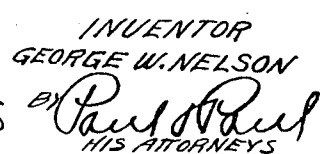


APPLICATION FILED APR. 15, 1907.

Patented Feb. 15, 1910.

3 SHEETS—SHEET 1.



949,401.

Patented Feb. 15, 1910.

3 SHEETS—SHEET 2.

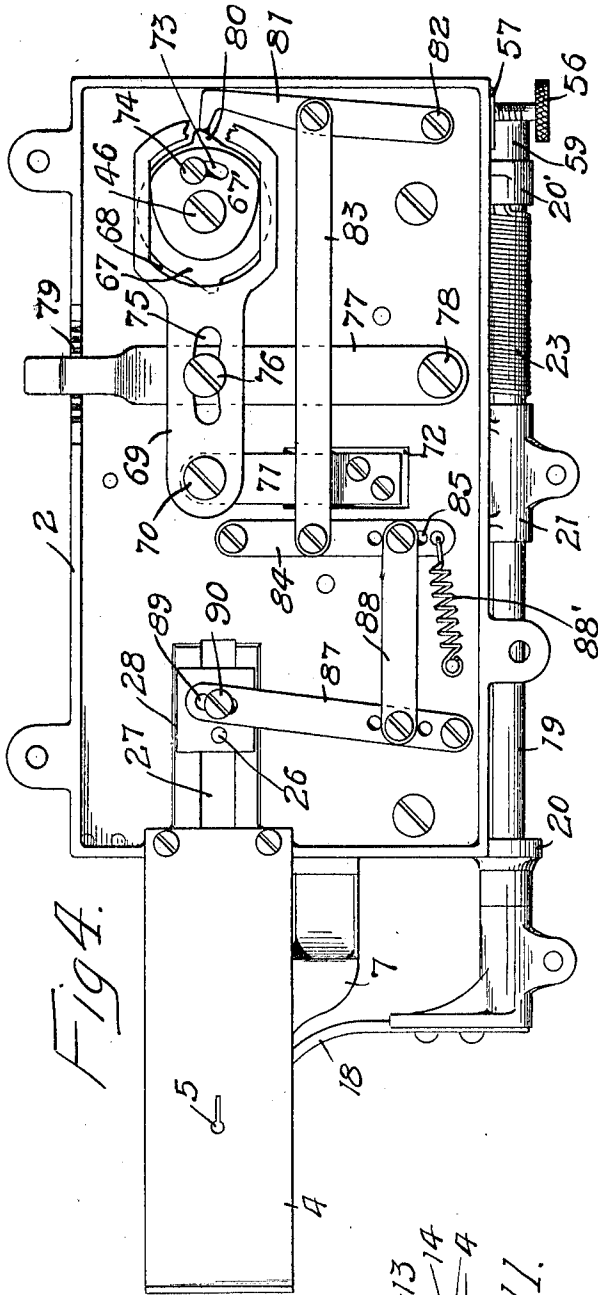


Fig. 4.

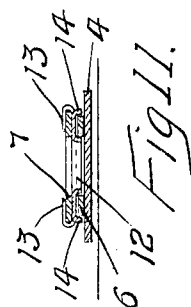


Fig. 11.

