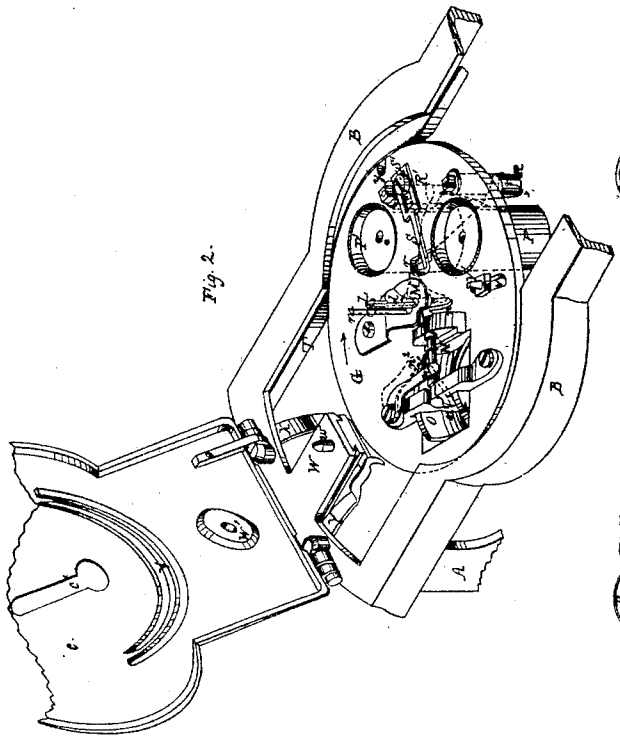
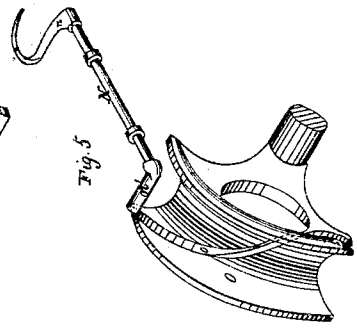
2 Sheets—Sheet 1.

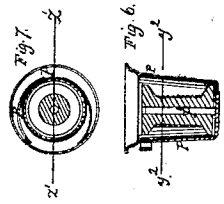
J. A. & H. A. HOUSE.

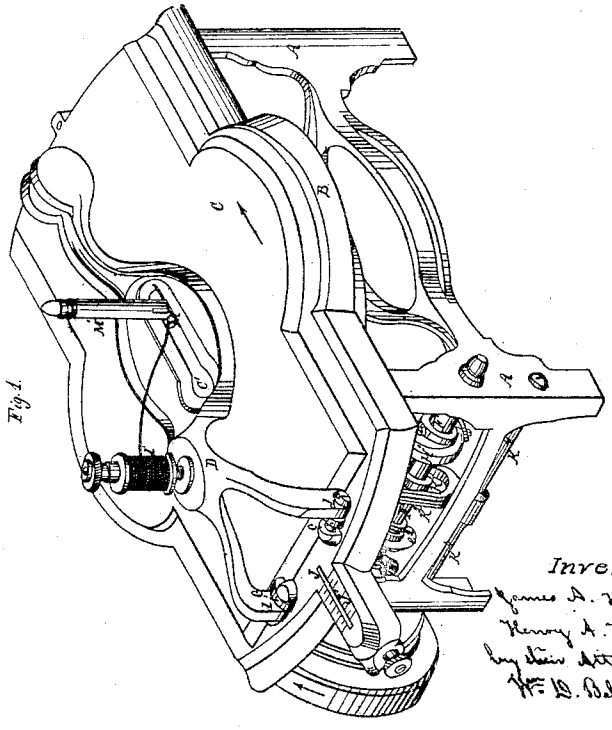
SEWING MACHINE.

No. 36,932. Patented Nov. 11, 1862.









