

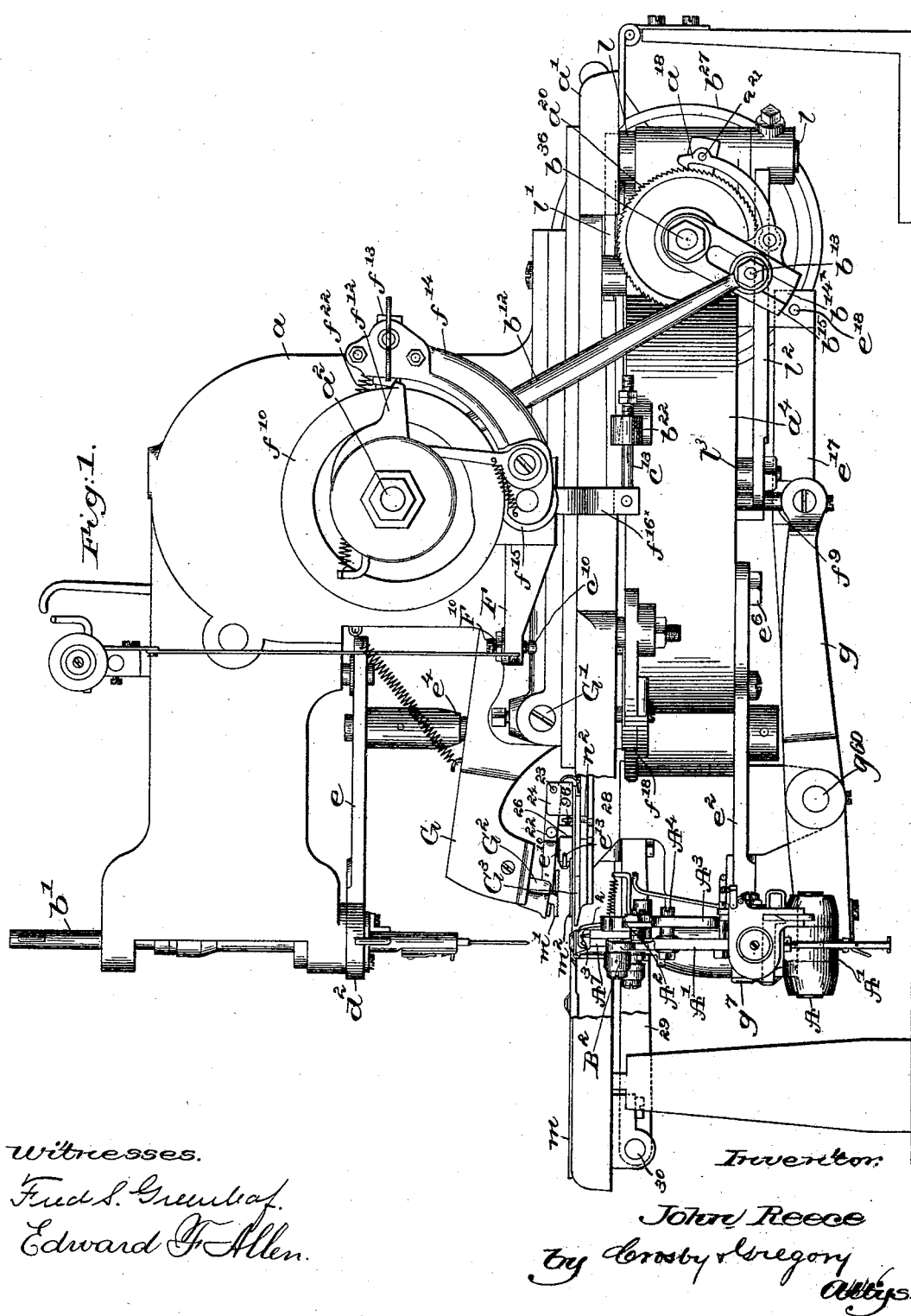
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10 Sheets—Sheet 1.

J. REECE.
BUTTONHOLE SEWING MACHINE.

No. 494,280.

Patented Mar. 28, 1893.



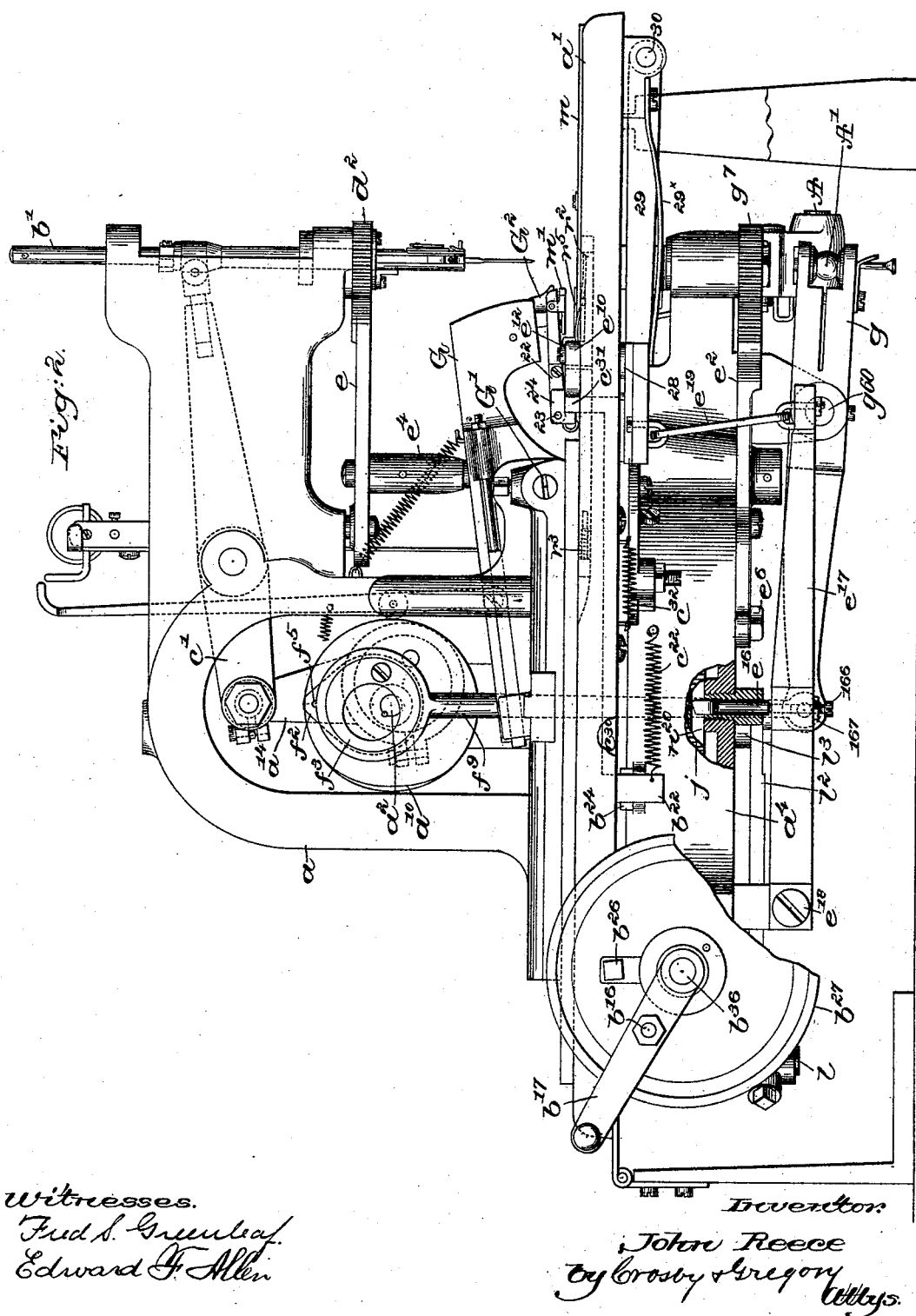
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Witnesses.

