

No. 612,605.

Patented Oct. 18, 1898.

C. A. DAHL.
BUTTONHOLE SEWING MACHINE.

(Application filed Oct. 21, 1897.)

(No Model.)

5 Sheets—Sheet 2.

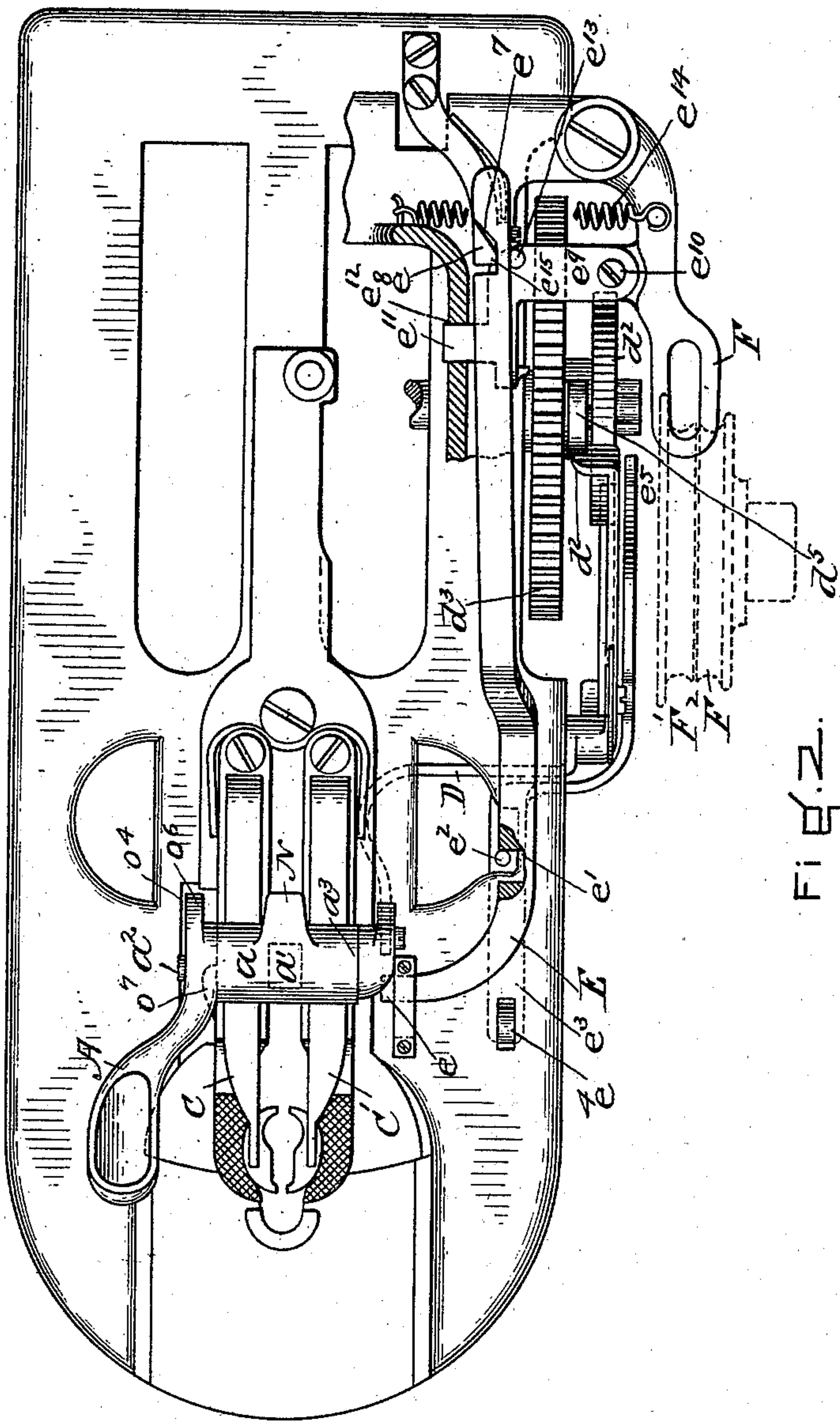


Fig. 2.

WITNESSES

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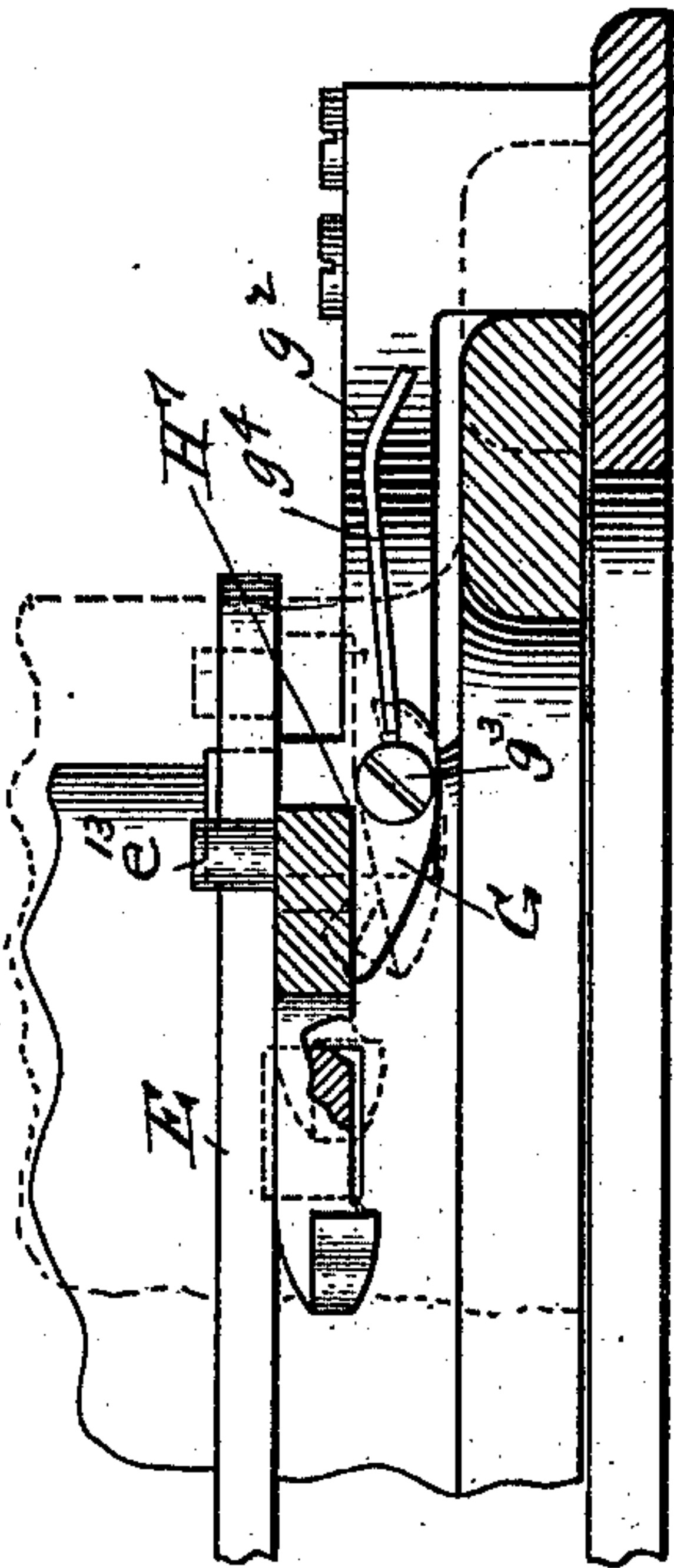