Witnesses

Jno. Johnson

Johnson Hill

Inventor

James A. House

Henry A. House

by their Attorney

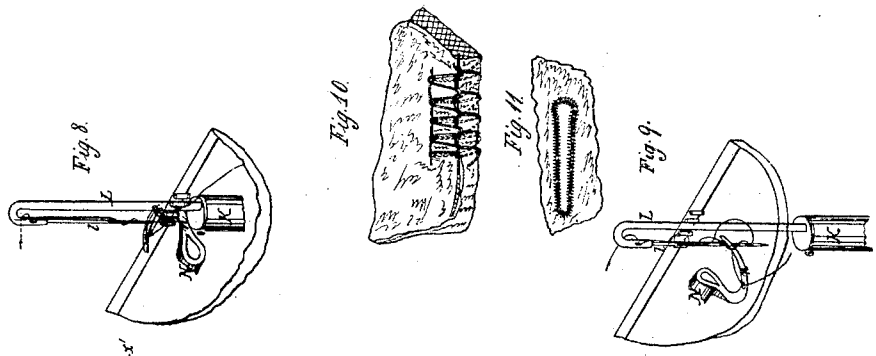
W. D. Baldwin

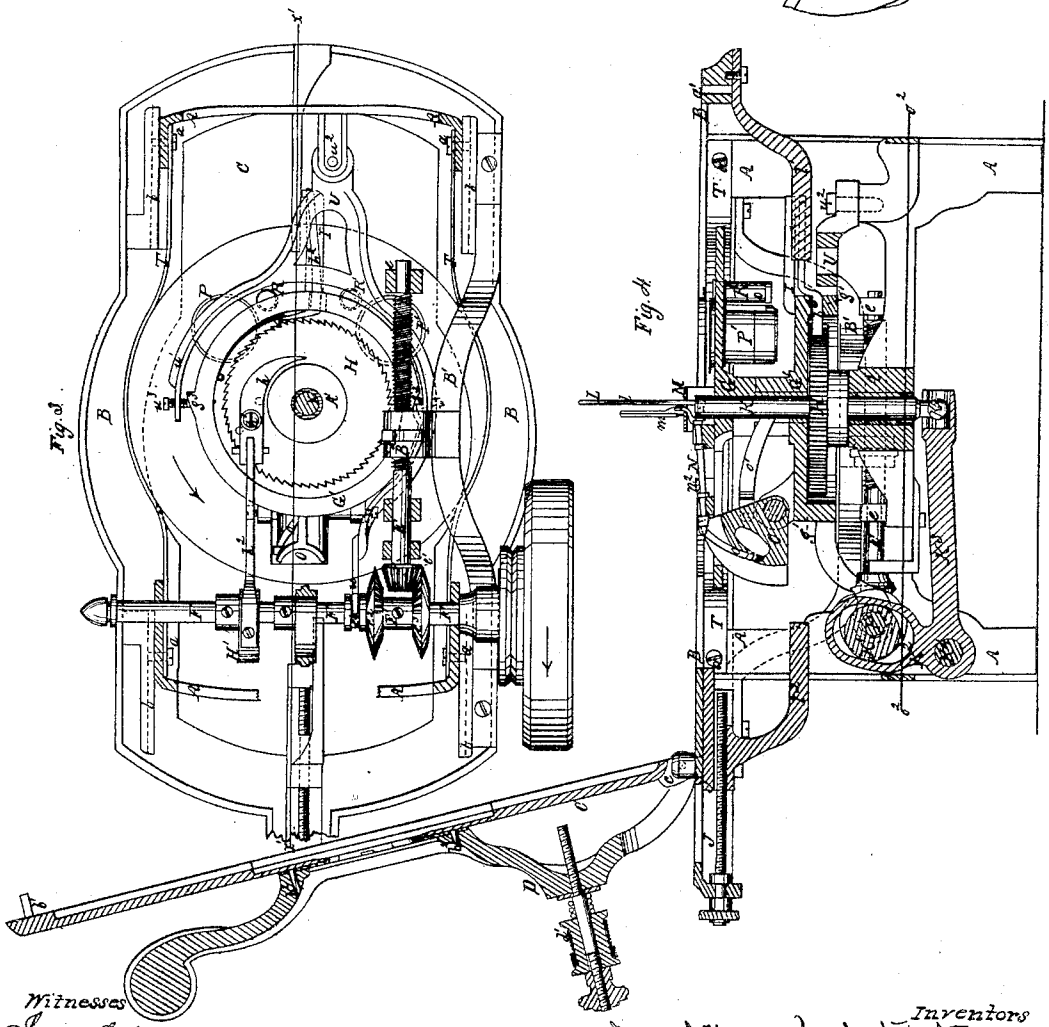
2 Sheets—Sheet 2.

J. A. & H. A. HOUSE.

SEWING MACHINE.

No. 36,932. Patented Nov. 11, 1862.





Witnesses
Jos. Johnson
J. Swaim Gill.

Inventors
James A. House
Henry A. House
by their Attorney
Wm. D. Bladin

UNITED STATES PATENT OFFICE.

JAMES A. HOUSE AND HENRY A. HOUSE, OF BROOKLYN, NEW YORK, ASSIGNORS TO THEMSELVES AND AUG. G. SEAMAN, OF SAME PLACE.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **36,932**, dated November 11, 1862.