Fred. L. Greenleaf
Edward F. Allen

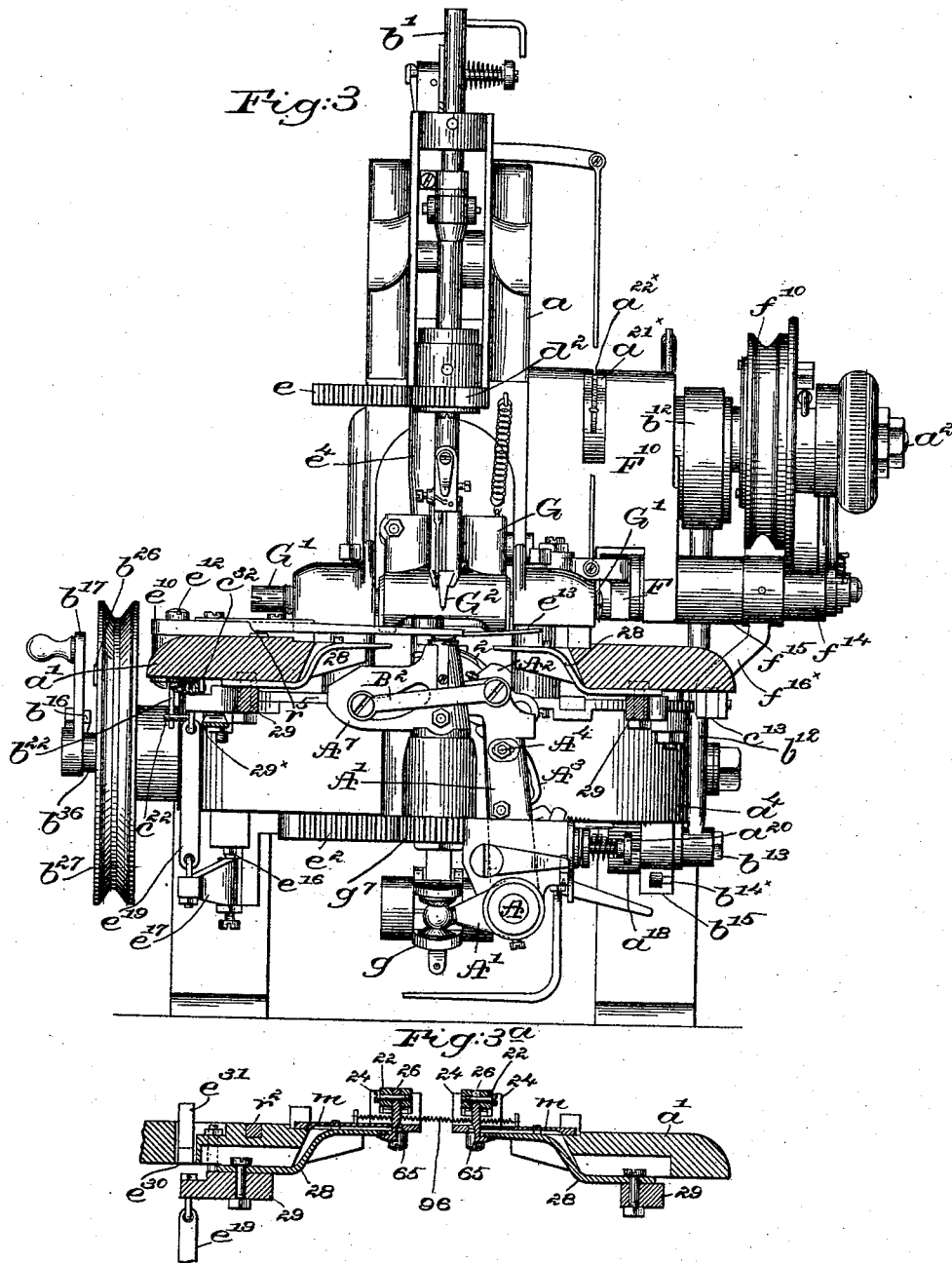
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Witnesses.