FIG. 4.

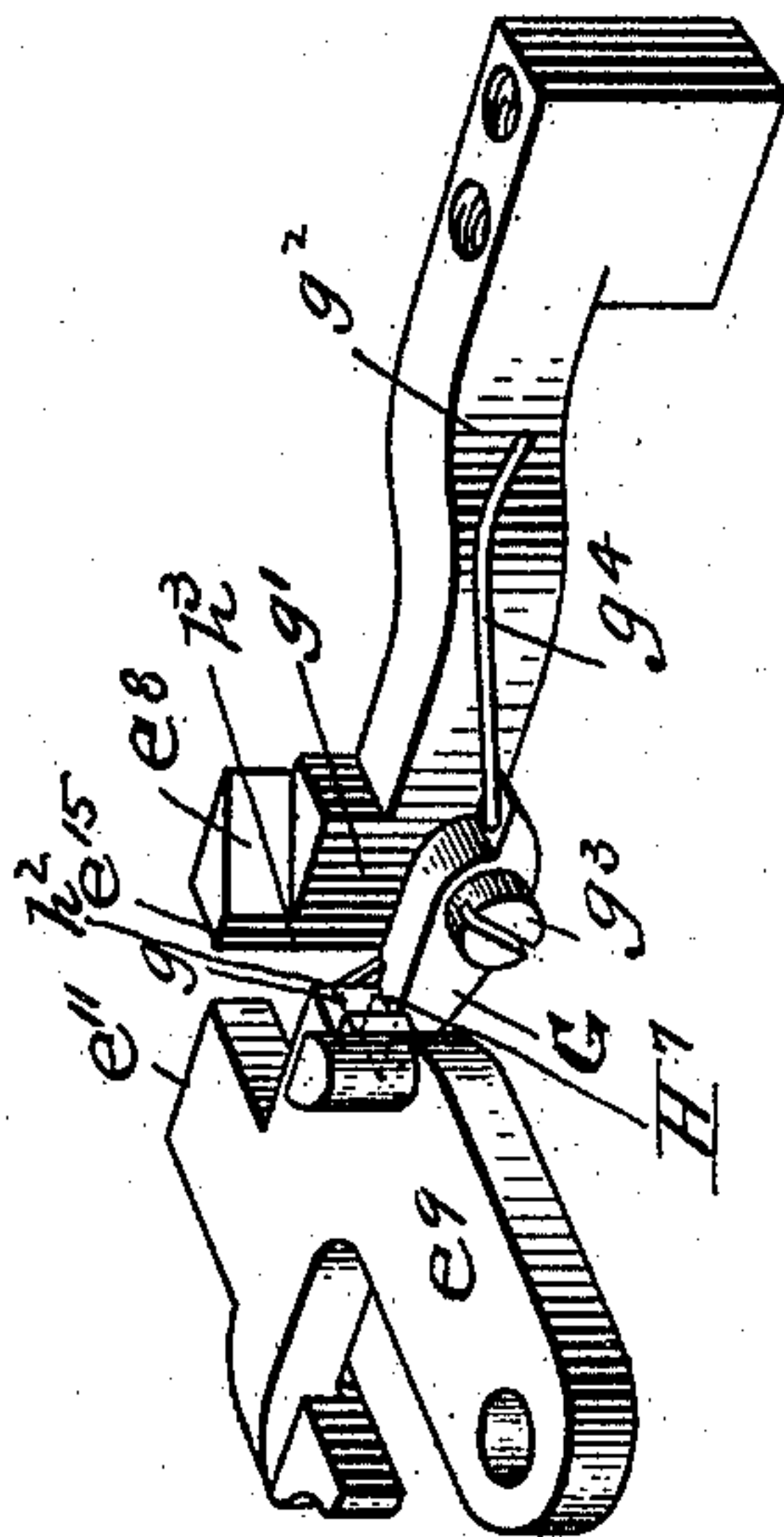


FIG. 5.