To all whom it may concern:

Be it known that we, JAMES A. HOUSE and HENRY A. HOUSE, both of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents a view in perspective of a machine for working button-holes, embracing our improvement. Fig. 2 represents a similar view of a portion of the same, the bed-plate and pressing-lever being thrown back and the thimble which covers the needles removed, in order to show more clearly the arrangement of the stitching mechanism. Fig. 3 represents a plan or view of the bottom of the machine inverted, a portion of the frame being broken away at the line o^2 o^2 of Fig. 4, to show the mechanism more clearly. Fig. 4 represents a vertical longitudinal section through the same at the line x' x' of Fig. 3. The two latter figures are on a larger scale than the others. Fig. 5 represents a view in perspective of the curved finger or looper which carries the lower thread, and of the cam which operates it detached from the rest of the mechanism. Fig. 6 represents a vertical axial section through one of the spool-carriers at the line z' z' of Fig. 7. Fig. 7 represents a horizontal transverse section through the same, looking upward at the line y^2 y^2, Fig. 6. Fig. 8 represents a view in perspective of the needle and finger, showing their relative position at the commencement of the operation of forming a stitch. Fig. 9 represents a similar view of the same, showing their relative position at the moment when the vertical needle has pierced the cloth and is about to commence its upward movement. Fig. 10 represents a view in perspective of a piece of cloth with the stitches loosely formed therein, in order to show more clearly the method of forming the stitch; and Fig. 11 represents a view of a piece of cloth with a button-hole worked therein.

Our invention, though generally adaptable to most descriptions of sewing-machines, yet relates more especially to those machines which are employed in uniting or stitching together the edges of a fabric, and has for its object the production of a machine which shall be capable of working a button-hole or other similar article in a practically successful manner by automatic means, to which end our improvements consist, first, in forming a button-hole or overcast-stitch by means of an eye-pointed needle, which works up from below and pierces the fabric, in combination with a finger or thread carrier, also working up from below the fabric, substantially in the manner hereinafter described; secondly, in mounting the entire stitching mechanism upon a disk or independent frame, capable of being rotated automatically at proper intervals without interfering with the operation of stitching, in order to sew around curves, such as the eyes of button-holes; thirdly, in combining a bed-plate to which the fabric is attached, having a periodical intermittent progressive movement in a rectilinear path, with a disk (carrying the sewing mechanism) and having a periodical intermittent rotary motion, the co-operation being such that the respective movements alternately take place at proper intervals, but one is always at rest while the other is in motion, whereby both sides and the eye of a button-hole may be worked without stopping the machine; fourthly, in so combining the mechanism of a sewing-machine that the whole of the moving parts thereof shall be situated below the table or bed-plate upon which the material to be operated upon rests, whereby great facility is given to the operator in manipulating the work; fifthly, in the combination of an eye-pointed needle with a shank so bent or curved that the needle shall move parallel to the shank and carry its loop through the fabric while the shank vibrates near the edge thereof, whereby the needle can be driven from below and yet work over the edge of the cloth; sixthly, in a curved finger or thread-carrier mounted on an inclined axis underneath the bed-plate and working up through an opening in the same over the edge of the cloth, to take up or enter the loop of the needle-thread above the cloth; seventhly, in mounting the curved thread-carrier on the end of an inclined shaft, turning in open bearings and held down by a spring, whereby the carrier may readily be removed

to thread it; eighthly, in combining the cam which actuates the thread-carrier with the needle-mandrel in such manner that the thread-carrier shall derive its stitching movements from the needle-mandrel, while the latter is rotated on its axis by the cam; ninthly, in combining with a rotating disk carrying the stitching-mechanism a perforated plate upon which the fabric rests and through which the needles play, as hereinafter described; tenthly, in combining a tension-post with the perforated stitching-plate, through which the needle and looper play, in such manner as to prevent the needle-thread from being caught by the looper as they pass each other; eleventhly, in combining one or more spool-carriers with a rotating and traversing disk carrying the stitching mechanism in such manner that the spools always maintain their relative positions to each other and to the needle and thread-carrier; twelfthly, in a tension apparatus whereby we can make a pearl at any part of the button-hole desired; thirteenthly, in a mechanism for imparting to the bed-plate a periodical intermittent progressive movement for the purpose of feeding the fabric to the needles in a proper manner; fourteenthly, in combining a friction apparatus with the rotating disk which carries the sewing mechanism, in order to control its rotating movements more perfectly; fifteenthly, in combining a fixed and an adjustable guide upon the sliding frame to regulate with precision the turning movement of the disk to work the eye of a button-hole; sixteenthly, in combining with suitable guides upon the sliding frame a detent on the rotating disk for the purpose of throwing the disk into or out of gear with the mechanism which turns it; seventeenthly, in combining with the rotating disk an automatic shifting-lever to stop or reverse the feed motion at the proper moment when working the button-hole; eighteethly, in a combination of mechanism for imparting an intermittent rotary motion to the disk when serving round the eye of the button-hole; nineteenthly, in combining a pin or stop on the rotating disk with a groove on the bed-plate, (which has a slight lateral play in its bearings,) for the purpose of drawing in the fabric to the needle when working the eye of the button-hole; twentiethly, in forming the rotating disk in two sections capable of being readily connected or disconnected, one section carrying the stitching mechanism proper, the other the driving mechanism; twenty-firstly, in combining the tension-posts with the disk in such manner that they shall be carried underneath the same; twenty-secondly, in a thimble or device for protecting the needles for holding the down the cloth and for guiding a cord to be worked in while making the stitch.

