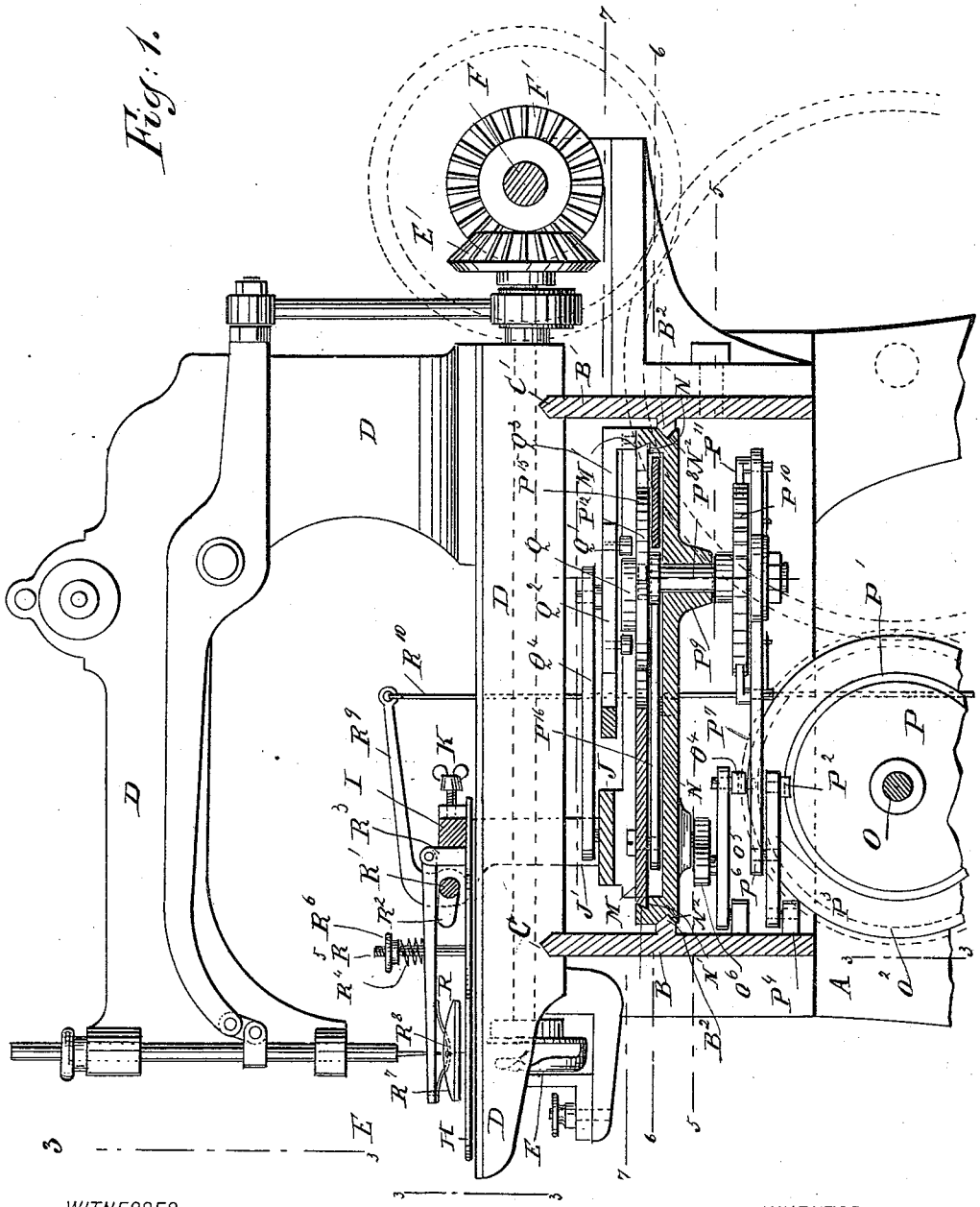
(No Model.) 4 Sheets—Sheet 1.

T. E. COLBY.

BUTTON HOLE SEWING MACHINE.

No. 441,058. Patented Nov. 18, 1890.

Fig. 1.



WITNESSES:
Henry Meininger
J. Culbert Peters

INVENTOR:
Thomas E. Colby
BY
Clarence A. Seward
ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 2.