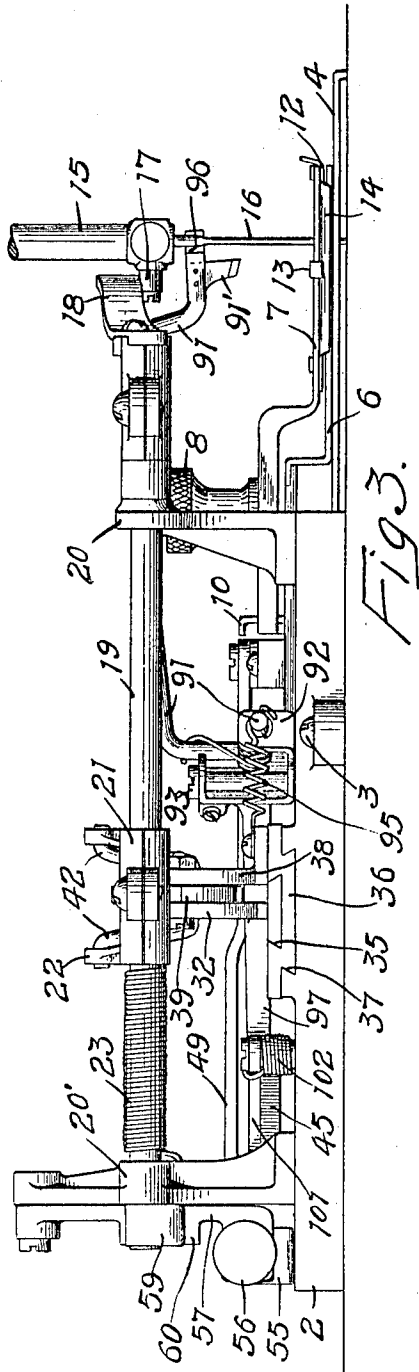


Fig. 3.

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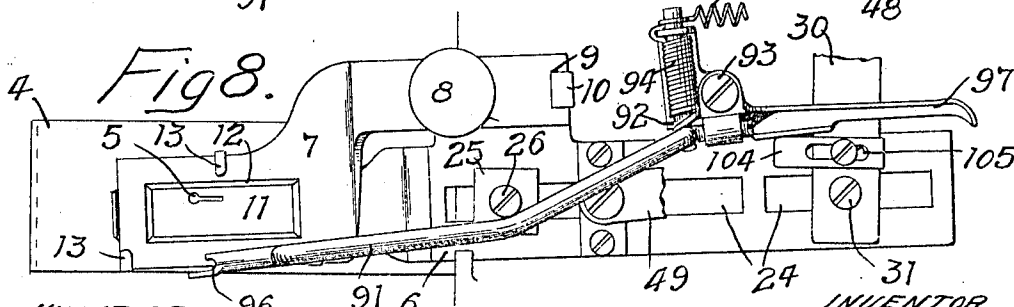
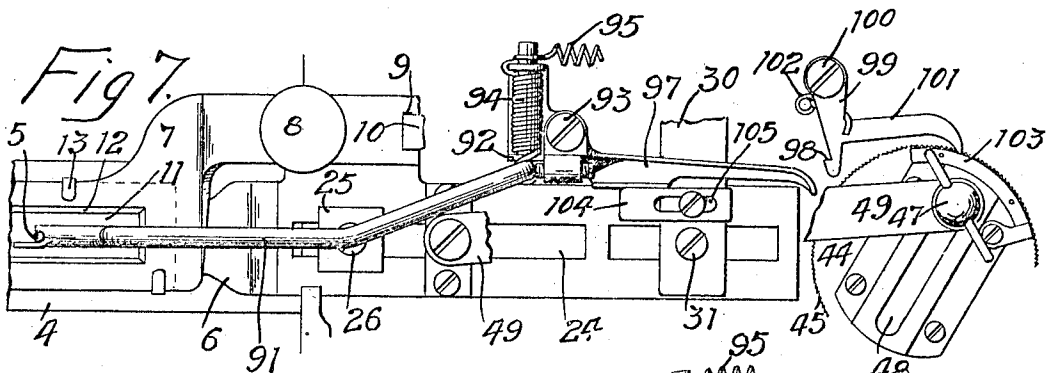
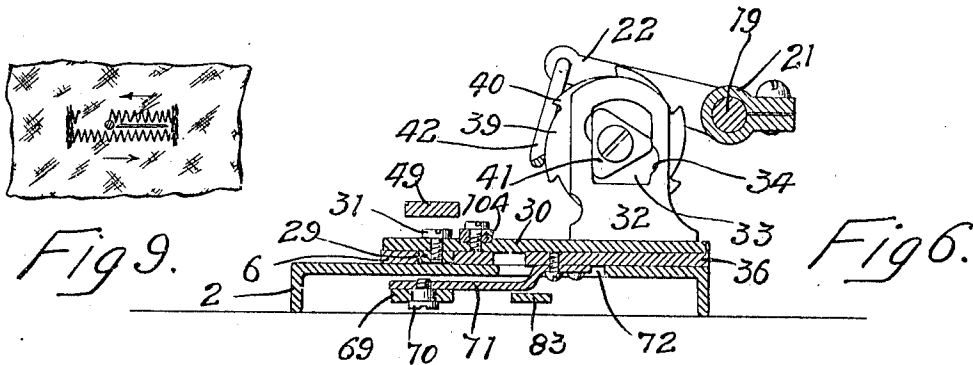
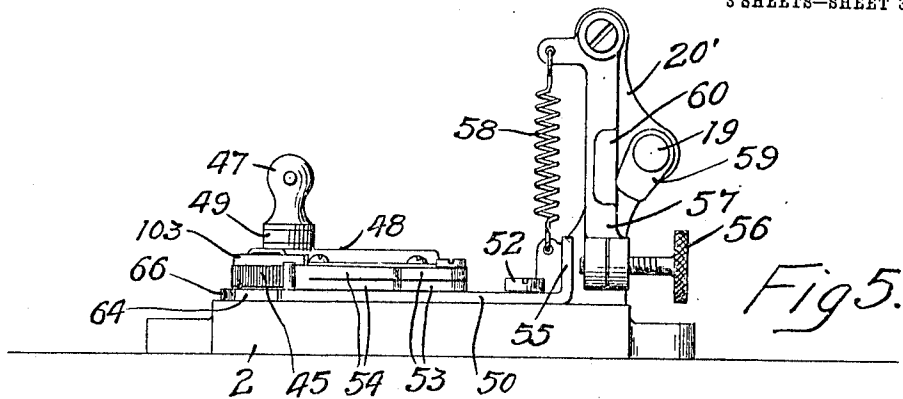
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 BY *Paul & Paul*
 HIS ATTORNEYS