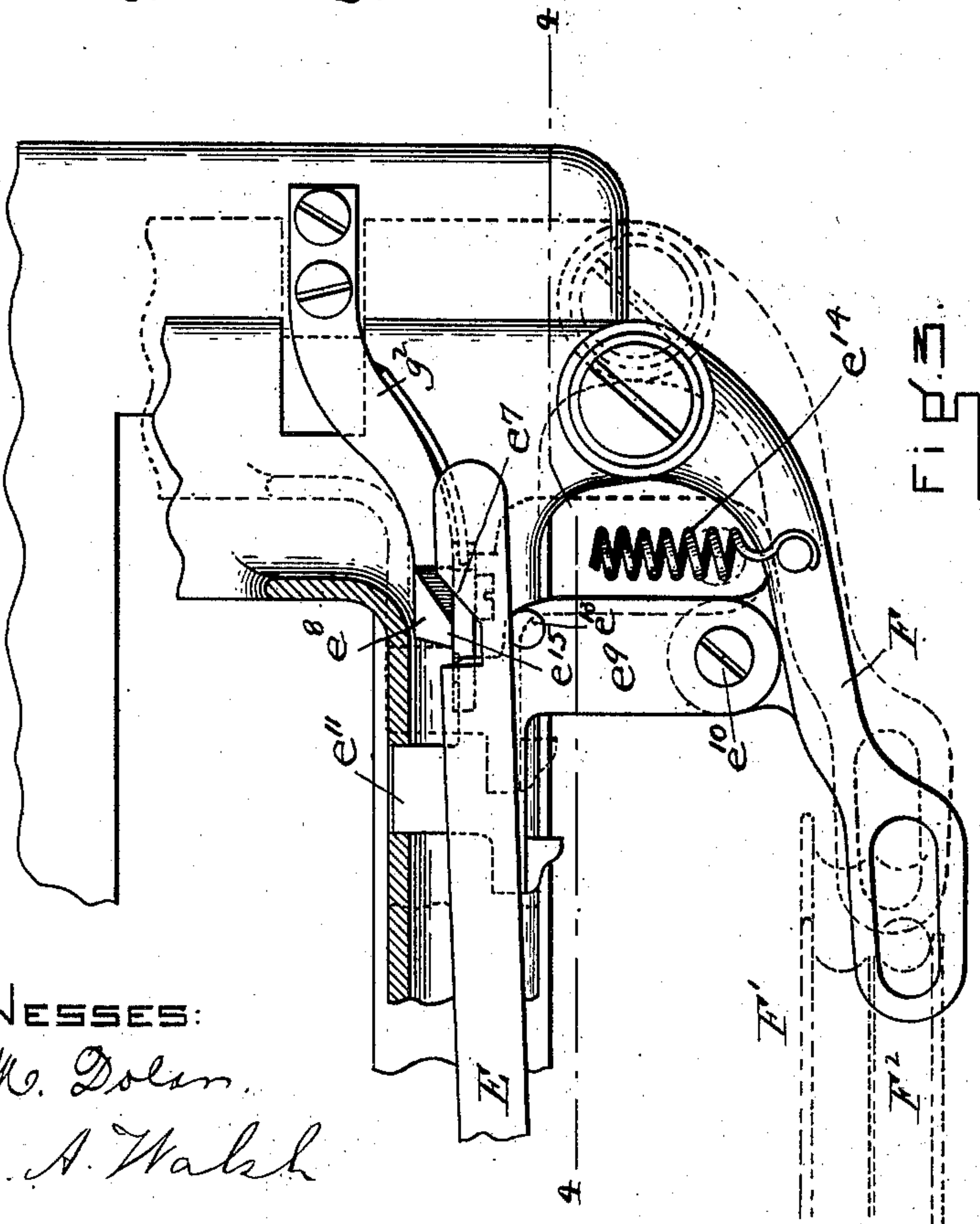


FIG. 6.