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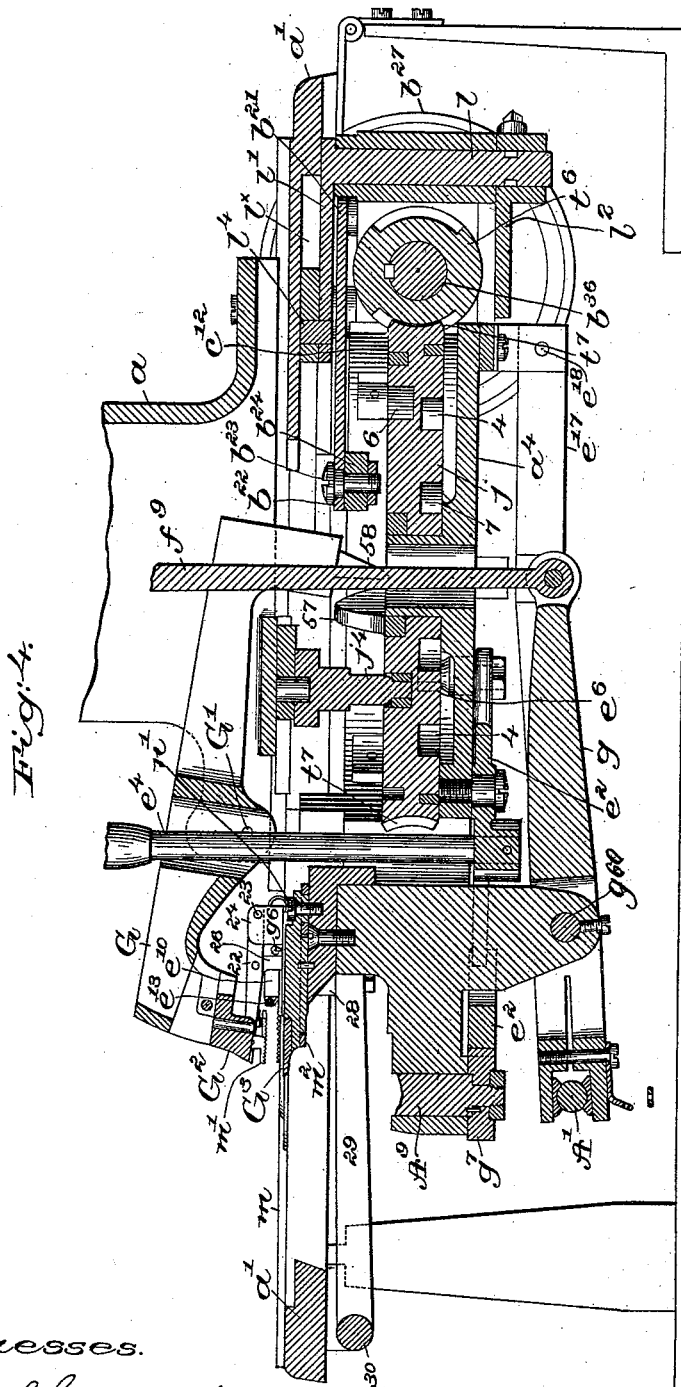
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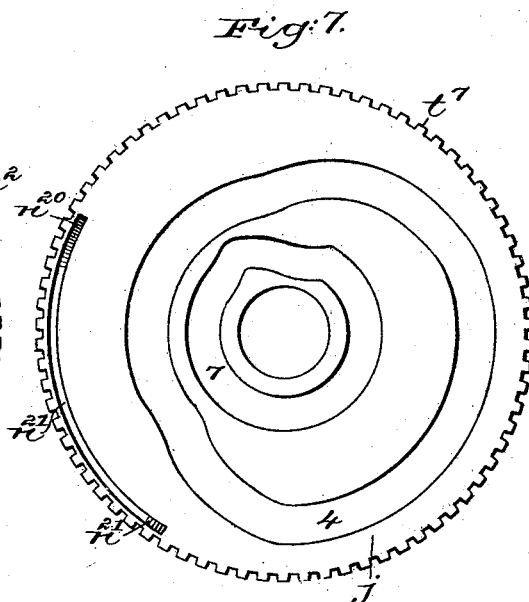
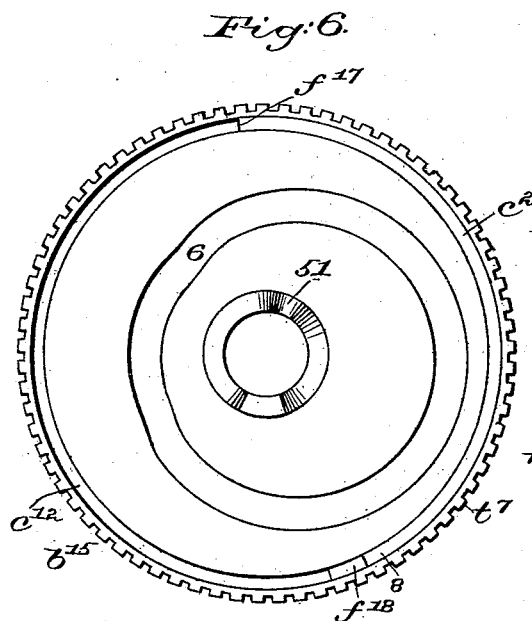
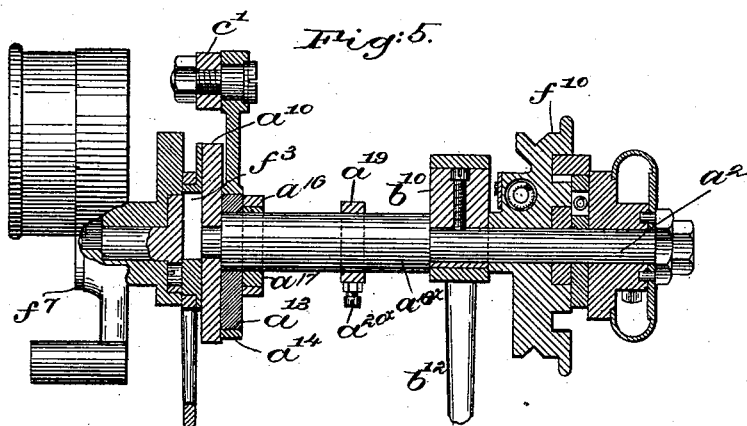
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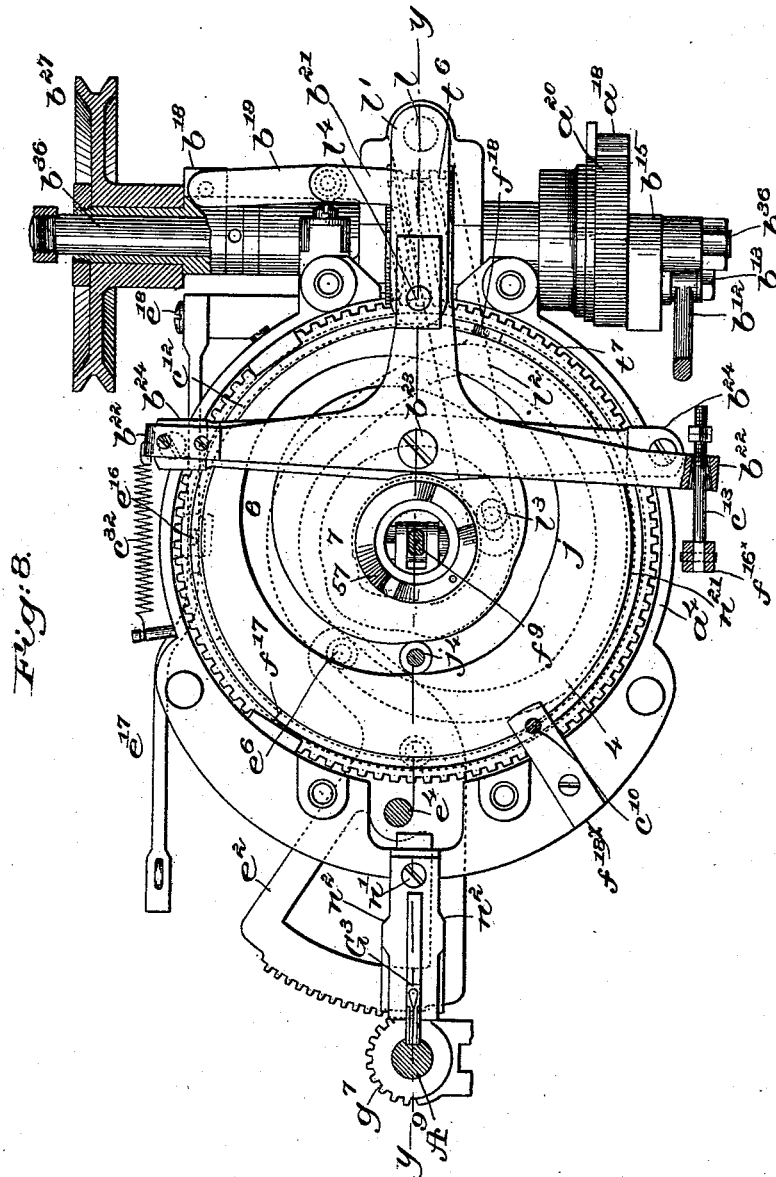
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Witnesses.
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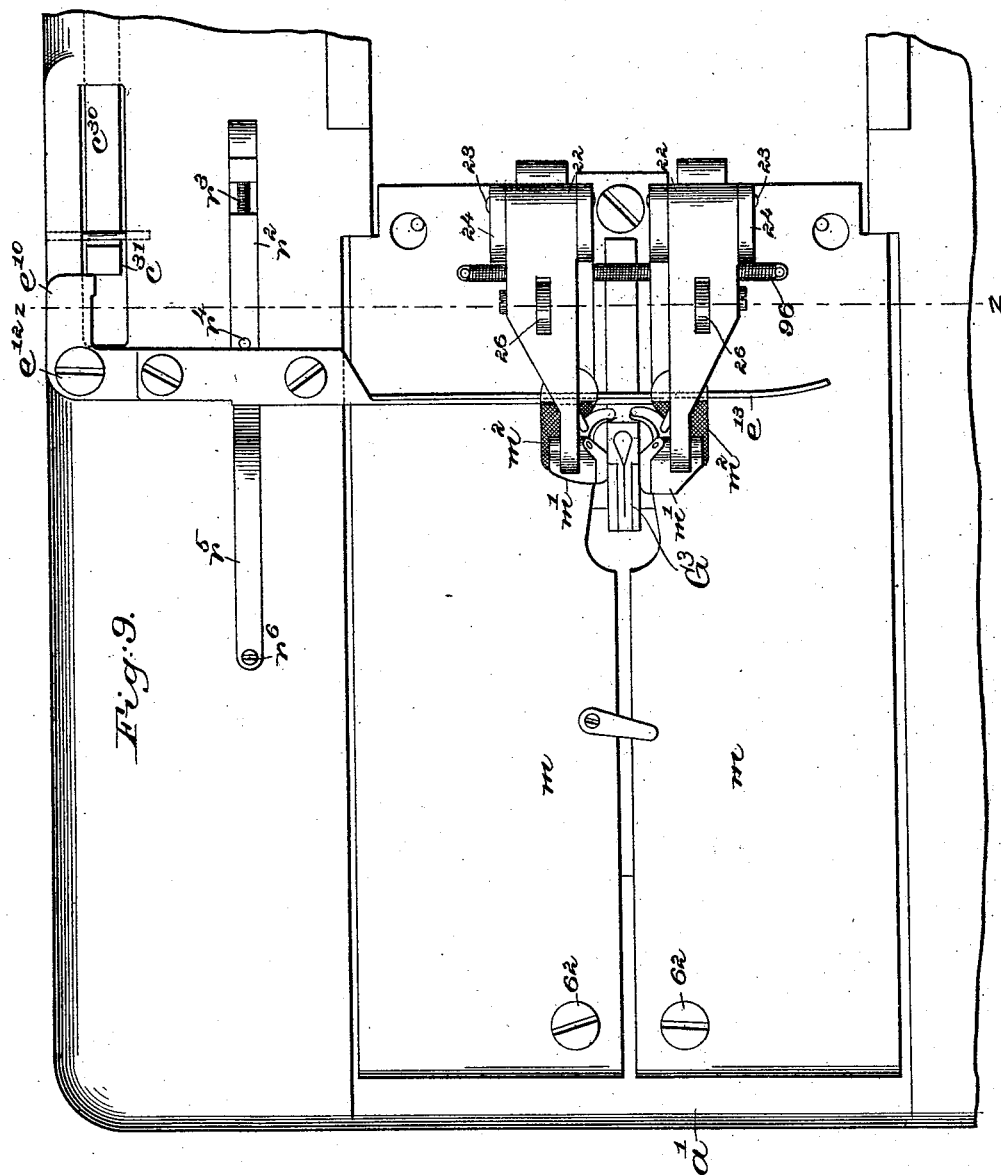
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witnesses.