949,401.

G. W. NELSON.
BUTTONHOLE MACHINE.
APPLICATION FILED APR. 16, 1907.

Patented Feb. 15, 1910.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

GEORGE W. NELSON, OF MINNEAPOLIS, MINNESOTA.

BUTTONHOLE-MACHINE.

949,401.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed April 15, 1907. Serial No. 368,448.

To all whom it may concern:

Be it known that I, GEORGE W. NELSON, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful
5 Improvements in Buttonhole-Machines, of which the following is a specification.

My invention relates to button-hole attachments for sewing machines operated by hand or power and for making button holes
10 of various sizes and lengths of stitches.

The primary object of my invention is to simplify and improve the mechanism shown and described in a certain pending application for Letters Patent of the United States
15 filed by me December 10, 1906, Serial No. 347,035.

The invention consists generally in improved means for regulating the length or bight of the button-hole stitch.

20 Further, the invention consists in improved means for shifting the stitch from one side of the button-hole to the other.

Further, the invention consists in improved means for regulating the lengths of
25 the rows of stitches on each side of the button-hole.

Further, the invention consists in improved means for spacing the stitches and making the distance between them uniform
30 at the sides of the button-hole.

Further, the invention consists in improved means for forming a strengthening bar at each end of the button-hole.

35 Further, the invention consists in means for causing the piling up of the stitches at the points where the bars are formed.

Further, the invention consists in various constructions and combinations, all as hereinafter described and particularly pointed
40 out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a top view of a button hole attachment for sewing machines, embodying my invention. Fig.
45 2 is a front view of the same. Fig. 3 is a rear view. Fig. 4 is a bottom view showing the mechanism for shifting the feed plates at the ends of the button hole and for forming the bars therein. Fig. 5 is an end view of the attachment. Fig. 6 is a sectional
50 view on the line *a—x* of Fig. 1. Figs. 7 and 8 are views illustrating the operation of the knife preparatory to cutting the button-hole. Fig. 9 is a detail view illustrating
55 a form of button-hole showing the direction

of movement of the needle in stitching the same. Fig. 10 is a detail view illustrating the mechanism for causing the piling up of the stitches at the ends of the button-hole. Fig. 11 is a sectional view on the line *y—y* 60 of Fig. 1.

In the drawing, 2 represents a base having suitable means, such as screws 3, for securing it to the top of a sewing machine. A plate 4 extends from one end of said base, 65 and is adapted to cover the feed plate of the machine and avoid the necessity of removing this plate when the attachment is used. The plate 4 has a key hole slot 5 in which the needle operates. 6 is the lower clamp plate 70 mounted on said base and having an end overhanging the plate 4.

