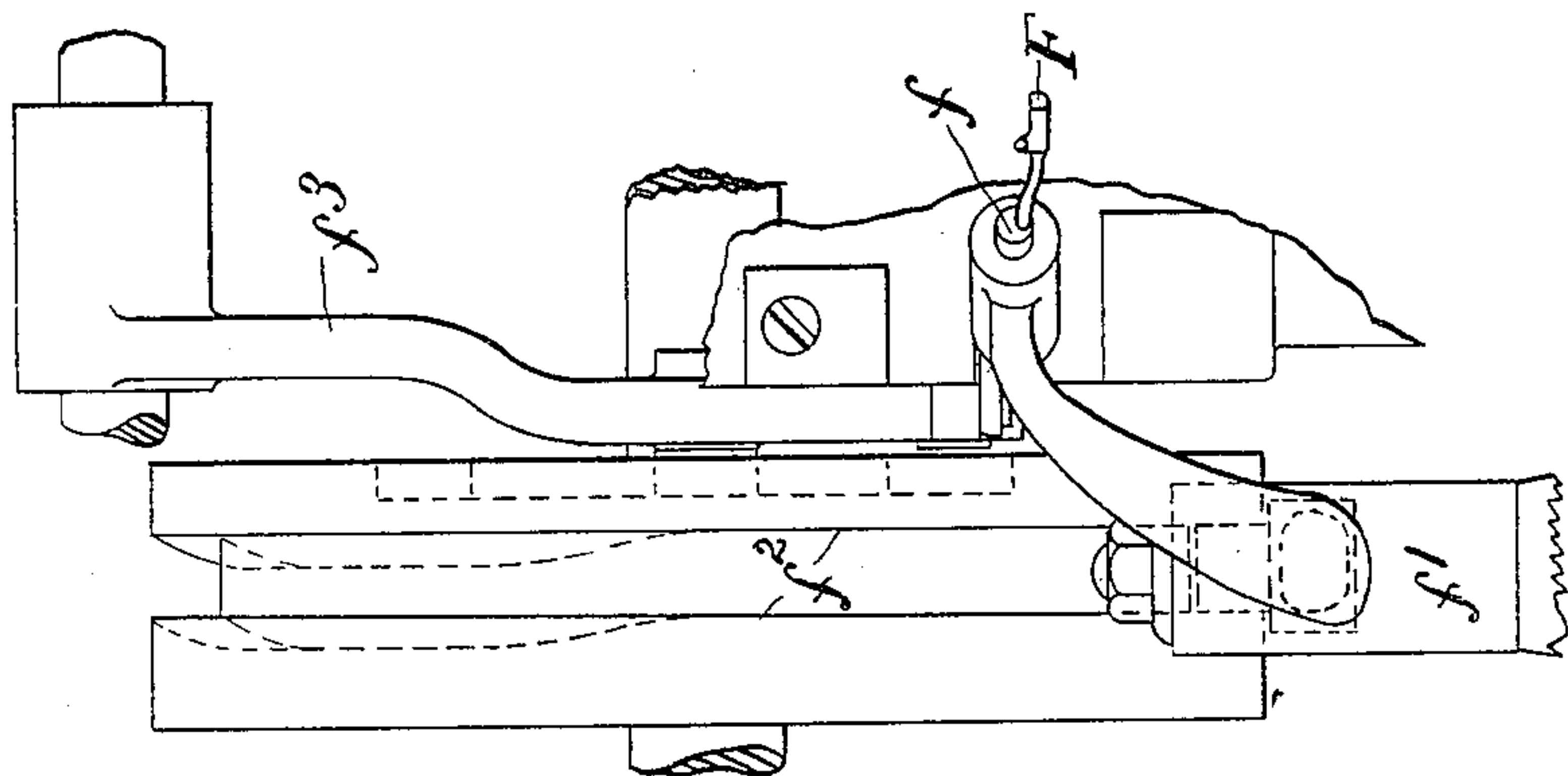


Fig. 4.