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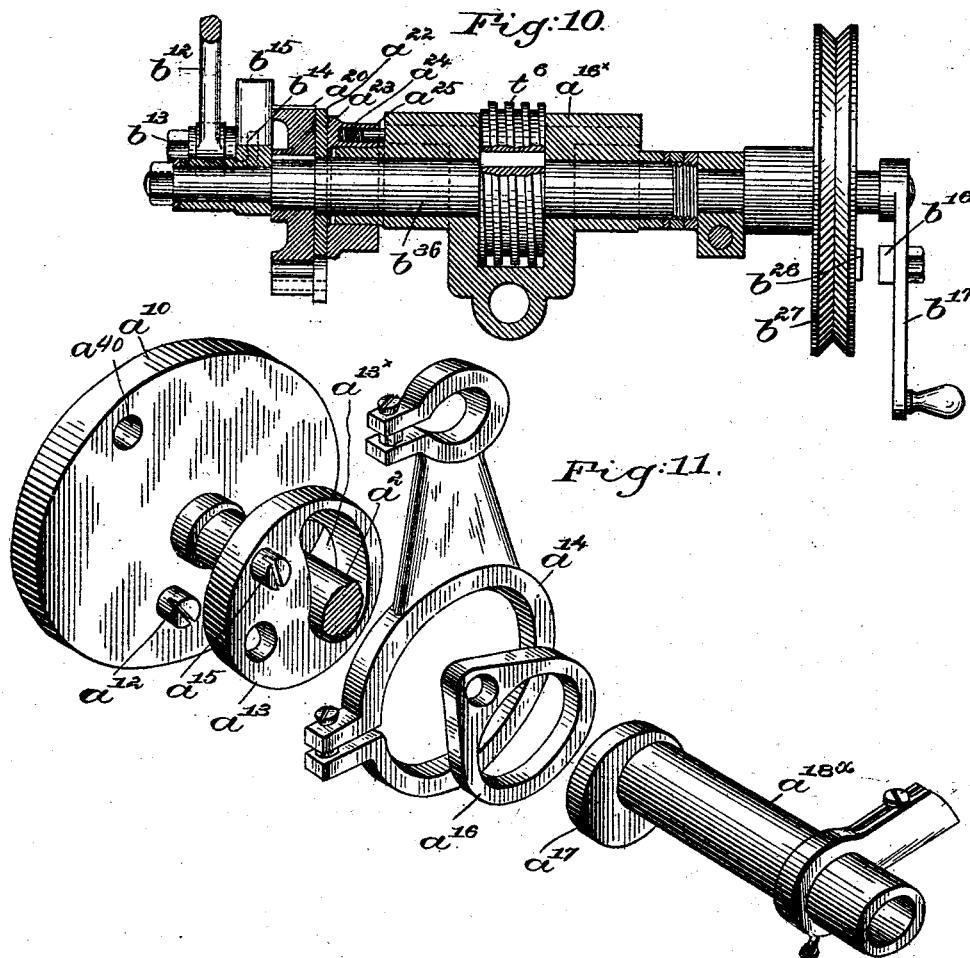
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Witnesses.

Fred S. Grunloof
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(No Model.)

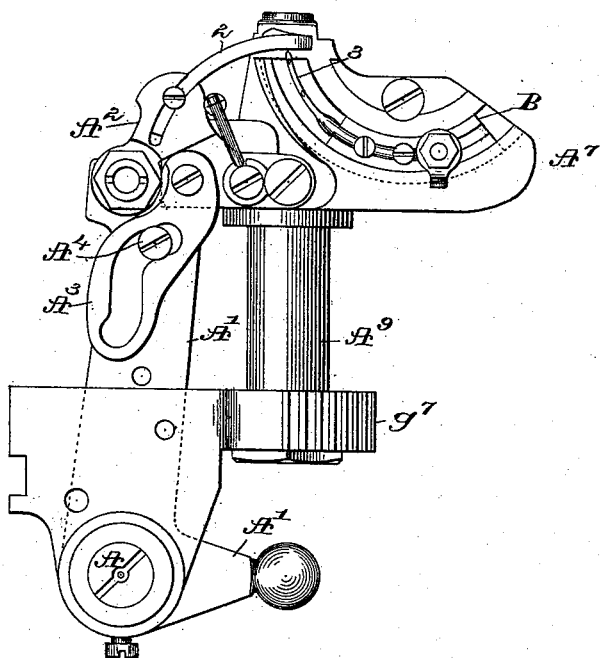
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Fig. 12.



Witnesses
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Fig. 13.

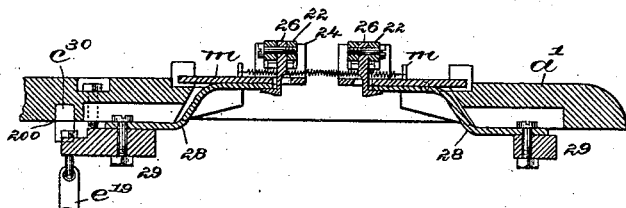


Fig. 14.

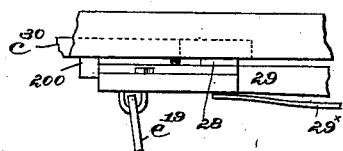


Fig. 15.

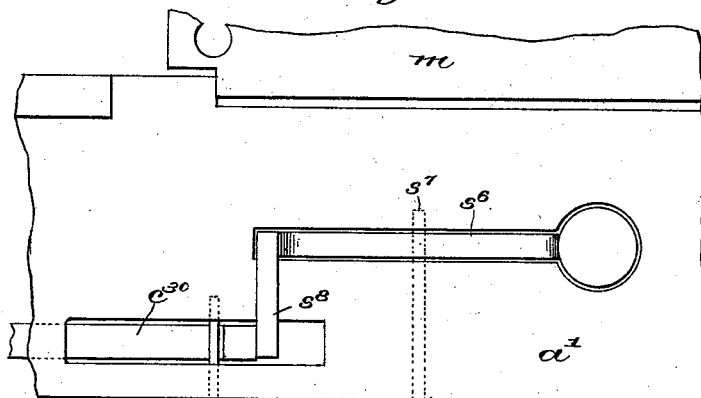
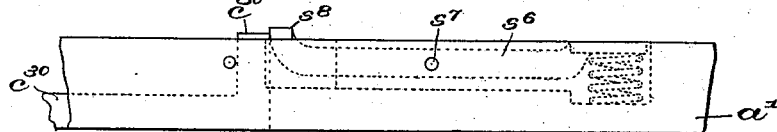


Fig. 16.



Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN REECE, OF BOSTON, MASSACHUSETTS.

BUTTONHOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 494,280, dated March 28, 1893.

Application filed August 23, 1892. Serial No. 443,885. (No model.)

To all whom it may concern:

Be it known that I, JOHN REECE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Buttonhole Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve that class of button-hole stitching machine in which the work to be stitched is held by a suitable work-clamp while the stitch forming mechanism makes the stitches for covering the edge of the button-hole slit, the stitch-forming mechanism and work-clamp having combined with them suitable mechanism by which to change their relative positions during the operation of stitching each button-hole. In this class of machine as heretofore constructed it has been customary to put the material in the work-clamp, and then close said clamp on the material by a hand operated lever, the act of clamping the material effecting the starting of the machine and its operative parts in the proper order, the machine being automatically stopped at the completion of a button-hole. So also in the class of machine referred to it has been customary to stop the stitching action of the stitch forming mechanism as the latter arrives at the small end of the button-hole, but thereafter the rotation of the belt wheel employed for driving the main shaft has been continued to effect such further relative movements of the stitch and cutter-carrying frames as to enable the cutter to be brought into cutting position with relation to the work-clamp, and then the said movement ceases, leaving the cutter elevated. It has been proposed to increase the throw of a lever instrumental in effecting what is called the feeding movement of the machine so that while the machine is being moved simply to put the cutting mechanism into position with relation to the work-clamp and also to actuate the cutting mechanism to cut the material and bring the needle into stitching position with relation to the cut button-hole, the relative distance of movement of parts at each throw of the lever shall be increased or the feed stroke be made longer, thus saving time between one and the next stitching operation. In the class of ma-

chine referred to the feeding movement has always been a step-by-step movement between the stitching of one and the next button-hole. In my aim to increase the speed of this class of machine I have devised mechanism whereby the act of putting the material into position to be clamped effects the starting of the machine so that a cam forming a part of the machine will thereafter automatically effect the closing of the work-clamp, and at about the same time another cam will act to quickly operate the cutter to cut the material then held in the work-clamp, and the cutter will then be permitted to rise and the movement of the machine will be continued until the stitch forming mechanism and the cut button-hole are in proper relative positions to commence the stitching thereof, when the stitching of the button-hole will be effected and the machine will be automatically stopped. In this my present invention the movement of the machine during the clamping and cutting of the button-hole and the bringing of the cut button-hole and stitch forming mechanism into operative position is effected at a substantially high speed and preferably by devices having a continuous rotation, and as soon as the stitch forming mechanism arrives in operative position the feeding movement of the machine is automatically reduced and made intermitting during the time that the stitch forming devices operate to form stitches. The placing of the material in position in the work-clamp may be made to effect the stating of the machine in various ways, I having devised different devices for accomplishing this valuable result, but inasmuch as I am the first to effect this result in any manner, this part of my invention is not limited to the exact form of appliances herein illustrated, or to any especial form of device or devices, as it will be obvious to those skilled in the art that this feature which results in so great a saving of time of the operator may be carried out mechanically by the employment of various forms of devices, without departing from my invention. In the machine herein represented, as I have embodied my invention, there are two pulleys which are rotated constantly, and one or the other, not both at the same time will control the feed movement of the machine, or the

relative movement of the stitch frame and clamp-frame. Each of these pulleys as constructed forms part of a clutch, and when one is operative the feeding movement is at one speed, and when the other is operative the feeding movement is at faster speed.

Figure 1, is a right-hand side elevation partially broken out of a sewing-machine embodying my invention, part of the work-clamp being omitted and shown enlarged in Fig. 9; Fig. 2, a left-hand side elevation partially broken out of the machine shown in Fig. 1. Fig. 3 is a front elevation of the machine shown in Fig. 1, a sufficient portion of the clamp-frame being cut away and the work-clamp omitted to show the under-thread carrying mechanism and other parts which would otherwise be hid; Fig. 3^a, a sectional detail of the work-clamp devices in the line $z-z$ Fig. 9. Fig. 4, is a partial longitudinal section of the machine in the line $y-y$ Fig. 8. Fig. 5 is a longitudinal sectional detail showing the shaft a^2 with parts surrounding and co-operating with it, said figure showing the counter in place and adapted to be actuated by a gear shown by breaking out some of the parts. Figs. 6 and 7 are respectively top and under-side views of the cam device to be described. Fig. 8 is a plan view of the cam device and the curb in which it is mounted together with the actuating shaft b^{30} and some of its co-operating parts. Fig. 9 is a much enlarged view showing the clamp frame, a work-holding clamp, and one form of starting device. Fig. 10 is a sectional detail showing the actuating shaft b^{30} and some of its co-operating parts. Fig. 11 is a detail showing some of the parts represented in Fig. 5, but separated so as to more clearly represent the same. Fig. 12, is an enlarged detail of some of the stitch-forming mechanism below the clamp-frame; Figs. 13 to 16, modified forms of my starting device to be described.

Inasmuch as many of the parts of the machine herein to be described are very similar in their construction and action to parts in United States Patent No. 349,359 granted to me, I will briefly refer to some of such parts before particularly describing the more special points of novelty to be herein covered.

The frame a , having an overhanging arm and an attached curb or casing a^4 constitutes what I shall call the stitch-frame; and the plate a' what I shall call the clamp-frame. The stitch-frame contains a shaft a^2 provided near its left-hand end, see Figs. 5 and 11, viewing the front of the machine, with a compound eccentric, to be hereinafter further described, which actuates a lever c' suitably jointed to the needle-bar b' , having an eye-pointed needle, such needle-bar having its bearings in a loose circular block having attached to it a partial gear d^2 . The shaft a^2 has a disk a^{10} provided with a hole a^{10} see Fig. 11 to receive a pin f^5 , see Fig. 2, extended from a plate f^2 provided at one side with an eccentric hub f^3 made hollow for lightness,

and surrounded by and adapted to actuate a link f^9 jointed to the rear end of a lever g pivoted at g^{60} on a leg or stand fixed to the casing a^4 , said lever actuating the ball-ended elbow lever A' having its fulcrum on a pin A in brackets or ears depending from the partial gear g^7 connected to the shaft A^9 mounted in a hub or bearing at one end of the casing a^4 , said shaft having at its upper end a throat-plate having a needle-hole and a gimp-hole, the said shaft also carrying a race-way block A^7 in which is reciprocated a segmental carrier B to which is connected the curved under thread-carrier 3, said carrier B deriving its movements from the lever A' through a link B^3 connected to it and to a stud extended from the said carrier. The needle has co-operating with it a looper 2 which takes the needle-thread below the material and draws it back and holds it for the passage through it of the under thread carrier, said looper being attached to a looper carrier A^2 , actuated by or through a slotted arm A^3 entered by a stud A^4 carried by the lever A' . The two partial gears d^2 and g^7 are engaged respectively by teeth at the end of the two pivoted segmental levers e and e^2 connected by an upright rod e^4 extended down through the clamp-frame and the casing a^4 , the lever e^2 having at its inner end a roller or other stud e^6 which enters a cam groove 4 at the under side of what I shall herein designate as a cam device, it being represented as a cam wheel or circular plate j , the hollow hub of the latter rotating about a hollow sleeve extended upwardly at the center of the casing a^4 , see Fig. 4, the link f^9 before referred to being extended through the hollow center of the said cam device and the hub of the casing.