7 is the upper clamp plate secured by a thumb screw 8 and having a slot 9 at one end to receive a lug 10 whereon the said
75 plate oscillates vertically a sufficient distance to allow the work to be inserted between it and the lower clamp plate 6. Both of these plates have openings 11 therethrough of sufficient size to expose the but- 80 ton hole as it is being formed.

12 is a gripper plate supported on the upper clamp plate by lugs 13 and having flanged edges 14 which overhang the edges of the lower clamp plate on each side of the opening therein and serve to hold the cloth 85 firmly on the lower clamp plate and stretch it sufficiently so that the button hole will be smoothly and evenly made. This gripper plate can be slipped off the upper clamp 90 plate whenever desired.

15 is the needle bar having a needle 16 and a projection 17 on one side against which an arm 18 mounted on a shaft 19 having bearings in standards 20 and 20', is 95 yieldingly held following the bar in its upward and downward movement. A hub 21 is secured on said shaft having inwardly projecting arms 22, and a spring 23 coiled on the said shaft is connected at one end to the standard 20', and bears at its other end 100 upon one of the arms 22 to yieldingly hold them in a depressed position, and the arm 18 in continuous contact with the projection 17. The lower clamp plate 6 has a longitudinal slot 24, and a plate 25 rests on said 105 clamp plate over one end of said slot and has a pivot screw 26 on which the said clamp plate oscillates. A slot 27 is provided in the base plate under the clamp plate and a plate 28 110

is fitted against the under side of the base beneath the slot 27, and into this plate 28 the pivot screw 26 extends.

In the opposite end of the slot in the clamp plate a block 29 is provided and a feed plate 30 is arranged transversely of said slot and has a screw 31 passing there-through. This feed plate extends under the rock shaft 19 substantially at right angles thereto and is provided with an upright standard 32 having an opening 33 with a cam edge 34. The plate 30 is adapted to reciprocate in a dove-tailed slot 35 in the upper surface of a plate 36 which reciprocates within a corresponding slot 37 in the base. A standard 38 is mounted on the plate 36 and a ratchet 39 having a series of teeth 40 is pivoted on the standard 38 and carries a triangular plate 41 which projects into the opening 33 in the standard 32 and is adapted to engage the cam edges thereof, and cause the reciprocation of the plate 30 at predetermined points in the operation of the machine. The ratchet 39 is revolved step by step by means of a loop 42 that is U-shaped in form and pivotally suspended between the arms 22 and held in engagement with the teeth of the ratchet by a spring 43. The rocking of the shaft 19 in one direction will cause the loop 42 to slide down over the teeth of the ratchet and on the upward movement of the loop with the opposite rock of the shaft, the ratchet will be revolved and the plate 30 reciprocated to move the lower clamp bar back and forth and regulate the length or bight of the stitches on each side of the button-hole. During this movement the block 29 will slide in the slot of the clamp bar sufficiently to allow the free movement of said bar.

The mechanism for feeding the material and regulating the length of the button hole consists, preferably, of a ratchet device comprising a disk 44 having a series of peripheral ratchet teeth 45 and centrally pivoted on a stud 46 at one end of the base. A screw 47 has its lower end slidably mounted in a guide 48 on the top of said disk and is pivotally connected by a bar 49 with the upper clamp bar. By adjusting the screw 47 in its slot the length of the button-hole can be regulated. The nearer the screw is set to the center of the disk the shorter will be the rows of stitches on each side of the button hole until the center of the disk is reached when the bar 49 will have no longitudinal movement at all. The screw 47 is conveniently located and the operator can easily and quickly adjust the mechanism for the desired length of the button hole. To operate the ratchet device, I provide a bar 50 slidably mounted on the base by means of a slot 51 and a screw 52, and carrying dogs 53 that are held in engagement with the ratchet teeth of the disk 44 by a spring 54.

The bar 50 has an upwardly turned end 55 in position to be engaged by a thumb screw 56 threaded into the lower end of an arm 57 that is pivoted at its upper end on the standard 20'. A spring 58 normally holds the arm 57 and the adjusting screw 56 out of contact with the turned up end 55 of the bar 50. A cam 59 is mounted on the end of the rock shaft in position to engage a lug 60 on the arm 57 so that with each stroke of the said shaft the arm 57 will be oscillated to move the screw 56 into contact with the bar 50 and force it forward to revolve the ratchet disk. The length of the stroke will depend upon the adjustment of the screw 56.