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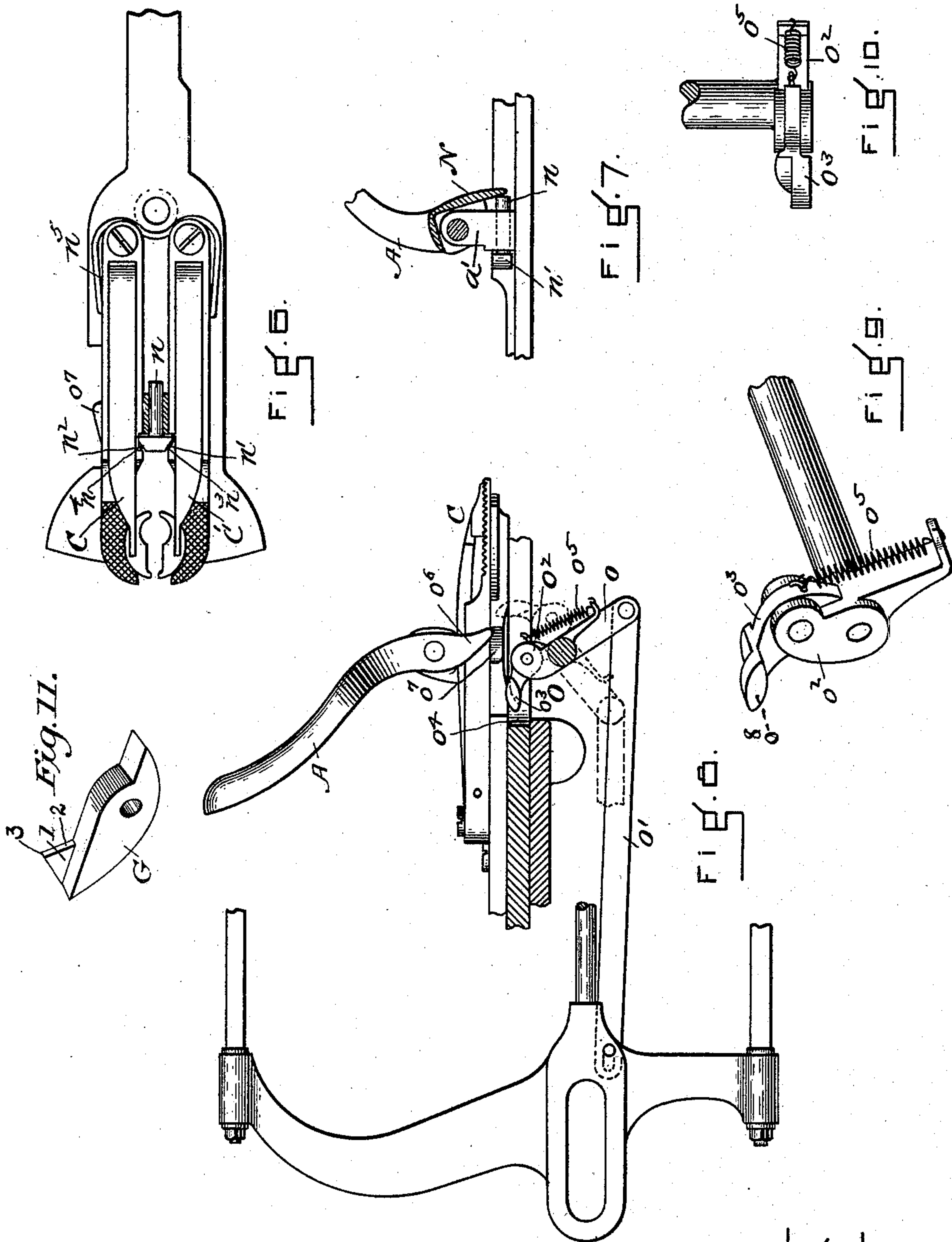
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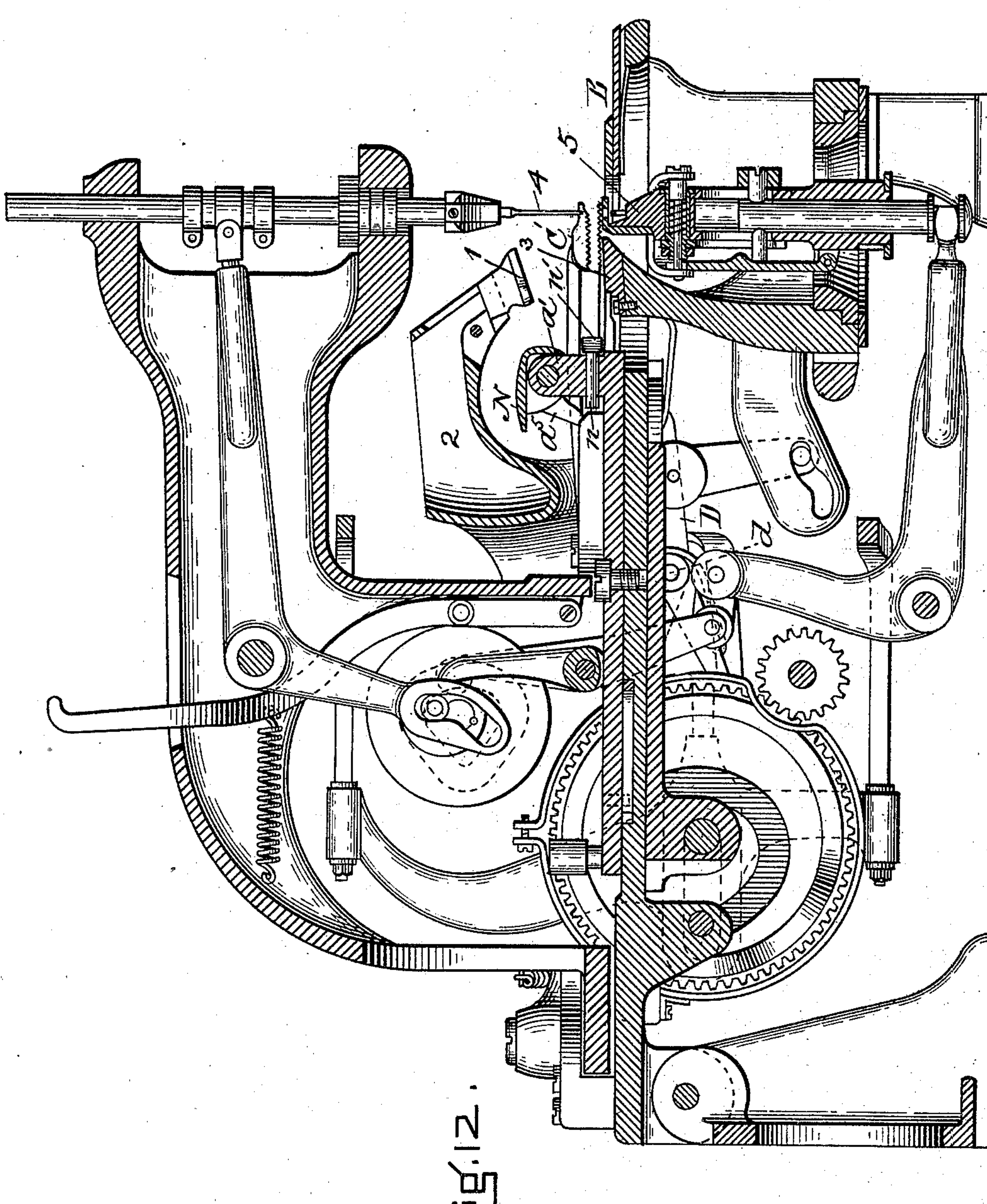


Fig. 12.

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UNITED STATES PATENT OFFICE.

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BUTTONHOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 612,605, dated October 18, 1898.