The devices thus far referred to, to effect the stitch-forming movements of the stitch-forming devices, and their rotation about the eye of the button-hole, are and may be all as in my patent referred to, except that the double eccentric for reciprocating said needle bar is not found in my said patent.

Referring now to Figs. 5 and 11, the shaft a^2 has fast to it a disk a^{10} provided with a pin a^{12} which enters a hole in an eccentric a^{13} surrounding the shaft a^2 and free to rock or slide somewhat with relation to said shaft owing to an elongated slot a^{13x} in the said eccentric. This eccentric is surrounded by one end of an eccentric strap a^{14} suitably jointed to the rear end of the needle bar actuating lever c' . The eccentric a^{13} has a pin a^{15} which enters a hole in a link a^{16} surrounding an eccentric a^{17} fast on a sleeve a^{18x} surrounding the shaft a^2 , said sleeve being held in adjusted position in the stitch-frame by or through a collar a^{19} , held fast to said sleeve by a screw a^{20x} , said collar having a bifurcated arm or portion a^{21x} , see Fig. 3, which is extended through a slot in the stitch-frame said arm being adapted to be clamped to the stitch-frame by means of a screw a^{22x} , screwed into the space between the two arms made by slotting or dividing said

portion a^{21x} , the screw expanding the arms against the sides of the slot in the stitch-frame. Adjustment of this sleeve about shaft a^2 causes the needle-bar to travel more or less rapidly at the lower end of its stroke, and this double eccentric imparts to the needle-bar one reciprocation to each rotation of the shaft a^2 , and it enables the speed of the movement of the needle-bar to be increased and diminished properly during the formation of each stitch in order that the needle may be properly timed to correctly co-operate with the looper and the needle-thread carrier. This double eccentric has been particularly described in order that the needle movement may be thoroughly understood, but the double eccentric is not herein claimed for the reason that it has been used in my machines for many years, I having commenced its use shortly after the date of my first patent in 1881. The cam device j at its lower side has a second cam groove or cam face 7 which receives in it a roller or other stud l^2 of an arm l^2 connected to a rock-shaft l , mounted in bearings at the rear end of the casing a^4 , said rock-shaft having preferably integral with it an arm l' having a stud l^4 on which is mounted a suitable swivel block which enters and slides in a groove herein marked l^x , made longitudinally in the underside of the clamp-frame a' , see Fig. 4.

The cam device has at its upper side a groove 6 in which is entered a roller or other stud j^4 fixed to and depending from the clamp-frame. If the cam device is rotated while the clamp-frame is anchored or restrained against longitudinal movement, the said cam device, owing to the fact that it rotates about a center of motion fixed in the casing a^4 , will cause the relative positions of the stitch-frame and clamp frame to be changed, and in the plan herein illustrated and referred to, the stitch frame and stitch-forming mechanism therein will travel over the clamp-frame in a straight line and when the active part of the cam 7 comes against the stud l^2 , the rear end of the stitch-frame will be given a lateral movement so that the needle carried by said stitch-frame will be given a motion to follow along and about the outline of the eye of the button-hole. It will be understood, however, that should the stitch frame be anchored or held firmly rather than the clamp frame, then in such plan the conditions would be reversed and the stitch frame would stand still and the clamp-frame would slide and be moved out of straight line to enable the work-clamp holding the material to move the latter in the proper lines to enable the stitching to go about the eye of the button-hole. The same relative movement of position of stitch-frame and clamp-frame is provided for in like manner in the patent referred to.

The cam device has at its upper side near its center a cam 57 which acts on a toe 58 of a cutter-carrying lever G , pivoted at G' and provided with a cutting-blade G^2 of a length

adapted to the length of the button-hole slit, said pivot G' being held in suitable ears on the stitch-frame. The button-hole cutting-blade operating as a single stroke cutter, co-operates with a suitable cutter bed G^3 held in place on a projection of the casing a^4 by a screw n' .

The clamp-frame has, as shown, connected to it by suitable screws 62, 62, plates m, m , on which are located ears 24, which receive pivot pins 23, on which are mounted the clamp levers 22, provided at their free ends, as herein represented, with pivoted clamping plates m' , each of said levers having jointed to it an L-shaped link 26 which is extended below the plate m , and acted upon by a spring-arm 28 of an arm 29 attached to a rock-shaft 30, there being two such arms. The plates m in practice have serrated clamp members m^2 connected thereto and adapted to engage the material under the plates m' . Each plate m at its under side near its inner end see Fig. 3^a, has a suitable stud 65 which acts against inclines or shoulders n^2 see Fig. 8, of a spreading device shown as a plate fixed under the cutting bed, said spreading device acting to spread the button-hole clamp or work-holding device after the button-hole has been cut in the material. The plates m, m , are connected together by a suitable spring 96.

The clamp-frame and the work-clamp, the button-hole cutter, the rock-shaft, and its arms 29 to close the clamp, and the cam for closing the cutting mechanism are all as in said patent.

The shaft a^2 at its right-hand end viewing the front of the machine, has loose upon it a pulley f^{10} co-operating with which is a dog f^{12} , and other co-operating parts, not necessary to be particularly described, constituting a clutch-mechanism substantially such as shown in United States Patent No. 367,063, said dog when in engagement with the clutch pulley enabling the latter, which is rotated continually, to effect the rotation of the shaft a^2 , the stud f^{13} carried at the upper end of an arm f^{14} forming part of a three-armed lever or rock-shaft being at such time held out of the path of rotation of the said dog. The said three-armed lever has its bearing in a tubular or sleeve-like hub f^{15} forming part of the stitch-frame. The arm F of the said lever has at its front end a suitable adjusting screw F^{10} which co-operates with the outer end of a slide pin c^{10} , guided by a guide-plate f^{18x} see Fig. 8, and by the stitch-frame, and which pin c^{10} rests upon a cam c^{12} made in the upper side of the cam device, said cam having an abrupt shoulder f^{17} and an incline f^{18} . When the slide pin c^{10} in the rotation of the cam device j rides up upon the higher part of the cam c^{12} , the arm having the stud f^{13} is put out of the range of motion of the dog f^{12} , and the pulley f^{10} is then caused to rotate the shaft a^2 and the stitching of the button-hole takes place; but as soon as the said pin drops from the abrupt end of the said cam the stud referred

to immediately comes within the range of movement of the dog f^{12} and effects the release of the pulley f^{10} from the shaft a^2 and the stitching movement of the stitch forming devices is immediately stopped. The arm f^{16x} of the three-armed lever referred to is joined by a rod c^{13} with one end of a lever b^{22} pivoted at b^{23} on a stud in a bridge-piece b^{24} crossing the cam device j and connected to the casing a^4 . The lever b^{22} has an extension b^{21} pivoted by link b^{19} to a hub b^{18} loose on the actuating shaft b^{36} , said hub supporting a loose pulley b^{27} having a clutch part b^{26} . This pulley will preferably be rotated continuously from some suitable source of motion preferably a belt extended to a counter-shaft.

The shaft b^{36} has fast upon it at one end an arm, crank or other device b^{17} provided with a clutch part b^{16} with which the clutch part b^{26} may be made to engage whenever it is desired that the actuating shaft b^{36} be rotated continuously by the fast speed pulley b^{27} . The shaft b^{36} has a worm t^9 which by its engagement with the worm teeth t^7 of the cam device j rotates the said cam device, the movement being either intermitting or continuous according to which of two clutch pulleys has control of the shaft b^{36} .