T. E. COLBY.

BUTTON HOLE SEWING MACHINE.

No. 441,058. Patented Nov. 18, 1890.

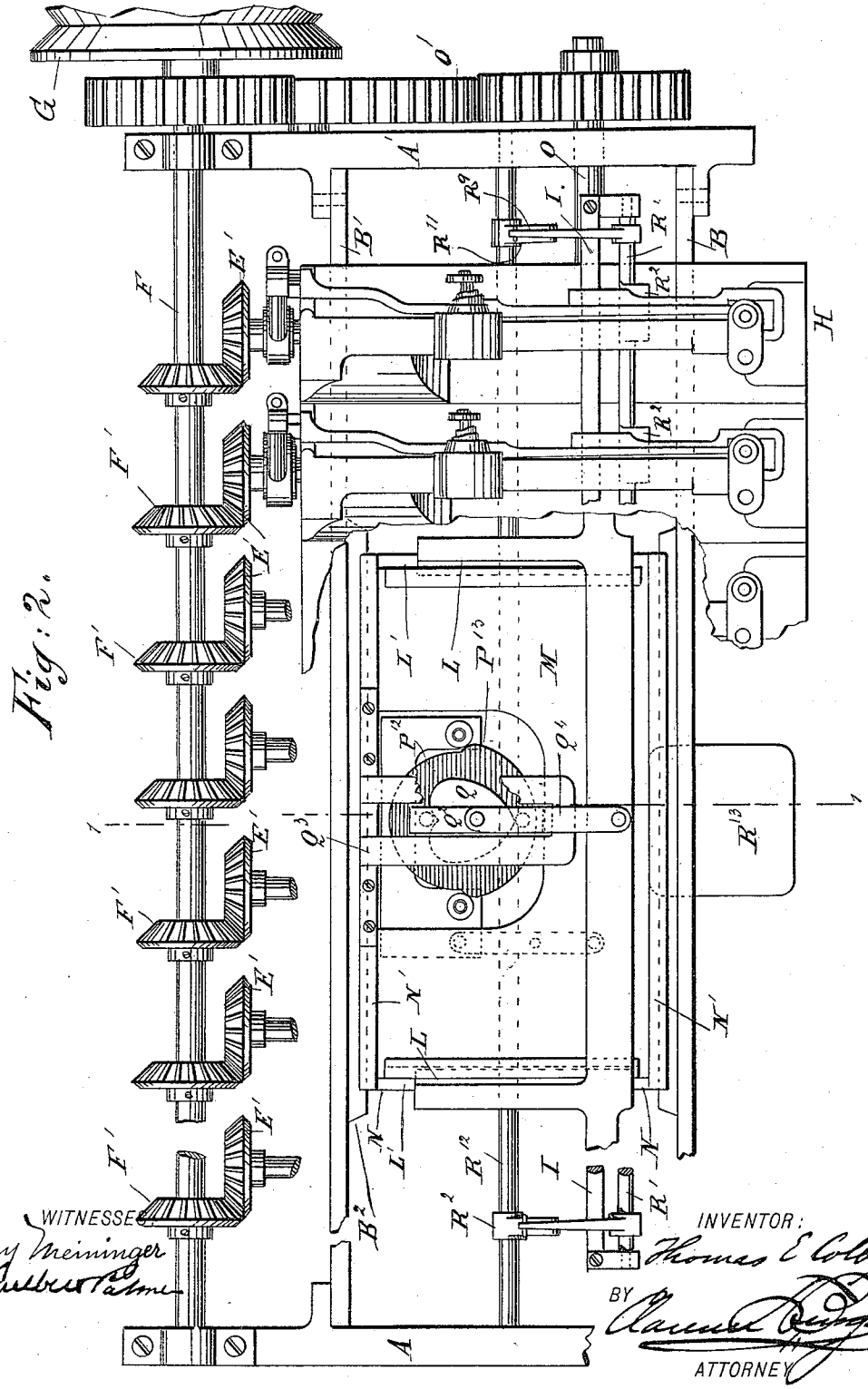


Fig. 2.