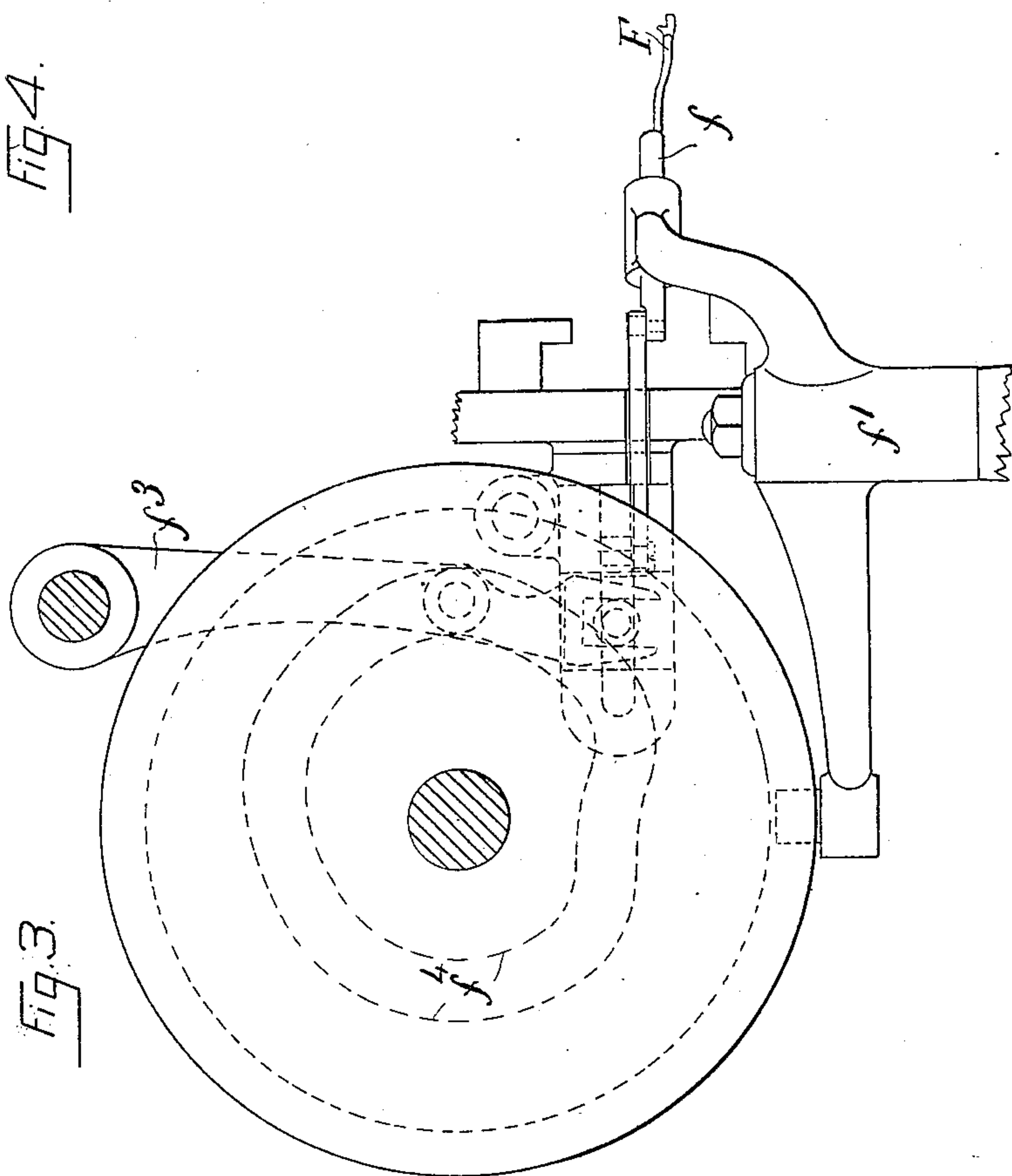


Fig. 3.