The shaft a^2 has fast upon it an eccentric b^{10} , see Fig. 5, which through an eccentric strap b^{12} is connected to a pin b^{13} having a foot b^{14} , shown by dotted lines Fig. 10, which enters a slot b^{14x} in a pawl-carrying arm b^{15} , mounted loosely on what I have denominated the actuating-shaft b^{36} , said pawl-carrier having connected to it a hooked pawl a^{18} which is adapted, in one direction of the stroke of the pawl-carrier, to engage teeth of the ratchet wheel a^{20} , fast upon the shaft b^{36} . This pawl near its outer end has a pin a^{21} which enters a slot in a friction plate a^{22} , surrounding the shaft b^{36} loosely at one side of the ratchet wheel, said plate being acted upon by a ring a^{23} in turn acted upon by a spring a^{24} said ring being held from rotation by a pin a^{25} . By means of this friction plate the pawl a^{18} when on its reverse stroke is given a slight movement away from the ratchet wheel a^{20} so that the pawl does not click over the ratchet teeth.

When the clutch pulley f^{10} is to rotate the shaft a^2 and make stitches, the arm f^{14} will be moved to the right Fig. 1 far enough to enable the stud f^{13} to release the dog f^{12} , and at such time the lever b^{22} will be moved sufficiently to draw the clutch part b^{26} of the pulley b^{27} back away from the clutch part b^{16} , and the pulley b^{27} will then run loosely on the shaft b^{36} . During the time that the stitch-forming devices are actuated to make stitches, the shaft b^{36} has imparted to it an intermitting rotation, and the stitches are of greater or less length according to the position of the pin b^{13} in the pawl-carrier. When, however, the lever F is moved by the cam c^{12} to disengage the clutch pulley f^{10} from the shaft a^2 to stop the stitching, the movement of the lever b^{22} , b^{21} , will slide the pulley b^{27} on the shaft b^{36}

so that its clutch part b^{26} will engage the clutch b^{16} and then the pulley b^{27} in continuous rotation will rotate the shaft b^{36} continuously and at a faster speed.

The end of the lever b^{22} opposite to that joined to the link c^{13} , has co-operating with it a slide c^{30} , see Fig. 2, one end of which has a suitable projection c^{31} which is acted upon and locked in place by one end of a starting device e^{10} represented in Figs. 1, 3 and 9 as a sort of lever, pivoted at e^{12} and having a finger e^{13} extended partially across the machine substantially at right angles to the length of the button-hole, said finger lying preferably between the upper and lower members of the clamp, so that when the material, (a button-piece or other article to be provided with button-holes, or to be stitched,) is put into the clamp said finger will be made to occupy part of the position occupied by the material, so that said finger e^{13} may be readily moved manually as the material is being manipulated, or said finger e^{13} may be moved by the finger of the operator, the turning of the starting lever from any cause releasing the slide rod c^{30} so that it may be moved forward, or to the right, see Fig. 2, by the spring c^{32} connected to it and to the clamp-frame. The clutch parts b^{16} , b^{26} are disengaged when the work-clamp is open, as in Fig. 2.

The rotation of the shaft b^{36} starts the cam device j , and the latter instantly by the end n^{20} of a cam n^{21} , see Fig. 7, moving with the cam device, acts on a slide rod e^{16} causing it to be depressed so as to effect the depression of a lever e^{17} pivoted at e^{18} and connected by link e^{19} with one of the arms 29 used to close the work-clamp as before described. Preferably the rod e^{16} will act on an adjusting device 166, shown as a screw having a check nut 167, rotation of the said adjusting device in one or another direction determining to a nicety the extent of the closing movement of the work-clamp. In this way the first effect of moving the starting device in the act of putting the work into the work-clamp is to effect the automatic closing of the work-clamp, and at substantially the same time the cam 57 of the cam device acts to turn the cutter lever G and automatically cut the work held in the cloth clamp.

The drawings show the parts of the machine in position to receive the material to be cut and stitched, the clamp being open, the cutter elevated and the machine at rest, with the exception that the two clutch pulleys f^{10} and b^{27} are running loosely. In this position the end of the lever b^{22} , see Fig. 2, contacts with the slide bar c^{30} , the spring c^{32} is slightly stretched and the outer end of the said bar is held locked back by the starting device. Now the operator while, or in the act of putting the work into the clamp causes the starting device to be moved, thus releasing the slide bar c^{30} and permitting the spring c^{32} to turn the lever b^{22} sufficiently to effect the engagement of the clutch pulley b^{27} with

the proper part of the shaft b^{36} and said shaft will be started in rotation, rotating the cam device and causing the cam n^{21} to effect as described the closing of the clamp, and as this is done the cam 57 actuates the cutting mechanism at the button-hole, and then the cutter rises from and the cam 6 brings the cut button-hole into stitching position, and the incline f^{18} of cam c^{12} turns the three-armed rock-shaft, causing the stud f^{13} to release the dog f^{12} so that the belt wheel f^{10} may be coupled with and rotate the shaft a^2 to actuate the stitch forming devices, and also to intermittently rotate the shaft b^{36} and the cam device j , but to do this, just as the three-armed rock-shaft is turned against the tension of spring c^{32} to release the dog f^{12} , as described, the arm f^{16x} pulls upon and turns the lever b^{22} far enough to cause the clutch pulley b^{27} to be disengaged from the shaft b^{36} which it at such time was rotating. The rotation of the shafts a^2 and b^{36} by or through the clutch pulley f^{10} is continued until the button-hole has been stitched, at which time the pin c^{10} drops off the abrupt shoulder f^{17} of the cam c^{12} . This dropping of the pin allows the three-armed rock-shaft to be moved by the spring f^{22} , see Fig. 1, thus bringing the stud f^{13} in position to turn the dog f^{12} and cause it to release the pulley from the shaft a^2 . As the three-armed rock-shaft is turned as described by the spring f^{22} , the spring c^{22} pulling on the lever b^{22} effects the re-engagement of the clutch parts b^{36} , b^{16} , and again starts the fast and continuous rotation of the shaft b^{36} , and the cam device j , the cam n^{21} thereon as the continuous motion of the cam device commences, relieving the pin e^{16} from pressure and permitting the spring 29^x to act on arm 29 and open the clamp. During and following the opening of the clamp the cam 6 acts to cause the change of position of the stitch-frame and clamp frame to bring the cutting mechanism into operative position. Just before the parts come into cutting position the end of the slide bar c^{30} strikes the end of the lever b^{22} and moves it sufficiently to effect the release of the clutch parts b^{36} and b^{16} , and the machine is again brought to rest with the end of the starting device holding the slide bar c^{30} . The machine will now remain at rest until the starting device is again moved.

In practice the speed of the machine is such and the operator will so manipulate the work by hand, that as soon as the clamp is opened said operator will, as quickly as possible, feed the work the distance of a button-hole and then as quickly move the starting device and in this manner the cutting and stitching are kept in rapid succession without any loss of time of the machine or the operator.

This invention is not limited to the exact shape shown of the device or bar c^{30} between the starting device and the lever b^{22} ; or between the starting device and the clutch b^{36} , b^{16} to effect its engagement on the movement

of the starting device after or while putting the work in the clamp. After the cutting of the button-hole has been effected, and during the relative change of position of the stitch frame and clamp frame the spreader n^2 , by contact with studs 65, one on each of the plates m , see the detail Fig. 3^a, acts to effect the spreading of the button-hole ready to be stitched.

This invention is not limited to the employment of devices of the exact form shown between the starting device and the means for starting up the cam for automatically closing the work-clamp, nor to the exact shape of the cam for closing the work-clamp.

The starting device shown in Fig. 9 has co-operating with it a restoring device shown as a rod r^2 normally acted upon by a spring r^3 to cause a pin or projection r^4 of the rod to quickly or almost instantly restore the starting device into its normal position and cause it to lock the slide bar c^{30} , this being done as soon as the clamp has been opened.