In a device of this kind where a ratchet and pitman drive are employed it will be understood that the longitudinal movement of the clamp plate will be somewhat irregular, slowing up as the pitman passes the center and moving faster at other points. This irregular movement would be objectionable as it would result in uneven spacing of the stitches, and I therefore provide means whereby the movement of the ratchet will be substantially uniform at all points of its revolution. The mechanism which I prefer to employ consists of a disk 61 secured on the stud 46 and having lugs 62 on opposite sides thereof in position to be engaged by a lug 63 on a lever arm 64 that is pivoted at 65 on the base and attached at its other end to the bar 50, a spring 66 normally holding the lug 63 in contact with the edge of the disk 61. During the revolution of the disk the lug 63 will follow its periphery and the lugs 62 are so arranged that they will contact with the lug 63 and force the arm 64 outwardly to increase the movement of the ratchet at the time when the pitman is passing the center. During the time the lug 63 is riding on one of the lugs 62 the stroke of the bar 50 will be very limited and consequently the stitches at the ends of the button hole or where the bars are formed will be very close together or piled upon one another. When the lug 63 passes off the lug 62 the dog 53 will slide back over a number of the ratchet teeth and be in position to increase the movement of the ratchet disk and equalize its travel to uniformly space the stitches while the pitman is passing the center.

For the purpose of increasing the throw or travel of the short arm of the clamp plate 6 to form the bars at the ends of the button hole, I provide a cam plate 67 beneath the disk 61 and mounted on the stud 46 and provided with oppositely arranged lugs 80 in position to engage an arm 81 pivoted at 82 on the base and connected by a link 83 with an arm 84 also pivoted on said base at one end and having a series of holes 85 in its other end and arranged substantially parallel with an arm 87 also pivoted at one end

on said base and having holes corresponding to those in the arm 84 and adjustable through said holes by a link 88. A spring 88' normally holds the arm 81 in engagement with the periphery of the cam plate 67. One end of the arm 87 has a slot 89 through which a screw 90 passes into the plate 28. Through this mechanism the oscillation of the arm 81 is transmitted to the pivotal point of the lower clamp plate 6 and said pivot moved back and forth on said clamp plate and base to increase the distance between said pivot and the button hole and cause the formation of the bars at the ends of the button hole. The adjustment of the link 88 on the arms 84 and 87 permits the stroke of the arm 87 to be regulated for the purpose of increasing or decreasing the travel of the plate 28 and the length of the button hole bars.

The stitches having been formed on one side of the button hole, it is necessary to provide mechanism for carrying the work around on the other side to form the other row of stitches. I therefore provide a cam plate 67' also mounted on the stud 46 within an opening 68 of a shifter bar 69 that is pivoted at one end by a screw 70 to a plate 71 which is secured to the sliding plate 36 through a slot 72 in the base. A slot 73 is formed in the cam 67' through which a screw 74 passes into the cam plate 67 to permit the adjustment of the cam 67' and properly time the operation of the mechanism controlled thereby. The shifter bar 69 has a slot 75 therein through which a screw 76 passes into a lever 77 that is pivoted at 78 on the under side of the base and has a sufficient tension or spring to keep in contact with a series of teeth 79 provided on the flanged edge of said base. By pressing down on the free end of the lever 77 it will be disengaged from the teeth and may be oscillated back and forth to increase or decrease the stroke of the shifter bar.