In order to carry out the objects of our invention we construct a strong rigid frame to contain the mechanism. Upon this frame we mount a sliding frame which traverses back and forth in a rectilinear path, and carries a bed-plate or table upon which the material to be sown rests, as well as a presser-lever to hold the material down upon the bed-plate. The bed-plate and lever are both hinged to one end of the sliding frame, but independently of each other, in order that they may be removed to give access to the machinery. A hole is also made in the center of each, and through this opening the needles work.

A driving-shaft works in suitable bearings in the frame and actuates the driving mechanism. The bed-plate and movable frame derive their movements from this shaft. A bracket secured to the movable frame carries a nut traversing on a screw arranged horizontally and longitudinally beneath the table and turning in bearings in the frame. An intermittent rotating movement is periodically imparted to the screw by means of a bevel-pinion on one of its ends. This screw gears alternately and at intervals into two bevel-wheels, secured upon the same collar, (one upon each side of the pinion,) which collar slides freely endwise upon the driving-shaft. The bevel-wheels have teeth upon one half only of their faces and are at such a distance apart that either or both of them may be disengaged at once, so that the screw may turn in either direction, or be at rest, as required.

The jaws of one end of a curved and forked shifting-lever (pivoted at one end to the frame so as to turn freely in a horizontal direction) engage in a slot in the collar of the bevel half-gears and slide them to and fro at the proper moment in a manner hereinafter more fully described.

A bearing is formed in the center of the stand or frame, upon which a disk is supported and turned. This disk, for convenience of construction, we prefer to form in two sections, one resting upon the other, and both securely fastened together. The lower section of the disk carries the actuating mechanism, while the stitching mechanism proper is carried by the upper section. The center of this disk is hollow and forms a tube through which a needle bar, arm, or mandrel reciprocates in the direction of its length. The mandrel is driven by an eccentric and pitman from the driving-shaft. The disk turns freely in its bearings in a horizontal plane. It is actuated by a pusher driven by a swivel eccentric on the driving-shaft. The pusher is pivoted to a ratchet-wheel, which turns loosely upon the disk during the forward stroke of the pusher; but when the movement is reversed a spring-pawl upon the disk engages the teeth of the ratchet, thus causing the disk to rotate. The spring-pawl is held out of contact with the ratchet when the sliding frame is moving by means of a guide-bar upon the frame; but as soon as the pawl slips past the end of the bar the disk begins to rotate. One of these guide-bars is placed at each end of the sliding frame. One is fixed, but the other is rendered adjustable, in order to vary the size of the hole worked. A scale is marked upon the sliding table, and

an index attached to the movable guide-bar serves accurately to measure the hole to be worked.

The vibrating needle-arm, which plays through the center of the rotating disk, has on its upper end a needle carrier or shank, bent into a U shape, so that when a needle is inserted into the shank it shall be parallel to its stem. This needle plays through a perforation in a stitching-plate and through the opening in the bed-plate and presser-foot hereinbefore mentioned. A perforated tension-post is also secured upon this stitching-plate to prevent the kinking of the needle-thread and its entanglement with the lower-thread carrier.

A curved finger or thread-carrier is secured on the end of an inclined shaft, which rocks in open bearings on the rotary disk. This shaft is held in place by a plate-spring, and may readily be removed in order to insert a thread into the eyes of the carrier. The shaft is rocked by means of a bent arm, which plays in a groove on a sector-shaped cam pivoted upon the disk. This cam derives its movements from the needle-mandrel, with which it is connected by means of a link. The needle-arm is connected with its pitman by a swiveling-joint, so that it may turn freely on its axis. The arrangement is such that while the finger or thread-carrier derives its rocking movement from the needle-mandrel the latter derives its turning movement from the carrier, so that their relative position remains unchanged at all times.