To prevent the starting device from being moved too far toward the operator by momentum I have provided the rod with a spring r^5 connected thereto by a screw r^6 , the free end of the spring contacting with the front side of the starting device. The arms 29 in practice are kept elevated by a spring 29^x , see Fig. 2, fast on an ear 30^x of the clamp frame, the said ear receiving the rock-shaft 30.

In Figs. 13 and 14, I have shown a modified form of starting mechanism which I will now describe briefly. The slide bar c^{30} like that shown in Fig. 2, has a projection 200 which is acted upon by one end of one of the arms 29, said arm in practice, however, being normally lifted a little higher by the spring 29^x than required in Fig. 2, so that the arms 28 shown in Figs. 2 and 3 and also fully in Fig. 3^a will contact with and slightly lift the inner ends of the plates m , m which are held loosely on the clamp-frame. When the inner ends of the clamp-plates m are held up slightly one of the arms 29 keep the slide bar c^{30} back, but as the operator puts the work into the jaws of the clamp the slightest downward pressure depresses the inner ends of the clamp plates and arms 29, thus releasing the slide bar c^{30} when the fast speed clutch is brought into operation as before described.

In Fig. 15, I have shown a modified form of starting device consisting of a lever s^6 , pivoted at s^7 on ears at the under side of the clamp-frame, said lever having one end s^8 adapted to meet and lock back the slide bar c^{30} , the opposite end of said lever having its end suitably adapted to be engaged or struck by the finger or hand of the operator when putting the work into the clamp.

I claim—

1. A sewing machine containing the following instrumentalities, viz;—a clamp frame, and a stitch frame, one relatively movable with relation to the other; a manually controlled starting device; a work-clamp; and

devices to automatically close the work-clamp after the machine has been started by the manually controlled starting-device preparatory to the making of a button-hole, substantially as described.

2. A sewing machine containing the following instrumentalities, viz;—a clamp-frame, and a stitch-frame, one relatively movable with relation to the other; a manually controlled starting device; a work-clamp; devices to automatically close the work-clamp after the machine has been started preparatory to the making of a button-hole, and button-hole cutting mechanism to automatically cut the material in the work-clamp preparatory to the stitching of a button-hole, substantially as described.

3. A sewing machine containing the following instrumentalities—viz;—a clamp-frame and a stitch-frame, one relatively movable with relation to the other; a manually controlled starting device; a work-clamp; devices to automatically close the work-clamp after the machine has been started preparatory to the making of a button-hole; button-hole cutting mechanism to automatically cut the material in the work-clamp preparatory to the stitching of a button-hole; and mechanism to automatically spread the cut button-hole, substantially as described.

4. In a sewing machine the following instrumentalities, viz;—a clamp-frame and a stitch-frame, one relatively movable with relation to the other; stitch forming mechanism; a manually controlled starting device; a work-clamp; devices to automatically close the work-clamp after the machine has been started preparatory to the stitching of a button-hole; and devices to automatically open said work-clamp at the completion of a button-hole, substantially as described.

5. In a sewing machine the following instrumentalities, viz;—a clamp-frame and a stitch-frame, one relatively movable with relation to the other; stitch forming mechanism; a manually controlled starting device; a work-clamp; devices to automatically close the work-clamp after the machine has been started preparatory to the stitching of a button-hole; devices to automatically open said work-clamp at the completion of a button-hole; and devices to automatically stop the machine at the completion of each button-hole, substantially as described.

6. In a button-hole sewing machine, a stitch frame a clamp frame, stitch forming mechanism, a work-clamp, a cam device to change the relative positions of the said frames during the stitching of a button-hole, and button-hole cutting mechanism, combined with actuating mechanism for said cam device, and with devices to rotate the said actuating mechanism and cam device at times continuously and at other times intermittingly, substantially as described.

7. A stitch-frame; a clamp frame; and a

cam device to effect the relative changes of position of said frames during the stitching of a button-hole, combined with an actuating device for said cam device, and two clutch pulleys and cams, and devices controlled thereby to automatically determine which of said pulleys shall move the said actuating mechanism and cam device, substantially as described.

8. A stitch-frame; a clamp-frame; and a cam device to effect the relative changes of position of said frames during the stitching of a button-hole; combined with an actuating device for said cam device; and two clutch pulleys each having a continuously rotating part, and cams, and devices controlled by said cams, whereby the said actuating device may be automatically put under the control of either of the said clutch pulleys and rotate the said actuating device at a high speed or at a slower speed, substantially as described.

9. The work-clamp, combined with a starting device located between the upper and lower members thereof and adapted to be actuated as the material is put into the said clamp, substantially as described.

10. The work-clamp, combined with a starting lever occupying a position to cross a line coincident with the length of the button-hole, substantially as described.

11. A button-hole sewing machine containing stitch-forming mechanism, a work-clamp, and a throat plate, adapted to over stitch the side edges and eye end of a button-hole with radiating stitches, and cutting mechanism, combined with a manually controlled starting device, to start the machine, and devices to thereafter automatically start the different parts, to effect first the automatic closing of the work-clamp and then the cutting of the button-hole and the stitching thereof, substantially as described.

12. In a machine for sewing button-holes, a stitch-frame, a clamp-frame, a work-clamp, stitch-forming mechanism comprising an eye-pointed needle located above the material, a complementary stitch-forming device located below the material and both rotatable substantially in unison about a common center when stitching the eye of the button-hole by radiating stitches, a cam device to change the relative positions of the said frames during the operation of stitching a button-hole, a manually controlled starting device to start the machine; and devices to thereafter automatically close the work-clamp to clamp the material, substantially as described.

13. In a machine for sewing button-holes, a stitch-frame, a clamp-frame, a work-clamp, stitch-forming mechanism comprising an eye-pointed needle located above the material, a complementary stitch-forming device located below the material and both rotatable substantially in unison about a common center when stitching the eye of the button-hole by radiating stitches, button-hole cutting mech-

anism, a cam device to change the relative positions of the said frames during the operation of stitching a button-hole, devices for automatically closing the work clamp, and devices to close the cutting mechanism, combined with a manually controlled starting device whereby the movement of the said starting device manually starts in motion the device for automatically closing the work-clamp, and causes the button-hole cutting mechanism to be actuated, substantially as described.

14. The combination with a work-clamp, a starting device to start the machine; devices to automatically close the work-clamp, a clutch mechanism, and intermediate devices to effect the engagement of the clutch, of a restoring device to automatically restore the starting device to its normal position, substantially as described.

15. The worm shaft, the cam device having worm teeth, a ratchet wheel at one end of the worm shaft, the main shaft a^2 , a clutch pulley normally loose thereon, and devices between said main shaft and said ratchet wheel to rotate the worm shaft, combined with a clutch pulley loose at the opposite end of said worm shaft, a co-operating clutch member fast on said shaft, devices to couple one of said clutch pulleys operatively to the shaft on which it

is mounted and to simultaneously unclutch the other pulley, substantially as described.

16. The lever b^{22} , the shaft b^{36} , a pulley normally loose thereon, clutch parts carried by said pulley and said shaft, connections between said loose pulley and said lever, a bar as c^{30} , and a spring c^{32} , combined with a starting lever co-operating with said bar, to operate, substantially as described.

17. A work-clamp, a lever as e^{17} , connections between it and the said work-clamp, and a cam, combined with a slide rod actuated by said cam and moving the said lever to close the work-clamp automatically, substantially as described.

18. A work-clamp, a lever as e^{17} , connections between it and the said work-clamp, and a cam, combined with a slide rod actuated by said cam and moving the said lever to close the work-clamp automatically, and an adjusting device to close the work-clamp more or less, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN REECE.

Witnesses:

G. BUTLER SMITH,
EUGENE A. REED, Jr.