In an attachment of this kind it is desirable to provide a knife for cutting the button hole, with mechanism for operating it at predetermined periods. I therefore provide a lever 91 mounted in a bracket 92 that is pivoted at 93 on the base and has a vertical movement in its bearings on said bracket and is normally held in a raised position by a spring 94. A cutting blade 91' is mounted on the lever 91. A spring 95 normally tends to swing the said lever 91 into the path of the needle bar and the end of said lever 91 has a socket 96 to receive the needle and rise and fall therewith as the mechanism is operated. An arm 97 is mounted on the said bracket and engages a notch 98 in a dog 99 that is pivoted at 100 on the said base and has an arm 101 which projects over the edge of the ratchet disk 44. A spring 102 normally tends to hold the

said dog 99 in engagement with the arm 97. A curved plate 103 is secured on the disk 44 in position to engage the arm 101 and trip the dog 99 once in every complete revolution of the disk 44, and during the time the arm 101 is in engagement with the plate 103 the dog 99 will be held away from the arm 97 and the spring 95 will be free to swing the knife lever into the path of the needle bar. With every alternate stroke of the needle the knife lever is moved away from the needle, and this is accomplished by means of a plate 104 having a slot 105 through which said plate is adjustably connected with the plate 30. During the movement of the plate 30 in one direction the plate 104 will engage the arm 97 and swing the knife lever away from the work. On the return movement of the plate 30, however, the knife lever will be allowed to swing into the path of the needle bar. During one of the movements of the arm 97 actuated by the plate 104 the dog 99 will be released, returning into the path of the arm 97 will lock it in its inoperative position.

I claim as my invention:

1. The combination, with a base, of sliding feed plates arranged one above another thereon, clamping members connected with said plates and means for moving them longitudinally, standards mounted on said plates respectively, one of said standards having an opening provided with cam edges, a ratchet wheel mounted on the other standard, a triangular plate carried by said ratchet wheel and adapted to enter said opening, and means for operating said ratchet wheel.

2. The combination, with a base plate, of sliding feed plates operating one upon another thereon, clamping members connected with said plates and means for moving them longitudinally, standards mounted on said feed plates respectively, one of said standards having an opening provided with cam edges, a ratchet wheel mounted on the other standard, a triangular plate carried by said ratchet wheel and adapted to extend into said opening and engage said cam edges, a loop arranged to engage the teeth of said ratchet wheel, and means for operating said loop to reciprocate said standards.

3. The combination, with a sliding feed plate, and a standard mounted thereon having an opening provided with irregular edges, there being recesses or depressions formed in said edges on opposite sides of said opening, clamping plates connected with said feed plates and means for moving them longitudinally, a triangular plate fitting within said opening and in contact with the edges thereof, a ratchet wheel whereon said plate is mounted, a loop arranged to engage the teeth of said ratchet wheel and revolve the same with a step by step movement, a rock shaft, arms mounted

thereon and on which arms said loop is supported, and means for operating said rock shaft.

4. In a sewing machine, the combination, with the needle bar and needle, of a rock shaft having an arm in the path of said needle bar, a pivoted clamp plate, a sliding feed plate connected with said clamp plate and having an opening provided with irregular edges, means for moving said plates longitudinally, a ratchet wheel having a series of teeth, a triangular plate mounted on said ratchet wheel and projecting into the opening in said standard and adapted to engage said irregular edges to reciprocate said standard and feed plate, arms mounted on said rock shafts, and a loop carried by said arms and adapted to slip over the teeth of said ratchet when said arms are moved in one direction and to engage said teeth and revolve said ratchet when said arms are moved in the opposite direction, whereby an oscillating movement will be imparted to said clamp plate, for the purpose specified.

5. In a sewing machine, the combination, with a needle bar having a projection on one side, of a rock shaft having an arm in the path of said projection, a spring device for normally holding said arm in contact with said projection, a clamp plate parallel substantially with said shaft and having an oscillating movement, a feed plate extending under said shaft at right angles substantially thereto and connected with said clamp plate, and mechanism actuated by the rocking of said shaft for reciprocating said feed plate and oscillating said clamp plate, said mechanism including a ratchet and means for revolving the same and a loop having an arm connection with said rock shaft.

6. The combination, with a feed plate, clamping members connected with said plate and means for moving the same longitudinally, of a ratchet wheel, a pitman connecting said ratchet wheel and said feed plate, a plate having a dog in engagement with said ratchet wheel, means for reciprocating said plate to operate said ratchet wheel step by step, and a regulating device whereby the movement of said ratchet wheel is increased or decreased according to the position of the pitman, and the travel of said feed plate thereby made uniform.