Application filed October 21, 1897. Serial No. 655,897. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. DAHL, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Buttonhole-Stitching Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention is an improvement upon that described in my application for Letters Patent of the United States, filed February 1, 1897, Serial No. 621,468. In said application there is shown and described a buttonhole-cutting mechanism and a buttonhole-stitching mechanism and means for starting the machine whereby the operation of the cutting mechanism is instantly followed by the beginning of the operation of the stitching mechanism, there being but a single actuation of the machine.

The present invention is an improvement in that the cutting mechanism or devices and the stitching devices are separately actuated, whereby it becomes possible to operate the cutting mechanism only or the stitching devices only, the starting of the cutting mechanism not involving the starting of the stitching mechanism.

In the drawings, Figure 1 is a view in right side elevation of enough of the machine and the starting mechanism to illustrate the features of my invention. Fig. 2 is a view in plan of the bed of the machine, the arm or upper bracket being removed and showing certain parts above the bed, such as the starting-lever and the work-clamps, and also representing in plan the starting mechanism. Figs. 3, 4, and 5 are enlarged views in detail representing portions of the starting mechanism, to which reference will hereinafter be made. Fig. 6 is a view of the work-clamps, principally in plan, to represent a portion of the mechanism for spreading them. Fig. 7 is a detail view, principally in elevation, to represent the connection between the starting-lever and the clamp-spreading mechanism. Fig. 8 is a detail view, principally in elevation, to represent the mechanism for

releasing and returning the starting-lever and for shifting the work-clamps at the end of the stitching operation. Fig. 9 is a view in perspective, and Fig. 10 a view in plan, enlarged, of portions of the mechanism represented in Fig. 8. Fig. 11 is a view in perspective of a latching-pawl, to which reference is hereinafter made. Fig. 12 is a view in vertical section to show the buttonhole cutting and stitching devices or so much thereof as may be necessary.

The invention is adapted to be used in conjunction with any buttonhole-stitching machine having a buttonhole-cutting mechanism and a buttonhole-stitching mechanism. I have represented it in Fig. 12 as combined with the buttonhole-cutting mechanism and buttonhole-stitching mechanism shown and described in my application above referred to, and I will now briefly enumerate the parts of said cutting and stitching mechanism. 1 is the buttonhole-cutter; 2, its operating-lever; 3, the anvil which coöperates with the buttonhole-cutter; 4, the upper eye-pointed needle of the stitching devices, and 5 the lower complementary stitching devices. The buttonhole-cutter and anvil are movable and operated as described in my said application for patent, and the stitch-forming devices are also moved, turned, and operated as therein described.

Referring to the drawings, A represents the starting-lever. It is preferably located above the bed B and at the left hand of the work or cloth plate. It has at its lower end a lateral extension a , (see Fig. 2,) the center of which upon the under side is removed to receive a pin or stud a' , to which the extension is pivoted by the pin a^2 . This construction is followed for the purpose of enabling this extension to be used in depressing and holding depressed the clamps C C'. To the end a^3 of the extension opposite the handle there is secured by a pin a^4 the gravity-pawl a^5 , which swings a limited distance upon the pin, the extent of its swinging movement being limited by a pin a^6 on the under side of the weighted section a^7 , which extends into a slot a^8 in the end a^3 of the extension a .

So far the construction of the starting-lever,

its extension, and pawl is like that of the similar parts in the application to which reference has been made, and the starting and operating devices of the cutting mechanism are like those of the said application and are started by the lever and pawl in the same way—that is, upon the backward movement of the upper end of the lever the pawl a^5 is brought into contact with the lever D, which is pivoted at d , and the inner end d' of which releases and causes engagement of the clutch connecting the crank-disk d^2 of the cutting devices with its actuating gear-wheel d^3 , it being understood that the movement of the starting-lever causes the end a^9 of the pawl to be brought into contact with the inclined end d^4 of the lever D and depress the same sufficiently to lift the end d' from contact with the finger or part d^5 of the clutch, and to be immediately disengaged from it by riding past it, when the lever D resumes its original position, bringing the end d' into the path of the arm or part d^5 , which comes into contact with it and is stopped by it.

It will be understood that in the operation of this type of machine it is desirable to provide for the independent cutting of the buttonhole-slit and the independent stitching of the buttonhole, so that the buttonhole-slit only may be made by the machine or so that unslit or uncut buttonholes may be stitched or so that one operation may succeed the other, and when the starting-lever is also used to start the stitching devices I prefer to use the pawl a^5 and the starting-lever A and to combine them with the starting-bar E of the starting mechanism of the stitching devices. This bar has its end e curved and brought into line with the line of movement of the lower end of the pawl a^5 , so that after the operation of the cutting mechanism the stitching devices may be started by a further movement of the starting-lever sufficient to cause the pawl a^5 to come into contact with the end of the starting-bar and move the starting-bar, which actuates the belt-shifter F. This additional movement of the starting-lever and movement of the starting-bar E is entirely voluntary, however, and does not of necessity follow the starting operation of the cutting devices, but requires a separate or additional impulse of the starting-lever to produce it.

The end e of the starting-bar may serve, when desired, as a stop, against which the lower end of the pawl a^5 may be brought into contact after it has served to start the cutting mechanism. A convenient way of causing the end of the bar to so act is provided by forming in the under surface of the bar a notch e' and by arranging a latch or pin e^2 to enter the notch and engage the starting-bar when it is desired that the end e should be stationary. This latch or pin e^2 extends through a hole in the bed-plate and is mounted upon a lever e^3 , which is pivoted at its forward end to the bed at e^4 , and the rear end e^5 of which (see Fig. 1) is brought below the crank-disk

d^2 and into a position to be struck or engaged by the projection e^6 from the pitman on the revolving crank-disk as it passes the same and approaches the end of its movement, the said projection e^6 then coming into contact with the end e^5 of the lever, depressing it sufficiently to remove the latch or pin e^2 from contact with the shoulder of the starting-bar E upon one side of the notch, and if backward pressure or movement is then being communicated by hand or other means to the starting-lever A the starting-bar E will be immediately moved over the end of said latch or pin and the said latch or pin will no longer act to restrain its movement, and this will permit the starting of the lever. While it is not necessary to thus latch the starting-bar and hold it latched until the end of the operation of the cutting mechanism and while it is not necessary to employ any stop for determining the time at which the second impulse shall be given the starting-lever A, yet I prefer in some instances to organize the machine with such a stop.