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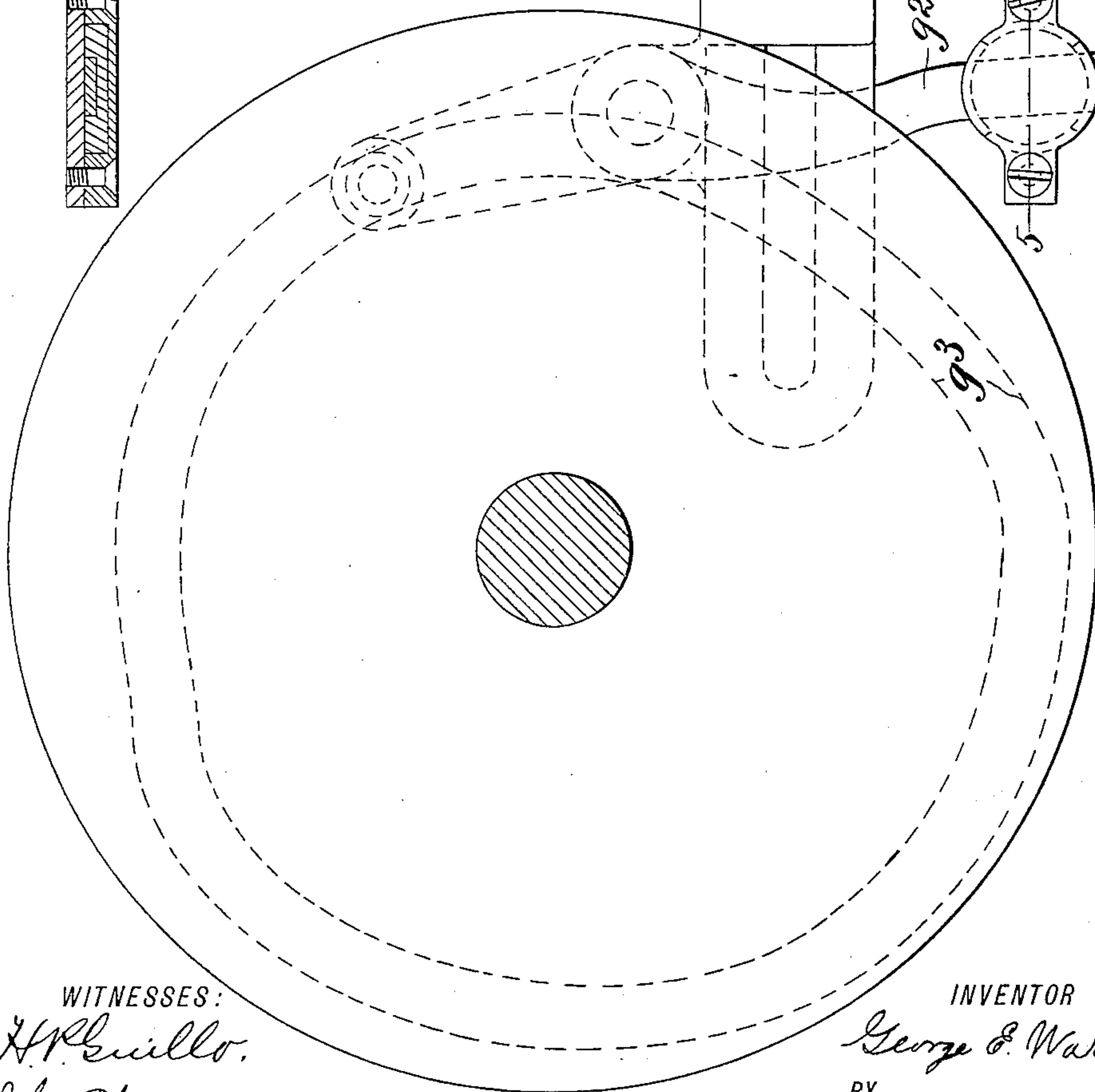
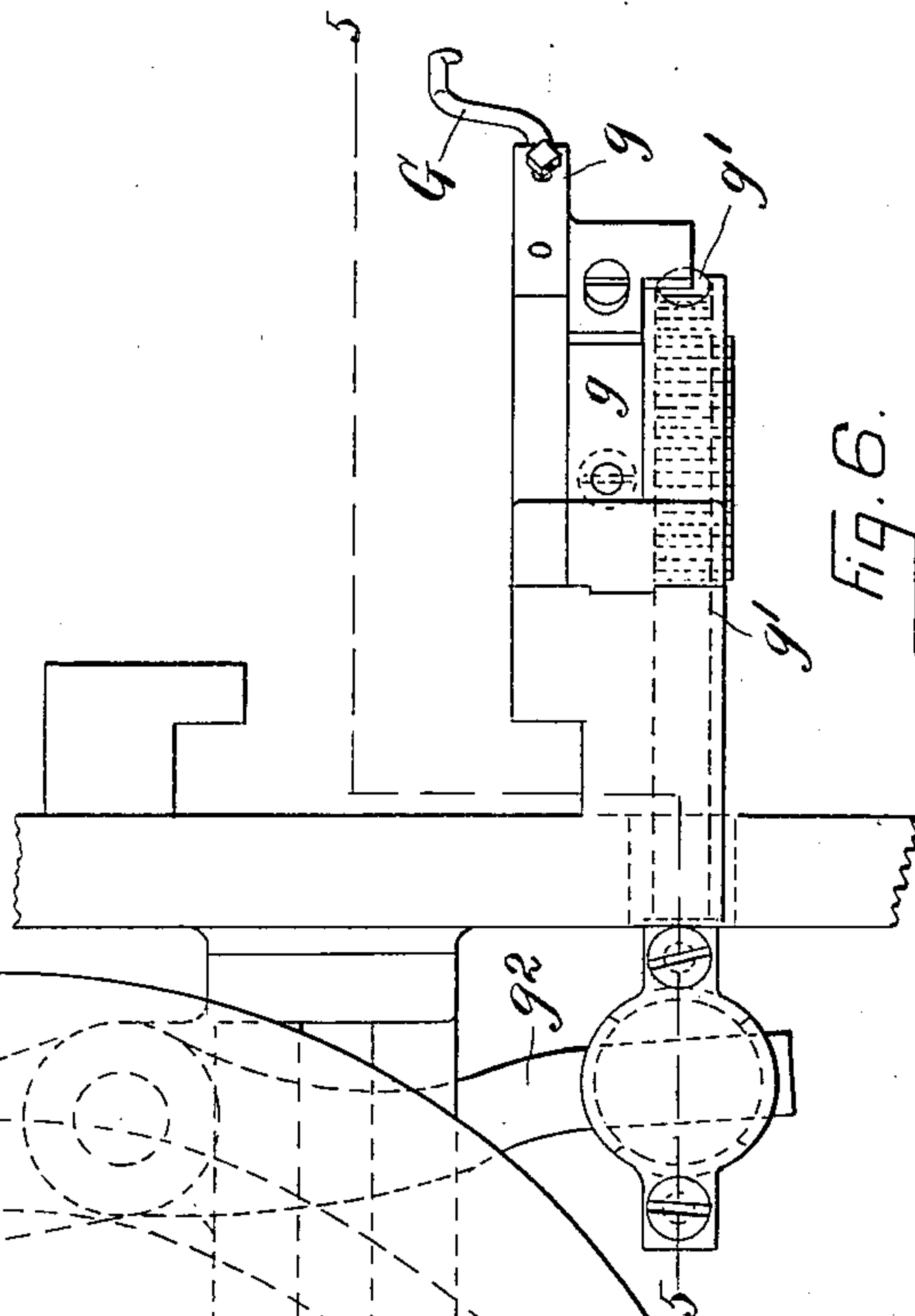
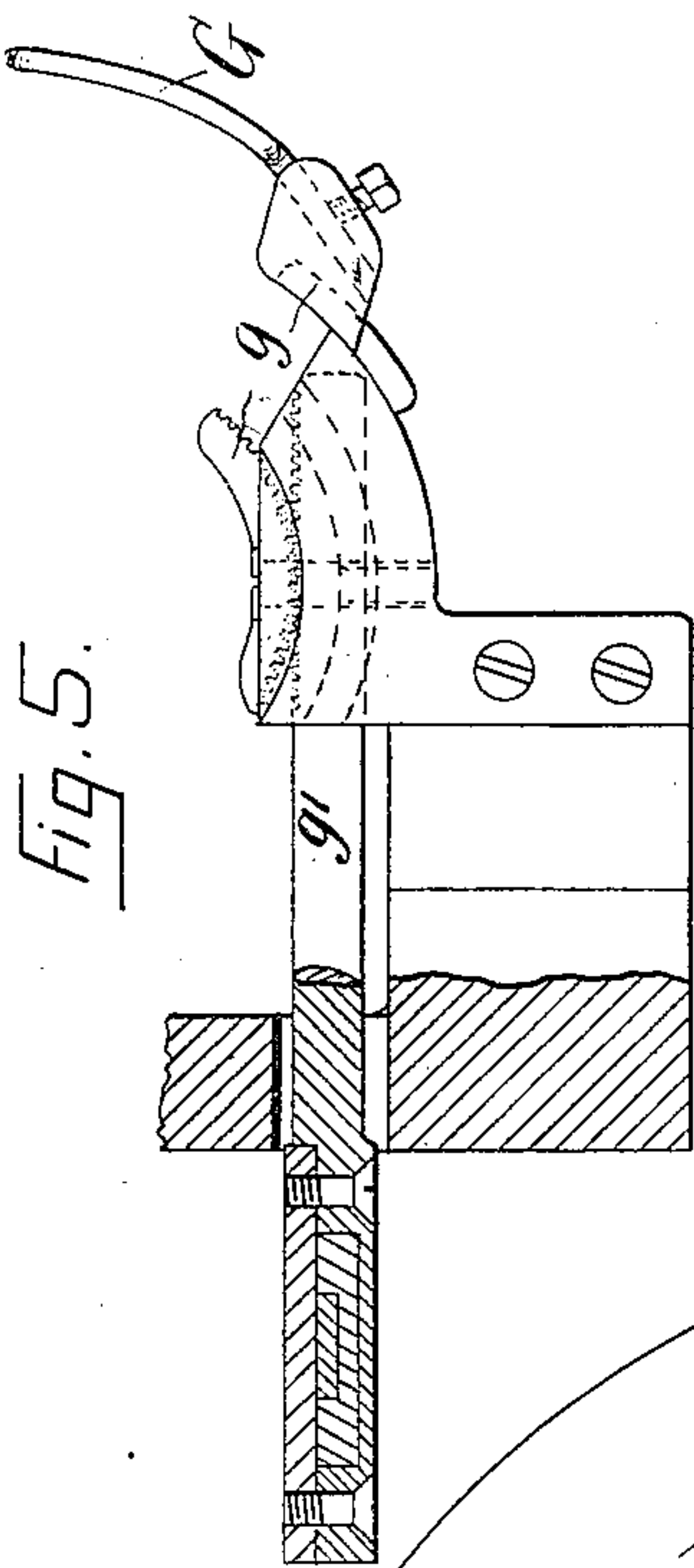
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WITNESSES:
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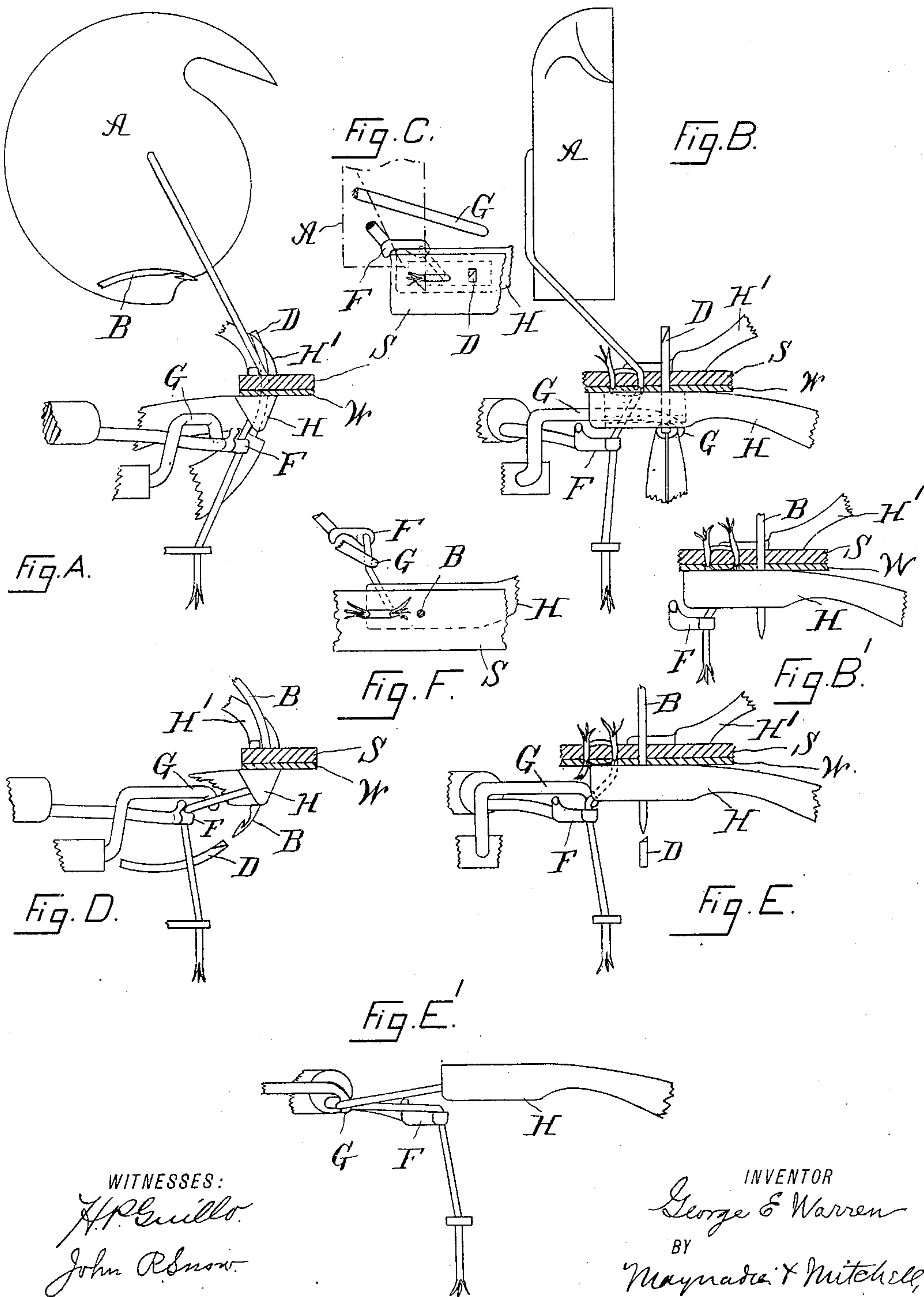
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(Application filed Oct. 12, 1896.)