Spool-cases are inserted into holes in the disk and held in place by springs. The cases are cup shaped, and have stems in their bottoms upon which an ordinary spool may be placed.

Suitable tension apparatus are also mounted upon the disk.

The accompanying drawings represent a convenient arrangement of parts for carrying out the object of our invention. In this instance the mechanism is shown as supported by and inclosed in a strong frame, A, of cast-iron. A sliding frame or table, B, rests upon this frame, and is provided with grooves *b* upon its under side, which traverse on pins *a*, projecting from the upper part of the main frame A, as shown in Fig. 3, thus enabling the sliding frame to traverse horizontally and longitudinally upon its supports.

A bed plate, C, is pivoted to one end of the sliding frame in such manner as to allow it a slight degree of lateral play on its hinges *c*. A pin, *b'*, upon the plate fits into a hole, *a'*, upon the sliding frame, and thus holds it steadily when lowered upon the sliding frame.

A curved and slotted arm-lever or presser-foot, D, is hinged to the sliding frame at the same point as the bed-plate and in like manner, by which means they can be raised from the bed-plate either both together or separately, as desired. A slot or opening, C', shaped like a key-hole or a button-hole, is made in the center of the plate and presser-foot, through which opening the needle *l* and finger *n* play. The material to be sewed is clamped between the bed-plate and presser-foot, which are held in a fixed position relatively to each other by means of pins b^2 on the plate, which fit into holes in the under side of the presser-foot.

A bracket, B', extends down from one side of the sliding frame B, and has secured upon it a nut, B^2, provided with a female screw. This nut works upon a male screw, E, turning in bearings *e* upon the main frame, by which means the sliding frame B is traversed.

A horizontal driving-shaft, F, is mounted upon suitable bearings upon one end of the main frame, beneath the table. A sleeve, E', is mounted upon the shaft near one end thereof, in such manner as to turn with the shaft, and yet be capable of sliding freely thereon in the direction of its length. This sleeve carries two bevel-wheels, e^2 e^3, facing each other, fixed at an invariable distance apart, and having teeth on one half of their peripheries only. A bevel-pinion, *e'*, is mounted upon one end of the rotating screw E. The bevel half-gears e^2 e^3 revolve one on each side of the pinion *e'*, and their relative position is such that either may be in gear with the pinion, (but not both at once,) or both may be disengaged from it at the same time, when, of course, the screw and sliding table would be at rest. By this means an intermittent progressive movement, either backward or forward, may be imparted to the sliding table B.

The engagement and disengagement of the half-gears and pinion is effected automatically in a manner hereinafter more fully described. The details of this arrangement are clearly shown in Figs. 3 and 4 of the drawings.

In the center of the frame a hollow pillow or bearing-cylinder, A', is erected, and forms the main bearing for the sewing mechanism proper. This mechanism is contained within a frame, which, for convenience of construction and other reasons, we prefer to make in the form of two disks, G G', arranged horizontally one above the other, with an interval between them, but securely constructed and rotating upon the main bearing A'. Both of the disks are perforated vertically, so as to leave an opening through which a needle-mandrel K plays. The lower disk, G', has a downward-projecting rim or flange, *g'*, which incloses a ratchet-wheel, H, turning freely upon the main bearing and independently of the disk. An alternate vibratory movement around its axis is imparted to this ratchet-wheel by means of a flat curved bar or hand, *h*, pivoted to its under side by a screw, *h'*. A swiveling eccentric, H', on the driving-shaft F imparts a reciprocating motion to the hand *h* by means of the pitman h^2, pivoted at one end to the eccentric, and at the other to the hand, as shown in Fig. 3. The length of the stroke of the ratchet-wheel may be varied by inserting the pivot *h'* into one of a series of holes in the ratchet-plate at varying distances from the center, or in some other suitable manner well known to mechanics. A horizontal arm or bar, I, is rigidly secured to

the lower disk, G′. A spring-pawl, h^3, is pivoted to the under side of this disk and lies below and parallel to the stop-bar I.

Upon each end of the sliding frame B is a curved bracket or guide-bar $I' I^2$. One of these bars is rigidly secured to the frame; but the other slides in a horizontal groove under the sliding frame. The arrangement is such that when the outer end of the spring-pawl bears against either one of the guide-bars it is held out of contact with the ratchet which then plays freely back and forth without turning the disk; but as soon as the end of the spring-pawl escapes from the guide-bar its other end engages the teeth of the ratchet-wheel and causes the disk to turn with an intermittent rotating movement.