The starting-bar E when moved by the starting-lever slides upon the bed-plate of the machine, and by means of the incline or wedge e^7 at its rear end and the stationary wedge or incline e^8 (see Fig. 2) upon which it rides its rear end is moved outward and an outward movement is thus given the belt-shifter F, which is like that of the said application and which shifts the belt from the pulley F' to the pulley F², through the medium of the link or slide e^9 , which is pivoted at e^{10} to the belt-shifter, has its inner end e^{11} extending into a guide-hole e^{12} in the frame of the machine, and bears a pin or stud e^{13} , against which the said moving end of the starting-bar is moved as it is swung outward by the inclines e^7 e^8 . A spring e^{14} acts to draw inward the belt-shifter and the link or slide e^9 and maintains a contact between the pin e^{13} and the starting-bar, and also holds the starting-bar in contact with the wedge e^8 or the slide e^{15} of the stationary block, against which it is moved by the traveling frame of the machine.

A latching-pawl G is employed to close behind the inner end of the link or slide e^9 at the end of its outward movement to start the machine, and this pawl serves to hold the said link or slide from moving inward until the stitching-frame has traveled sufficiently to bring said inner end of the link or slide which moves with the frame opposite the stationary surface g' upon the stationary stop arm or piece g^2 below the stationary incline e^8 upon the same arm. The latching-pawl G is pivoted to the stop piece or arm g^2 at g^3 . Its engaging section is in the form of a thin triangular plate or extension 1, which rises from the side of the pawl near its movable end, (see Fig. 5,) and it will be understood that the slide or link keeps the pawl depressed until it has been moved outward by the starting-bar in the starting of the machine, when

it moves forward sufficiently to release the pawl and permit the thin triangular section 1 to rise behind its end and the slide or plate then closes, bringing its inner face or end g against the outer face of the said triangular pawl extension 1 and rides upon the same as it is moved backward with the traveling frame. The spring g^4 serves to lift the pawl upward. This operating part of the pawl is made thin and the link or slide finally rides past or beyond the same, moving inward on the stationary surface g' , upon which it continues to ride until the machine comes to rest, traveling backward upon it at any desired distance and then forward to its original or stopping position, and upon its return movement the forward lower corner of the said link or slide comes into contact with the inclined surface 2 of the pawl extension and moves the pawl downward out of its path, the upper point or top 3 of the extension then resting or bearing against the under surface of the link or slide, and the machine comes to rest when the link or slide has been moved upon said return movement by or beyond the end of the stop-arm g^2 , so that the spring e^{14} may move the link or slide inward to its original position.

The stop-arm g^2 is bolted to the bed of the machine, and it acts as a support for the pawl G, has the wedge surface e^8 and the link or slide holding surface g' , while its forward end is so located or arranged as to determine the point of stopping of the machine, the link or slide e^9 riding forward upon the surface g' until its rear corner h^2 passes its forward corner h^3 , when the arm no longer acts to support the traveling link or slide, and it may be immediately moved inward by the spring e^{14} then riding upon the upper edge 3 of the pawl extension and immediately operating the shipper to transfer the belt from the fast pulley f^2 to the loose pulley F.

It will be understood that the gear d^3 is continuously rotated, as in my said application. The starting-bar is held to the bed at its forward end by a narrow cap-plate, the cap-plate extending through a recess cut in the upper surface of the plate, so that the plate not only acts to hold the end of the lever down, but to some extent as a guide; but the fit is loose, as it is necessary that the rear end of the bar should be capable of transverse movement. It is also held down in part by the boss, which acts as a support for the main shaft, and the shipper-spring, when the machine is not in its stopping position, serves to hold it between the pin e^{13} and the stationary wedge e^8 . When the shipper is in the stopping position, the rear end of the bar is free to be moved laterally. The work-clamps are moved downward upon the first movement or impulse of the starting-lever and are at the same time locked in their depressed condition and the buttonhole-cutting mechanism then cuts the buttonhole-slit. A further movement of the starting-lever not only

moves the starting-bar to operate the starting mechanism of the stitching devices, but it also at the same time operates the clamp-spread- ing mechanism, the additional movement of the lever necessary for the purpose of actuating the starting mechanism of the stitching devices bringing the arm N, which projects from the extension, into contact with the end of the pin n . This pin is supported by the post to which the starting-handle is pivoted and is free to move horizontally therein. Its forward end has the wedge surfaces $n' n^2$, and the pin being moved forward by the arm N the said wedge surfaces are moved against the wedge surfaces $n^3 n^4$ of the clamps, thereby opened in opposition to the stress of the closing spring n^5 , and this serves to spread the buttonhole before the stitching begins.

Of course where a stop is employed for establishing the time at which the starting-lever may be moved the same stop will act to prevent the operation of the buttonhole-spreader until the desired interval.