(No Model.)

6 Sheets—Sheet 5.



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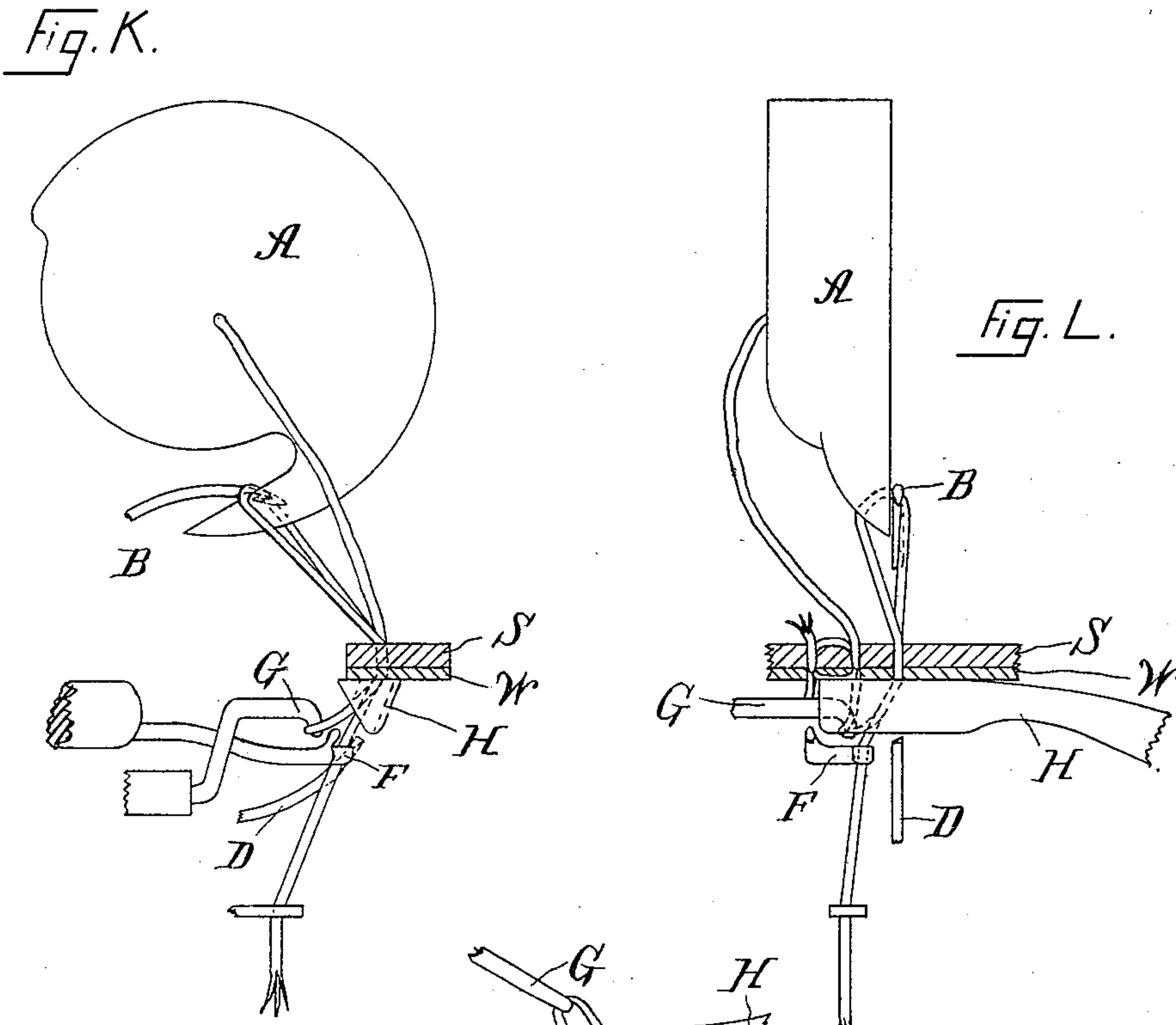
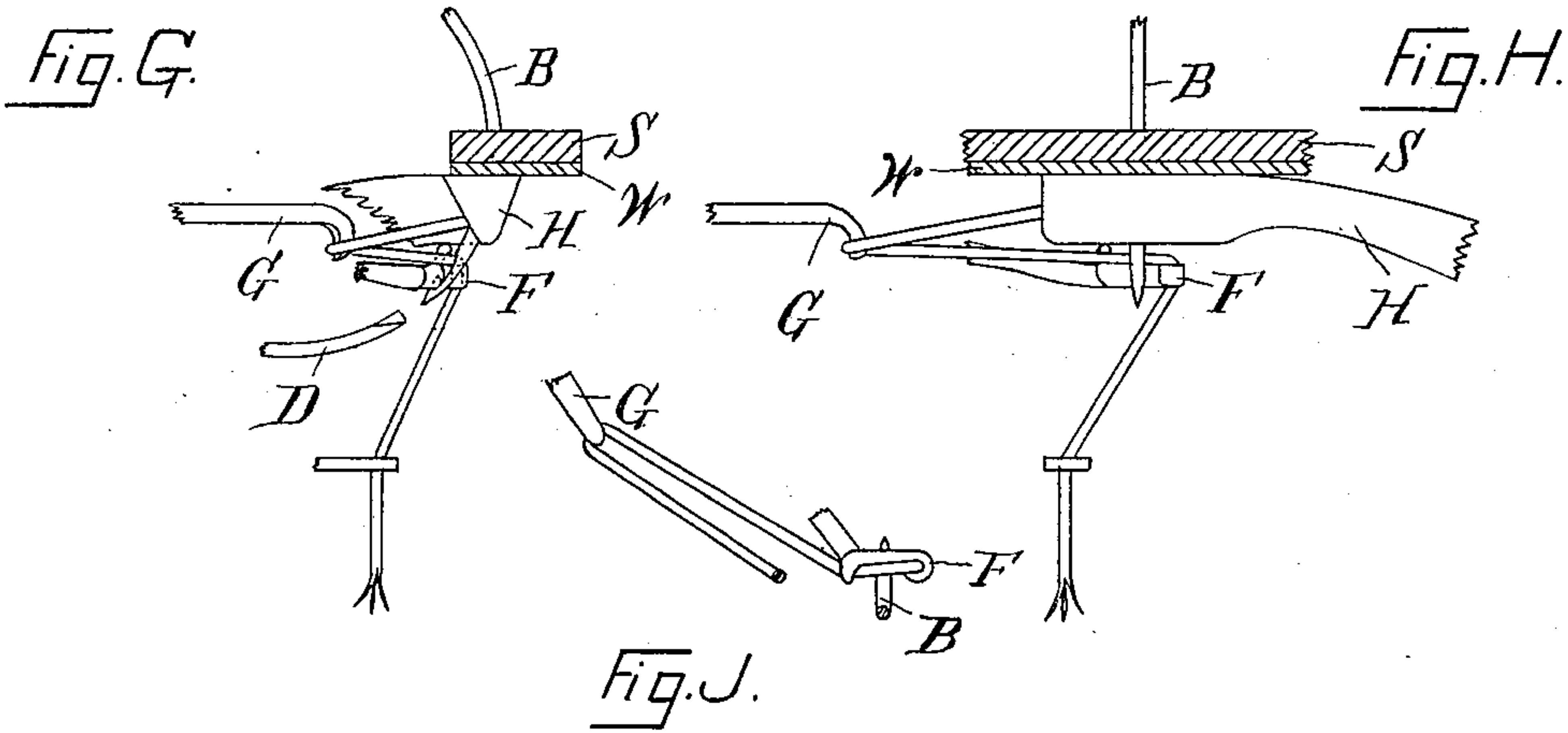