The movable guide I^2 is adjusted by a set-screw, J, on the end of the sliding frame. A scale is marked upon a projection, J′, at one end of the frame, and the distance which the guide moves is accurately measured by means of an index, J, which projects through a slot in the table. The size to which the button-holes are to be worked can thus be accurately adjusted.

The needle-mandrel K is driven by means of an eccentric, K′, on the driving-shaft, revolving in a yoke, K^2, on an elbow-lever or pitman, K^3, turning on a pivot, K^4, on the frame. The connection between the pitman and mandrel is formed by means of a swiveling ball-and-socket joint, K^5, which permits the needle to rotate freely on its axis without impeding its longitudinal vibrations.

A needle-bar, L, is mounted upon the upper end of the mandrel. This bar is vertical, and bent over in an arched form at the top, so that the two parts shall be parallel. An eye is formed near its point, through which a thread may be passed. The needle-bar can readily be removed from or adjusted in the mandrel when required.

A straight needle, *l*, with three eyes near its point, is inserted into the end of the needle-bar in such manner that it may readily be removed or replaced at any time. The needle-bar plays through an opening in a stitching-plate, M, secured to and projecting above the face of the upper disk, G. A tension-post, *m*, extends upward from this plate parallel to the needle-bar, and is provided with a series of holes to regulate the tension of the needle-thread.

The needle and tension-post may be protected by means of a tube or thimble, M′, which may also serve to hold down the edge of the cloth and to guide a cord to be covered by the stitching.

A curved finger or thread-carrier, *n*, having an eye near its point and another near its heel, is secured to the end of a slightly-inclined shaft, N, turning in suitable bearings on the disk G. This shaft has a rocking movement imparted to it by means of a bent arm, *n′*, on its hinder end, which arm works in a slot, *o*, on a quadrant-shaped cam O, pivoted to the lower disk, G.′ This cam is connected with the needle-arm K by a link, *o′*, and is operated by it. The bearings of the rock-shaft N are so constructed that it can be lifted out of place at any time. It is held in place when at work by a spring, n^2, pivoted on the disk G and turning freely in a horizontal direction.

The spools are carried in spool-cases P P′, which fit into holes in the disk G, and are held in place by springs *p*, which encircle the cases. The spools turn on rods *p′* in the cases, which have slots in them, through which the thread passes. Tension-rods R R′ are also secured to the under side of this disk, and have holes in them, through which the threads are passed. A retaining-spring, S, is also placed upon the disk. This spring has a slot, *s*, in one end, in which a set-screw, *s′*, works. By this means the spring can be moved either longitudinally or laterally in a horizontal plane.

The disk is compressed between plate-springs T, the ends of which are secured to the frame A, and in this instance the screws *a*, which secure the plate springs T to the frame, also form the pins on which the frame B slides.

The sliding frame, as before remarked, is traversed backward and forward by means of two bevel half-gears, e^2 e^3, which act alternately upon the bevel-pinion *e′* on the end of the screw, and are alternately thrown into or out of gear in the following manner: The collar E′ slides freely on the driving-shaft F, and is actuated by one arm, *u*, of a forked lever, U, which enters a groove, e^4, on it. This lever is curved, so as partially to encircle the wheel G′, and extends entirely across the machine and turns upon a pivot, u^2, on the frame. The other arm, *u′*, of this lever is also curved and partly encircles the disk G′. A screw, u^3, is inserted into the end of this arm. Upon the opposite arm a projection, u^4, is also made.

Upon one side of the disk is a cam-plane, g^3, corresponding with the set-screw u^3 on the short arm *u′*, while on the opposite side is a corresponding notch, g^2. When the disk is rotated the cam-plane strikes against the screw u^3, and slides the gears endwise on the shaft, throwing one into the other out of gear, or holding both out of gear at once.

The operation of the machine is as follows: The parts are supposed to be in the attitude shown in Fig. 1 of the drawings—that is, just beginning to operate on the straight side of the button-hole. A button-hole having been cut in the cloth it is placed over the key-hole C′ upon the bed-plate C, and clamped between it and the presser-foot D. The needle *l* and finger *n* having been properly threaded and the tensions adjusted, the machine is ready for operation. The finger-thread is carried by the spool P. It passes through a slot in the spool and through a hole in the bottom of the tension-rod R′, entering it in the center in order to permit the rod to be turned without entangling the thread. It then passes partially around the rod and through an opening, *r*, in the disk G, and through the tension-spring S. Thence

it passes through the eye in the heel of the bent finger, and along the inside of the finger to its point, and through the eye in the point to the other side again. The needle-thread passes from the spool P′ around another tension-rod, R, in a manner similar to that of the other thread, then through the opening in the disk, and through the eyes of the thread-retainer *m*. Thence through the eye of the shank to the side on which the finger comes on its upstroke, and down through the upper eye of the needle to the other eye, thence to the second eye, and back again through the third and lowest eye. By this mode of threading the needle and finger are prevented from catching in each other's threads as they pass. If it is desired to lay in a cord with the stitching, one can be brought down from the spool *d*′ on the presser-lever.