The starting-lever may be returned by hand and the cloth-clamps released by such movement at the end of the buttonhole-cutting operation, and it is automatically returned continuously at the end of the stitching operation past the position which it occupies preparatory to starting the stitching mechanism to the original position which it occupies preparatory to starting the cutting mechanism. This automatic return movement of the starting-lever also insures the automatic release of the clamps, which are raised and opened to release the work, and at the same instant the stitching devices are returned to their original position and the clamps are moved to starting position. This result is obtained by connecting the mechanism which is released at the completion of the stitching operation and which operates to turn back the stitch-forming devices and move the clamps to the stitching position with the starting-lever by means of a rock-lever O, pivoted to the under surface of the bed, (see Figs. 8, 9, and 10,) having a downward-extending arm o , which is connected with the said devices by a long link o' , and which lever O also has an upward-extending arm o^2 , having at its upper end bearings for a pawl o^3 , which extends upward through the slot o^4 and is arranged to yield in one direction in opposition to the spring o^5 , secured to it and to the arm o . This pawl is adapted, as it is progressively moved in one direction, to ride past the downward projection o^6 of the starting-lever, or from the position represented in full line in Fig. 8 to the position represented by the dotted line in the same figure, and upon the release of the yoke to which it is attached by the link it is adapted to be moved continuously backward and at a time when the work-clamp has been transferred sufficiently to cause the end o^6 of the starting-lever to be brought in line with the part o^8 of the pawl, which, riding against the same,

moves it backward and the upper end of the starting-lever forward, thereby causing the automatic opening and release of the clamps and the return of the starting-lever to starting position, and at the same time the inner edge of the pawl rides against the incline d^7 and serves to transfer the clamps laterally slightly to their original or starting position.

The operation of my invention is as follows: The work is placed between the members of the clamp. The starting-lever is moved backward, depressing the upper members of the clamp and locking them in their depressed position and at the same instant starting the operation of the buttonhole-cutting mechanism which cuts the buttonhole-slit. The machine may then come to rest or it may be further operated by again moving the starting-lever farther than it was first moved, and this will cause the stitching devices to be set in operation and the buttonhole to be stitched. This will permit the machine to either cut the buttonhole-slits alone or to cut the slits and stitch the buttonholes, or to stitch the buttonholes without previously forming the buttonhole-slits, or to stitch the buttonholes in cuts which have previously been formed by other means.

To actuate the stitching mechanism without actuating the cutting mechanism, the pawl a^5 is lifted over the end d^4 of the lever D before the starting-lever is moved. This will bring the pawl in advance of the end of the lever D and will cause it upon the movement of the starting-lever to actuate the stitching mechanism only.

When a stop is employed for stopping the lever after it has actuated the slit-cutting mechanism, less care is necessary upon the part of the operator in the use of the starting-lever, as its second impulse or the one necessary for starting the stitching devices cannot be again given it before the cutting devices have completed their operation, and when the stop is employed the operator may press against the starting-lever continuously and the two starting movements will follow each other in rapid succession.

While I have represented the starting-lever as arranged to be moved by hand, it can of course be operated by foot by means of a treadle and connecting devices connecting it with the starting-lever. I would say also that while I prefer to combine the starting movements whereby a lever shall be common to both starting devices, yet I do not wish to be understood as limiting the invention to this, as in some instances each starting mechanism may be provided with an independent starting lever or handle.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a buttonhole cutting and sewing machine, the combination of the cutting mechanism, its starting and stopping devices, the

buttonhole-sewing mechanism, its starting and stopping devices and a hand-actuated means like a lever connected with and operating during one part of its movement the starting devices of the slit-cutting mechanism and also connected with and operating during another part of its movement the starting devices of the buttonhole-sewing mechanism, whereby the cutting and sewing mechanism are independently started by the same hand-actuated means.

2. In a buttonhole cutting and sewing machine, the combination of the slit-cutting mechanism, its starting devices, the buttonhole-sewing mechanism, its starting devices and a starting-lever connected with and operating during one part of its movement the starting devices of the slit-cutting mechanism and also connected with and operating during another part of its movement the starting devices of the buttonhole-sewing mechanism.

3. In a buttonhole cutting and sewing machine the combination of the slit-cutting mechanism, its starting devices, the sewing mechanism, its starting devices, the cloth-clamps and a starting-lever connected with and operating the cloth-clamps to depress them, and also connected with and operating the starting devices of the slit-cutting mechanism, and the sewing mechanism, whereby the cloth-clamps are depressed and the slit-cutting and sewing mechanisms are set in operation by the same lever, and means locking the starting-lever against movement during operation of the cutting mechanism.

4. In a buttonhole cutting and sewing machine the combination of the slit-cutting mechanism, its starting and stopping devices, the buttonhole-sewing mechanism, its starting and stopping devices, the work-clamps and a lever connected with said work-clamps and operating during the first part of its movement to depress the same, and also connected with and operating during the first part of its movement the starting devices of the slit-cutting mechanism and also during another part of its movement connected with the work-clamps to spread the same and connected with and operating the starting devices of the sewing mechanism whereby upon the movement of the lever the clamps are closed and the slit-cutting mechanism started and whereby upon the further movement of the lever the clamps are spread and the buttonhole-sewing mechanism set in operation.

5. In a buttonhole cutting and sewing machine the combination of the slit-cutting mechanism, its starting devices, the buttonhole-sewing mechanism, its starting devices, a starting-lever connected with and operating during one part of its movement the starting devices of the slit-cutting mechanism and also connected with and operating during another part of its movement the starting devices of the buttonhole-sewing mechanism,

and a stop for stopping the movement of said starting-lever at the completion of the first part of its movement.

6. In a buttonhole cutting and sewing machine the combination of the slit-cutting mechanism, its starting and stopping devices, a starting-lever connected with and operating during one part of its movement the starting devices of the slit-cutting mechanism and also connected with and operating during another part of its movement the starting devices of the buttonhole-sewing machine, a stop for preventing further movement of the starting-lever after it has started the operation of the slit-cutting devices, and means operated by the slit-cutting mechanism to move said stop at the end of their operation, whereby a further movement of the starting-lever may then take place.

7. In a buttonhole cutting and sewing mechanism the combination of the slit-cutting mechanism, its clutch-operating lever D having the end d^4 , the buttonhole-sewing mechanism, its starting-bar E, having the end e arranged in relation to the end of the clutch-operating lever as specified, the starting-lever A and its pawl a^5 adapted to be moved in successive order upon and with the said end d^4 of the lever D and upon and with the end of the starting-bar E to move them, and to be moved back over the same without operating them.