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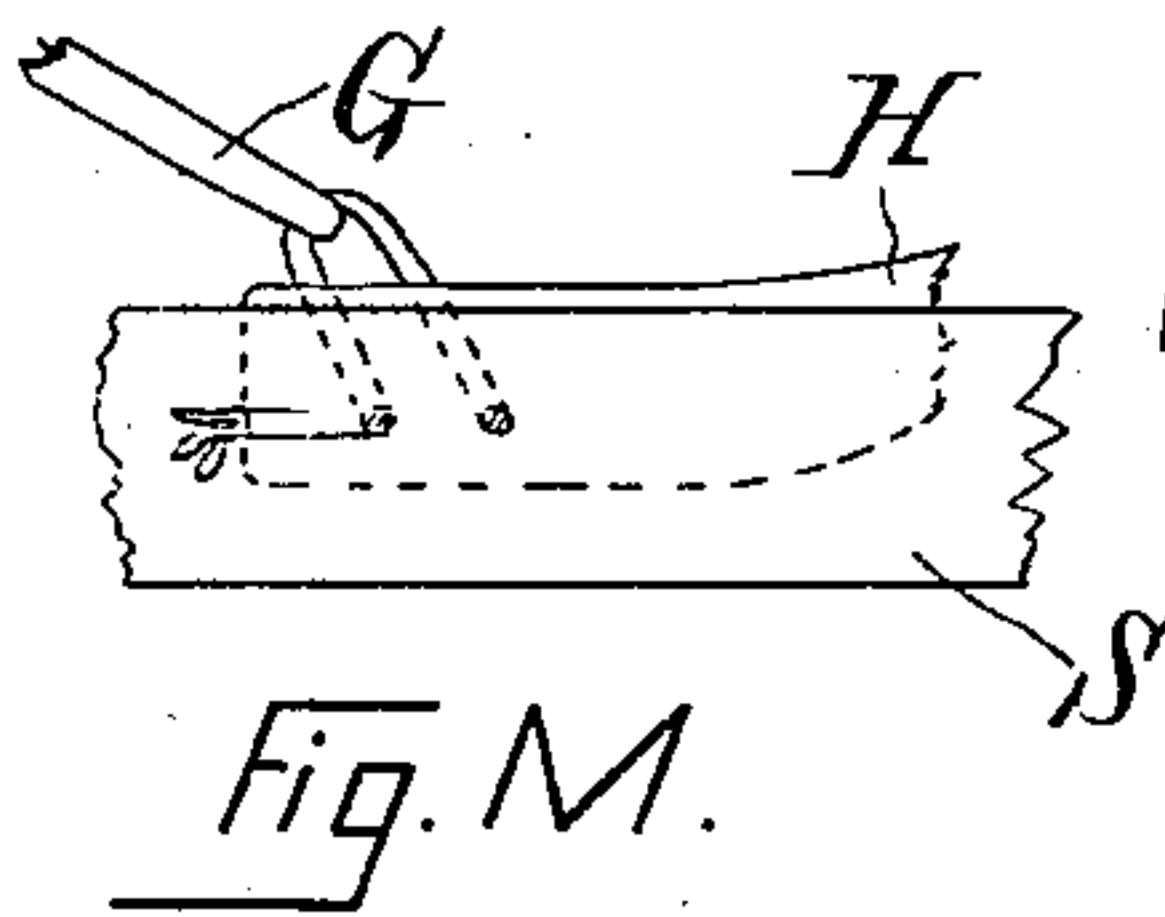
(Application filed Oct. 12, 1896.)