7. In a button hole machine, the combination, with the upper and lower clamp plates between which the work is held, said lower plate having a longitudinal slot and a pivot pin extending through said slot and on which said clamp plate is adapted to slide lengthwise, of means for reciprocating said plates lengthwise, said means comprising a disk having a series of peripheral ratchet teeth, and means for revolving said disk with a step by step movement, and a pitman rod connecting said disk with said lower clamp

plate, and said pitman rod having an adjustable connection with said disk whereby the stroke of said clamp plates may be regulated, and means for oscillating said clamping plates laterally.

8. In a button hole machine, the combination, with the upper and lower clamp plates, said lower plates having a longitudinal slot and a pivot pin extending through said slot and whereon said clamp plate is adapted to slide lengthwise and oscillate laterally, of a ratchet disk and means for revolving it with a step by step movement, a pitman rod connecting said disk to said clamp plate and whereby a longitudinal reciprocating movement will be imparted to said clamp plate, and means for oscillating said clamp plate on its pivot, for the purpose specified.

9. The combination, with a clamp plate, of a disk having a series of peripheral ratchet teeth, a pitman rod pivotally connecting said disk with said clamp plate, a sliding bar arranged substantially at right angles to said clamp plate and having a dog in engagement with the teeth of said ratchet disk, and means for reciprocating said bar to revolve said ratchet with a step by step movement and operate said clamp plate longitudinally and means for oscillating said plate laterally.

10. In a button hole machine, the combination, with a clamp plate having a longitudinal slot, and a pivot pin extending through said slot and whereon said clamp plate is adapted to slide lengthwise, a ratchet disk, a pitman rod connecting said disk with said clamp plate, a reciprocating bar having a dog to engage the teeth of said ratchet disk, a rock shaft arranged at right angles substantially to the movement of said bar, and means operated by the movement of said rock shaft for actuating said bar to revolve said disk and move said plate lengthwise, and means actuated by the rocking of said shaft for moving said plate laterally.

11. In a button hole machine, the combination, with a needle bar, of a reciprocating clamp plate, mechanism for reciprocating said clamp plate comprising a ratchet disk, a pitman connecting said ratchet disk with said clamp plate, a bar having a dog to engage the teeth of said rod, a rock shaft arranged to be actuated by the movement of said needle bar, a cam mounted on said rock shaft, a pivoted arm in the path of said cam, and a thumb screw mounted on said arm and arranged to engage said sliding bar, and said screw being adjustable in its support whereby the time of operation of said sliding bar and ratchet may be varied, and means for moving said plate laterally.

12. In a button hole machine, the combination, with a needle bar, of a reciprocating clamp plate, and means for moving it laterally, and a mechanism for moving said clamp

plate longitudinally comprising a disk having a series of ratchet teeth, a pitman rod connecting said disk with said clamp plate, a sliding bar having a dog to engage the teeth of said ratchet, a rock shaft arranged to be actuated by the movement of said needle bar, means operated by the movement of said rock shaft for actuating said sliding bar, and said means being adjustable whereby the time of operation of said sliding bar and said rod can be varied.

13. In a button hole machine, the combination, with a sliding clamp plate and a movable pivot whereon it is mounted, of means for reciprocating said plate lengthwise, means for oscillating said plate on its pivot, an arm 87 having a fixed pivot at one end and pivotally connected at its other end to the movable pivot of said clamp plate, a second arm also pivoted at one end, a link connecting said arms, a third arm having a link connection with said second arm and yieldingly held, and means for oscillating said third arm to change the position of said movable pivot and increase or decrease the throw of the short arm of said clamp plate, substantially as described.

14. In a button hole machine, the combination, with a base plate, of a sliding clamp plate and means for reciprocating the same, a movable pivot whereon said plate is mounted, an oscillating arm 81 pivoted on said base plate and having a compound link connection with said movable pivot whereby the oscillation of said arm will move said pivot back and forth and increase or decrease the throw of the short arm of said clamp plate, and a revolving disk also mounted on said base plate and having peripheral lugs arranged to engage said arm 81 and oscillate the same, substantially as described.

15. The combination, with a base plate having a longitudinal slot, of a clamp plate also having a slot, a pivot pin passing through the slot in said base plate and in said clamp plate and adapted to slide therein, said clamp plate having a longitudinal movement on its pivot, and means for operating the same, means for imparting a transverse or oscillating movement to said clamp plate, and means for moving the said pivot to increase the throw of the short arm of said clamp plate.