8. The combination in a buttonhole cutting and sewing machine of the buttonhole-sewing mechanism, its starting-bar, the starting-lever adapted to move said bar, a starting-bar lock comprising a movable pin adapted to engage a shoulder thereon and means connecting said pin with the slit-cutting mechanism whereby it is caused to be moved to disengage the locking-pin from the bar at the end of the operation of said slit-cutting mechanism, and said slit-cutting mechanism.

9. The combination in a buttonhole-sewing machine of the starting-lever, a starting-bar moved thereby, a loose pulley and a fast pulley upon the main shaft of the sewing-machine, a belt-shifter moved by said starting-bar to shift the belt from the loose pulley to the fast pulley, and by a spring to move the belt from the fixed pulley to the loose pulley, a latch for temporarily holding the shipper after it has been moved by the said starting-bar, an abutment for holding the said shipper-lever during the remainder of the traveling frame backward and forward, means for tripping said shipper-holding latch and means for disengaging the shipper from said abutment at the completion of the sewing operation of the machine.

10. In a buttonhole cutting and sewing machine the combination of the slit-cutting mechanism, its starting and stopping devices, the buttonhole-sewing mechanism, its starting and stopping devices, the buttonhole-clamps, a starting-lever connected with and operating said clamps to close the same dur-

ing the first part of its movement and also connected with and operating the devices of the slit-cutting mechanism and during another part of its movement thereof operating the button-clamps to spread the same and connected with and operating the starting devices of the buttonhole-sewing mechanism and means for automatically returning the starting-lever to its original position immediately after the completion of the sewing operation of the machine.

11. The combination in a buttonhole cutting and sewing machine of the clamps, the clamp-operating lever adapted during the first part of its movement to depress the clamps and during the second part of its movement to spread the clamps, the buttonhole-cutting mechanism and starting devices therefor operated by the clamp-lever during the first part of its movement, buttonhole-sewing mechanism, starting devices therefor operated by the clamp-lever during the second part of its movement, as and for the purposes described.

12. The combination in a buttonhole cutting and sewing machine of the clamps, the clamp-operating lever adapted during the first part of its movement to depress the clamps and during the second part of its movement to spread the clamps, the buttonhole-cutting mechanism and starting devices therefor operated by the clamp-lever during the first part of its movement, the buttonhole-sewing mechanism, starting devices therefor operated by the clamp-lever during the second part of its movement, and means for moving said work-clamp lever continuously backward to the position which it occupies at the beginning of the cutting operation at the completion of the sewing of the buttonhole, thereby releasing the work-clamps and permitting them to open.

13. In a buttonhole cutting and sewing machine the combination of the slit-cutting mechanism, its starting devices, the buttonhole-sewing mechanism, its starting devices, a starting-lever connected with and operating during one part of its movement the starting devices of the slit-cutting mechanism and also connected with and operating during another part of its movement the starting devices of the buttonhole-sewing mechanism, the said devices being so organized that the said lever may operate the slit-cutting mechanism and be returned to its normal position without operating the buttonhole-sewing mechanism.

14. The combination in a buttonhole cutting and sewing machine of the slit-cutting mechanism, its starting mechanism, a movable frame, the buttonhole-sewing mechanism carried by said frame, its starting mechanism, a starting-lever connected with the starting devices of the slit-cutting mechanism and the devices of the buttonhole-sewing mechanism to operate them successively and to be disconnected from them during its re-

turn to its original position, and means movable past or by the starting-lever in one direction without operating the same and against the same in the reverse direction to then operate to restore it to its original position and thereby permit the clamps to close toward each other and open, as and for the purposes described.

15. The combination of the main shaft of the sewing mechanism, the fast and loose pulleys thereon, a belt-shifter, a movable frame carrying the sewing mechanism and belt-shifter, means for moving the belt from the loose to the fast pulley, a latch for holding the belt-shifter in said position, means for unlatching during the movement of said frame a retainer for holding the belt-shifter with the belt in engagement with the fast pulley during the movement of said frame and until its return to its original position, devices for releasing the said belt-shifter at the end of said movement of the frame and a spring for returning said shipper upon said release to its original position, to move the belt from the fast pulley to the loose pulley.

16. The combination of the clamp-lever having the extension N, the post a' to which it is pivoted, a slide carried by said post and having the tapering or inclined ends $n' n^2$, the spreading clamps having the surfaces against which the said inclined surfaces are adapted to be brought into contact, the extension of said lever being adapted to be brought into contact with said slide to move the same and cause it to spread the clamps.

17. The combination in a buttonhole-sewing machine of the work-clamps, the clamp-lever having a depressing and holding cam for moving downward the clamps and holding the same, and the extension U with the

post a' to which the lever is pivoted, a slide carried by said post and having an end adapted to engage the clamps and open the same upon its movement, the said cam and lever being so shaped and pivoted and the extension so arranged that the clamps are first locked downward and held locked and then by an additional movement of the cam and lever without unlocking the clamps the extension is brought into contact with the spreading devices and the clamps spread.

18. The combination in a buttonhole-sewing machine of the laterally-movable work-plate having a cam o^7 , the clamp-lever having an extension o^6 and a movable pawl or device adapted to be brought into contact with said inclined surface and with the extension of the clamp-lever immediately after the completion of the sewing of the buttonhole to move said work-plate laterally slightly and at the same time to move the clamp-lever to its original position, thereby releasing the clamps.

19. The combination in a buttonhole-sewing machine of a slide operated as specified, the rock-shaft connected with the slide by a link and a hinged pawl movable by said rock-lever inoperative when moved in one direction and operative when moved in the other direction, the work-plate having the wedge and the clamp-lever having the extension past which said pawl rides when moving in one direction and with which it is brought into contact near the end of its movement in a reverse direction, as and for the purposes set forth.

CHARLES A. DAHL.

Witnesses:

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