The needle may be covered by a tube or thimble, M′, which prevents anything from catching in it, and also serves both as an additional means of holding the cloth down upon the stitching-plate and as a guide for the cord. The finger *n* can readily be removed in order to thread it.

Rotary motion may be imparted to the driving-shaft F in any suitable manner. As the shaft revolves the eccentric K′ acts upon its yoke K², and vibrates the needle-arm K through the pitman K³ and rock-shaft K⁴. A semi-rotative or rocking movement is imparted to the finger *n* by means of its bent arm *n*′ playing in the slot *o* in the vibrating cam O, which is connected to and operated simultaneously with the needle-arm K by the link *o*′.

The stitch is formed in the following manner: As the straight needle descends it passes through a loop of the finger-thread and then through the cloth, the loop of finger-thread being tightened at the same time by the backward and downward movement of the finger. After passing through the cloth the needle descends on the inner side of the finger (which is all the time retreating) until its point is about one-fourth of an inch below the point of the finger to allow sufficient loopage. It then begins to ascend, the loop opening as it rises, and the finger passes through the loop thus formed, and up through the slit and over the edge of the fabric. When the movement is reversed the needle again passes through the finger-thread, which is again drawn tight.

Owing to the inclination of the shaft N, and the relative positions of the needle and finger, their threads are alternately thrown partially around each other, thus producing an interlocked stitch. This is clearly shown in Figs. 8 and 9 of the drawings, the former representing the relative position of the needle and finger at the beginning of their stroke, and the latter their position at the termination of the downward stroke of the needle. Fig. 10 shows a loose stitch exhibiting its formation more clearly; and Fig. 11 a button hole completed. In all the figures the blue lines represent the needle-thread, and the red lines the finger-thread.

The rectilinear traversing movement is imparted to the bed-plate C and movable frame B in the following manner: The relative arrangement of the cam-plane g^3 on the disk G′, and the pin w^3 on the forked lever U is such that the half bevel-gear e^3 is held in contact with the pinion e' on the end of the screw E which moves the frame, thus giving it an intermittent rectilinear forward movement. The turning movement of the sewing apparatus is effected by means of the pusher h^2. This pusher is operated by the swivel eccentric H′ on the driving-shaft, and acts upon a hand, *h*, pivoted to the under side of the ratchet-wheel. The ratchet-wheel turns on the forward stroke of the pusher, and when its movement is reversed the spring-pawl h^3 engages the teeth of the ratchet-wheel and turns the disk around. A series of holes are cut in the ratchet-wheel at varying distances from the center, into which holes the pivot of the hand *h* screws, in order to vary the distance through which the disk is turned at each stroke of the pusher. When a half-revolution of the disk has been effected, the stop-lever I strikes one of the guide-bars I′ I² and releases the pawl from the ratchet-wheel. At the same moment the cam-plane g^3 strikes the forked lever U and throws the other bevel half-gear e^2 into play with the pinion e' on the screw E, thus reversing the movement of the bed-plate and causing the needle to traverse down the other side of the button-hole. The length of the stitch may be adjusted by using traversing-screws of different pitches. It will be observed that by arranging the stitching mechanism entirely below the table, the surface of the table is left unobstructed, whereby the handling and turning of the work is greatly facilitated. Moreover, the operator has at all times an unobstructed view of the work, and can thus instantly detect any imperfection or incorrectness in the stitching.

In Fig. 2 of the drawings a device is shown for causing the eye of the button-hole to be properly drawn to the needle; but experience has demonstrated that the work can generally be successfully done without the use of this apparatus.

Upon the under side of the bed-plate C is a a groove, V, the curve of which is slightly eccentric to the center of the eye-hole C′ in the bed-plate. Upon the disk G is an adjustable pin, *v*′, which is held in the slot *v* by means of a set-screw. In Fig. 2 the disk is represented as turned somewhat out of its true position, which is such that when the needle begins to work the eye of the button-hole the pin *v*′ should enter the groove V, so as to draw the edge of the plate closer to the needle.