16. In a button hole machine, the combination, with a clamp plate having a longitudinal slot and an adjustable pivot pin extending through said slot and whereon said clamp plate is adapted to slide lengthwise, means for moving said clamp plate lengthwise, an oscillating arm having a compound link connection with said movable pivot whereby the oscillation of said arm will move said pivot back and forth and increase or decrease the throw of the short arm of said clamp plate, and means for operating said

arm and comprising a rock shaft, a ratchet wheel operatively connected with said shaft, and means for oscillating said clamp plate by the movement of the ratchet wheel, substantially as described.

17. In a button hole machine, the combination, with a suitable base, of a clamp plate pivoted thereon, means for reciprocating said clamp plate lengthwise, a plate 35 connected with said clamp plate at right angles substantially thereto, and means for reciprocating said plate 35 to oscillate said clamp plate, a plate 36 mounted on said base and supporting said plate 35, a shifter bar connected to said plate 36 at one end and having an adjustable pivot whereby the stroke of said bar may be regulated, and said bar having an opening at one end, and a cam fitting within said opening and arranged to engage the edges of the same to oscillate said shifter bar and reciprocate the plate 36.

18. In a button hole machine, the combination, with a sliding clamp plate, and means for oscillating the same, of a ratchet device having a pitman connection with said clamp plate, and means for imparting a step by step rotary movement to said ratchet and means for reducing the movement or travel of said ratchet device at predetermined points in its revolution, for the purpose specified.

19. In a button hole machine, the combination, with a clamp plate, and means for oscillating the same, of a ratchet device having a pitman connection with said plate, means for rotating said ratchet device with a step by step movement, and means for increasing the travel of said ratchet device when the pitman is on the dead center, whereby the movement of the ratchet will be uniform.

20. In a button hole machine, the combination, with a base plate, of a clamp plate pivoted thereon, and means for oscillating said clamp plate laterally on its pivot, said means including a plate having a sliding pivotal connection with said clamp plate and adapted to move on said base plate in a direction at right angles substantially to said clamp plate, and mechanism for shifting the position of said operating plate at predetermined intervals, said shifting means including a bar secured to said operating plate, a shifter lever pivotally connected with said bar, and a cam device having means thereon for engaging and operating said shifter lever.

21. In a button hole machine, the combination, with the upper and lower clamp plates, and means for imparting a longitudinal and lateral movement thereto, of a gripper plate having lugs adapted to engage the edges of the upper clamp plate, and flanged edges to overhang the edges of the lower clamp plate.

22. The combination, with a base plate, of a clamp plate having a sliding pivot thereon, means for moving said clamp plate longitudinally and laterally, an arm 87 pivoted 5 on said base and having a sliding pivotal connection with said pivot, a second arm 84 also pivoted at one end on said base, a link 88 connecting said arm 84 with said arm 87 and capable of adjustment thereon, and 10 means for oscillating said arm 84, substantially as described.

23. The combination, with a base plate and a clamp plate having a sliding pivot thereon, means for moving said clamp plate 15 longitudinally and laterally, of an arm 87 pivoted on said base at one end and having a sliding connection at its other end with said pivot, an arm 84 also pivoted on said base, a link connecting said arms with one 20 another, a bar 81 pivoted at one end on said base and connected with said arm 84, a cam plate arranged to engage said bar 81 and oscillate the same, and a spring device for holding said bar 81 in contact with said cam 25 plate.

24. The combination, with a base plate, of a clamp plate pivoted thereon, a feed plate operating transversely with respect to said clamp plate and attached thereto, a plate 30 interposed between said feed plate and said base plate and having guides therein for said feed plate, a shifter lever having a slot intermediate to its ends and pivotally connected at one end with said interposed plate, 35 a bar pivoted on said base plate and connected with the slot in said shifter lever and having one end projecting beyond said base plate, the connection of said bar with said lever sliding in the slot in said lever, and means engaging one end of said shifter lever 40 for oscillating the same at predetermined intervals to move said interposed plate, for the purpose specified.

In witness whereof, I have hereunto set my hand this 8th day of April 1907.

GEORGE W. NELSON.

Witnesses:

RICHARD PAUL,
J. B. ERA.