(No Model.)

6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

GEORGE E. WARREN, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO THE
CAMPBELL MACHINE COMPANY, OF SAME PLACE.

SHOE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 658,604, dated September 25, 1900.

Application filed October 12, 1896. Serial No. 608,568. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. WARREN, of Pawtucket, in the county of Providence and State of Rhode Island, have invented an
5 Improved Lock-Stitch Sewing-Machine, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, and Fig. 2 a
10 front elevation, of the head of a sewing-machine embodying my invention. Figs. 3 and 4 are details illustrating mechanism for actuating the thread eye or looper. Figs. 5 and 6 are details, on a larger scale, illustrating
15 mechanism for actuating the thread-arm and loop-holder. Figs. A to M, inclusive, are diagrams showing the relative position of the parts in the formation of a stitch according to my invention.

20 My invention is an improved lock-stitch sewing-machine; and it consists in the combination of a hook-needle, a shuttle, a shuttle-holder, a shuttle-driver, a thread-arm, a thread-eye, a take-up for the needle-thread,
25 and means for operating these several elements.

The objects of the invention are to measure off shuttle-thread for the next stitch by moving the shuttle-holder away from the pre-
30 ceding stitch while the needle-thread is held taut by the dwell of the take-up, to supply slack thread to the needle while it is drawing the loop of needle-thread through the work, and to hold the needle-thread away from the
35 surface of the work while the shuttle is passing through the loop of needle-thread.

In machines of this class—that is, for forming a lock-stitch—a take-up or equivalent device draws the needle-thread through the
40 work after the shuttle has passed through a loop in the needle-thread to set the stitch and draw the lock—that is, that part of the needle-thread and that part of the shuttle-thread which cross one another in the lock-stitch—
45 to the desired depth or to the desired distance from one surface of the work, and the needle-thread should be and ordinarily is so drawn taut while the shuttle-thread is slack until the take-up or its equivalent is just about to
50 complete its stroke and set the stitch, but at that moment the slack in the shuttle-thread

should be used up and both needle-thread and shuttle-thread should be drawn taut just as the stitch is set and the lock located, with the result that at the moment of completing
55 the lock-stitch the needle-thread is drawn taut by its mechanism, and the shuttle-thread is also drawn taut by the tightening of the needle-thread about it and by the resistance of the shuttle-tension, for as the needle-
60 thread is drawn taut the needle-thread carries the shuttle-thread with it until all the slack of the shuttle-thread is used up and the shuttle-thread is drawn taut between the lock and the shuttle-tension. In prior machines
65 of this class requiring the shuttle-thread to be measured off or pulled through the shuttle-tension to afford slack, as above explained, the shuttle-thread is pulled through the tension by the revolution of the shuttle in order
70 to afford slack shuttle-thread for each stitch; but at the moment of completing the lock-stitch both threads are taut, as above explained, and as the measuring off of shuttle-thread for the next stitch requires about one-
75 sixth of a revolution of the machine the needle-thread must be slacked before that measuring off of the shuttle-thread is completed, and the result is that the tension of the shuttle-
80 thread must be very light, for if it were not the slack needle-thread would yield to the strain on the shuttle-thread, if that strain were great enough to pull the shuttle-thread through a heavy tension, and the lock would be displaced, as it is not practical to keep the
85 needle-thread taut during the time required to measure off slack shuttle-thread when that measuring off is done by the revolution of the shuttle; but a sidewise movement of the shuttle sufficient to measure off the nec-
90 essary slack thread can be given by an easy cam in a very small fraction of a revolution of the machine, and it is practical to keep the needle-thread taut during that short time by causing the take-up or equivalent mech-
95 anism for tightening the needle-thread to dwell a moment while at the end of its thread-tightening stroke, and this feature of my invention is the combination of mechanism to give the shuttle-holder a movement with
100 mechanism to tighten the needle-thread which dwells at the end of its thread-tight-

ening stroke sufficiently to allow the shuttle-moving mechanism to move the shuttle-holder and shuttle sufficiently to draw out shuttle-thread through the tension, and thus afford slack shuttle-thread for the next stitch. The new results are that the tension of the shuttle can be made far heavier than was practical in other machines of this class, for the measuring off of the shuttle-thread takes place immediately after the lock is completed and while the needle-thread is held under strain, and the lock-stitch can be made tighter and more uniform as to locating the lock. The reason of this greater uniformity in locating the lock is that when the strain on the needle-thread meets not only the resistance of pulling the lock into its place in the work, but also the additional resistance of a heavy tension on the shuttle-thread, the needle-thread will stretch more or less under that strain instead of pulling the lock to a greater or less depth in the work, and all the slight variations in practical operation will result simply in unimportant variations in the stretch of the needle-thread instead of in objectionable variations in locating the lock. With a light tension on the shuttle-thread, as heretofore in all machines of this class, these slight variations in practical operation result in objectionable variations in locating the lock. Stated practically, this feature of my invention allows the use of a much heavier tension on the shuttle-thread than has heretofore been practical and prevents the slight variations in that heavy tension from producing objectionable variations in the tightness of the stitch and in the location of the lock. When a loop of needle-thread long enough for a shuttle to pass through it is drawn through the work, the needle-thread is sunk more than is desirable in the surface of the work, and this is especially the case in machines in which the loop, drawn through the work by the needle, is taken by the shuttle from the needle and elongated by the passage of the shuttle through it. This feature of my invention wholly remedies this evil, as the thread-arm after performing its usual function in cooperation with the thread-eye holds the needle-thread out of contact with the surface of the welt while the loop is being drawn through the work by the passage of the shuttle, and the needle-thread is thus laid on the surface of the welt or other work instead of being sunk into that surface. The arm is of course removed from between the needle-thread and the work before the stitch is set.