On the end of the sliding frame is a bracket, W, through which a pin, *w*, passes. This pin is upheld by a curved spring, X, on the frame, and on the other side of the bracket is another spring, Y. When the machine is working the

straight side of a button-hole the pin *w* fits into a depression, W′, in the plate C and prevents it from moving about on the sliding frame; but just before the disk G begins to turn its edge impinges upon the spring Y and draws down the pin *w*, thus leaving the bed-plate free to play laterally on its hinges. When the disk has completed its turning movement the spring Y rises up through a notch, *y*′, in the edge of the disk and prevents it from turning any farther, and the pin *w* locks the bed-plate at the same moment.

The spring X can be thrown out of play by turning it horizontally on its pivot, and if the pin *v*′ be removed the device above described will cease to operate, except that the pin W will still hold the plate steadily.

It is obvious that the details of the construction of our machine might be modified in various ways without departing from the spirit of our invention, which modifications would readily suggest themselves to a skillful mechanic after reading our specification. For example, the sliding frame B might be made stationary and the gearing frame be caused to traverse without varying the result, as an inspection of our drawings will clearly show.

We have described our machine as adapted to working button-holes; but it is manifestly adaptable to various other descriptions of work.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of an eye-pointed needle working up from below the table and penetrating the fabric with a thread-carrier also working up from below and penetrating the fabric, substantially in the manner described, for the purpose set forth.

2. Mounting the entire stitching mechanism upon an independent skeleton frame or disk having a periodical intermittent rotary movement imparted to it, substantially in the manner described, for the purpose set forth.

3. The combination of a bed-plate (upon which the material to be sewed is clamped) having a periodical intermittent progressive motion in a rectilinear path, and in alternately-opposite directions, with an independent disk or frame carrying the stitching mechanism and having an occasional intermittent rotating movement in one direction, when co-operating, substantially in the manner described, for the purpose of working automatically both sides and the eye of a button-hole, as herein set forth.

4. The combination of a stitching mechanism, substantially such as described, with a bed-plate or table upon which the fabric rests in such manner that the whole of the entire mechanism shall be beneath the bed-plate, as herein described.

5. The combination of an eye-pointed needle with a shank so curved or bent that the needle shall move parallel to the shank and carry its loop through the fabric while the shank vibrates near the edge thereof, substantially in the manner described, for the purpose of sewing over the edge of a fabric, as herein set forth.

6. The curved finger or thread carrier *n*, when arranged and operating substantially as and for the purpose specified.

7. The combination of the inclined shaft N of the thread-carrier, when made to rest in open bearings, with a retaining-spring, n^2, substantially as described, for the purpose set forth.

8. The combination of the cam O, inclined shaft *n*, and needle-mandrel K, when co-operating substantially in the manner and for the purpose described.

9. The combination of the rotating disk G and stitching-plate M, as and for the purpose described.

10. The combination of the stitching-plate M and tension-post *m*, substantially as and for the purpose described.

11. The combination of the spool-cases P P′, disk G, needle *l*, and thread-carrier *n*, when arranged and operating substantially in the manner described.

12. The combination of the spool-case P, tension-post R′, adjusting-spring S, and thread-carrier *n*, substantially as described, for the purpose of regulating the position of the pearl, as set forth.

13. The combination of the sliding frame B and traversing-screw E, substantially in the manner and for the purpose set forth.

14. The combination of the rotating disk G with the friction-springs T, substantially as and for the purpose described.

15. The combination of the adjustable guide-bar I' and fixed bar I^2 with the sliding frame B, substantially in the manner and for the purpose described.

16. The combination of the guide-bars I' I^2 with the stop-lever I and spring-pawl h^3, substantially in the manner and for the purpose described.

17. The combination of the shifting-lever U with the rotating disk G′, substantially in the manner and for the purpose described.

18. The combination of the pusher *h*, ratchet-wheel H, and spring-pawl h^3, substantially in the manner and for the purpose described.

19. The combination of the groove V on the bed-plate with the stop-pin *v*′ on the disk, substantially as and for the purpose set forth.

20. The combination of the two sections G G′ of the disk, when connected and co-operating substantially in the manner and for the purposes described.

21. The combination of the tension-posts R R′ with the disk G, when arranged beneath the same, as and for the purpose described.

22. The shield or thimble M′, to protect the needle, to bear upon the fabric, and to retain the gimp in position, substantially in the manner described.

In testimony whereof we have hereunto subscribed our names.

JAMES A. HOUSE.
HENRY A. HOUSE.

Witnesses:
E. N. HOUSE,
F. HEARSON.