In the drawings I have shown in Figs. 1 and 2 the main parts of a sewing-machine embodying both features of my invention in their preferred form for use in sewing the outer sole to the welt, the shuttle A and its race α being above the needle B and awl D and the shuttle-driver, the needle-carrier, and the awl-carrier being actuated by racks and pinions, as will be clear from Figs. 1 and 2 to all skilled in the art without detailed description. The

thread-eye F is an instrument for laying the thread in the hook of the needle, often called a "looper," and it and its actuating mechanism are well shown in Figs. 3 and 4. The thread-arm G, which cooperates with the thread-eye F to form a bight of thread between the needle and the work, as is fully described in Patent No. 253,156, dated January 31, 1882, granted to Duncan H. Campbell, and suitable mechanism for actuating thread-arm G are well shown in Figs. 5 and 6. These two mechanisms—namely, the thread-eye and its actuating mechanism and the thread-arm and its actuating mechanism—will also be clear to all skilled in the art without detailed description, for both are well known, except that the thread-arm G has in addition to its usual functions, fully described in said Patent No. 253,156, the further function of laying the thread on the surface of the work and preventing it being sunk into that surface; but this further function as well as the new function of the shuttle are more clearly shown in Figs. A to M, inclusive, and will now be fully described by reference to those figures.

When the parts are in position, as shown in Figs. A, B, and C, a stitch has just been set and the shuttle A has moved away from the last needle-hole full of thread far enough to measure off shuttle-thread for the next stitch, the needle-thread being held taut by the take-up mechanism, and the awl D is preferably through the work, as shown. As the awl D is retracted the needle B follows it, (see Fig. D,) and the needle feeds the work and the parts assume the position shown in Figs. D, E, and F—that is, the thread-eye F and the thread-arm G engage the needle-thread, as shown in Fig. E, so that when the thread-eye F threads the needle (in the familiar way with this well-known style of thread eye or loop) a bight is formed in the needle-thread by the action of the arm and eye, as shown in Figs. G, H, and J. As the needle is retracted the thread-arm G moves toward the needle B to deliver slack thread on the left side of the needle, as shown in Figs. K, L, and M, the take-up mechanism at the same time affording slack thread on the right side of the needle, and when the loop is drawn sufficiently through the work the shuttle-nose enters the loop of the needle-thread. (See Figs. K and L.) The thread-arm G does not drop the bight of needle-thread as soon as the needle has drawn the loop into the work, as heretofore in machines containing a thread-eye and thread-arm, but holds the needle-thread, as shown in Figs. K, L, and M, while the shuttle passes through the loop of needle-thread, and thus prevents it from being sunk into the welt W, the position of the parts being then as shown in Figs. K, L, and M, which also illustrate the slacking of the shuttle-thread for the next stitch by the return motion of the shuttle, aided in this instance by the feed of the work.

The members of the work-clamp H and H'

and the sole S and welt W are as usual, and their relations to the other parts are clearly shown in the diagrams Figs. A to M. The parts not lettered constitute the main parts of a sewing-machine especially designed for stitching the outer sole to the welt in the manufacture of welted shoes and need no detailed description. The preferred mechanism for actuating the thread-arm G is shown in detail in Figs. 5 and 6 when the carrier *g* of the thread-arm G is mounted in curved ways, (shown in dotted lines in Fig. 5,) and is a segmental gear engaging with the rack *g'*, which is reciprocated by the cam-lever *g*² and cam *g*³.

15 Figs. 3 and 4 show the preferred mechanism for actuating the thread-eye F, its carrier *f* being mounted in one arm of lever *f'*, which lever is actuated by its cam *f*², and carrier *f* is moved endwise by cam-lever *f*³, suitably connected to carrier *f* and its cam *f*⁴, as will be clear from Figs. 3 and 4.

The shuttle-race *a* is mounted on the bracket *a'*, which is secured to the slide *a*², which slides in ways in the frame of the machine, as will be clear from Figs. 1 and 2. The slide *a*² is actuated by cam-stud *a*³ and cam *a*⁴. The face of the rack *a*⁵ is made wide, so that the pinion *a*⁶ on the shaft of the shuttle-driver will remain in mesh while the shuttle-holder *a* is moved.

What I claim as my invention is—

1. In a sewing-machine the combination of a hook-needle; a shuttle; a shuttle-holder; a shuttle-driver; a take-up for the needle-thread; mechanism for actuating the needle; 35 mechanism for causing the shuttle and shuttle-driver to move about an axis in the shuttle-holder; mechanism for actuating the take-up to first take up the needle-thread and then dwell; and mechanism for moving the shuttle-holder away from the preceding stitch while the take-up dwells. 40

2. In a sewing-machine the combination of a hook-needle; a shuttle; a thread-arm; a thread-eye; mechanism for actuating the needle; mechanism for actuating the shuttle; 45 mechanism to cause the arm and eye to deliver thread to the needle in the form of a bight extending from the hook of the needle over the arm to the work in order to supply slack thread to the needle while the needle is drawing the loop of needle-thread through the work; and mechanism to cause the arm to hold the needle-thread away from the surface of the work while the shuttle is passing 55 through the loop of needle-thread, then drop the loop of needle-thread and return to its position to form a new bight, as the stitch is set.

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