WITNESSES:
Henry Meininger
J. Culbert Palmer

INVENTOR:
Thomas E. Colby
BY Samuel Duncan
ATTORNEY

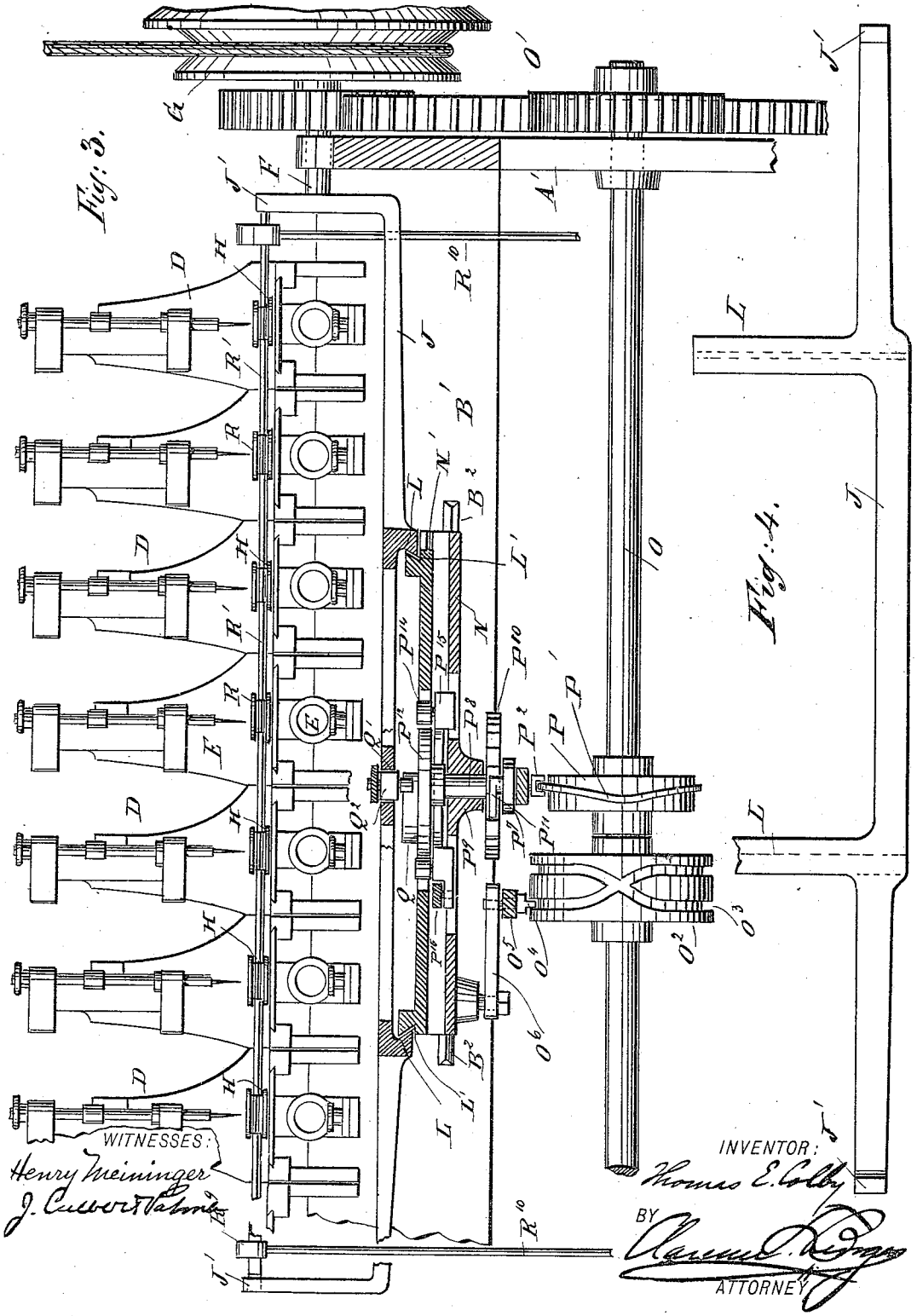
THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 3.

T. E. COLBY.

BUTTON HOLE SEWING MACHINE.

No. 441,058. Patented Nov. 18, 1890.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

T. E. COLBY.

BUTTON HOLE SEWING MACHINE.

No. 441,058. Patented Nov. 18, 1890.

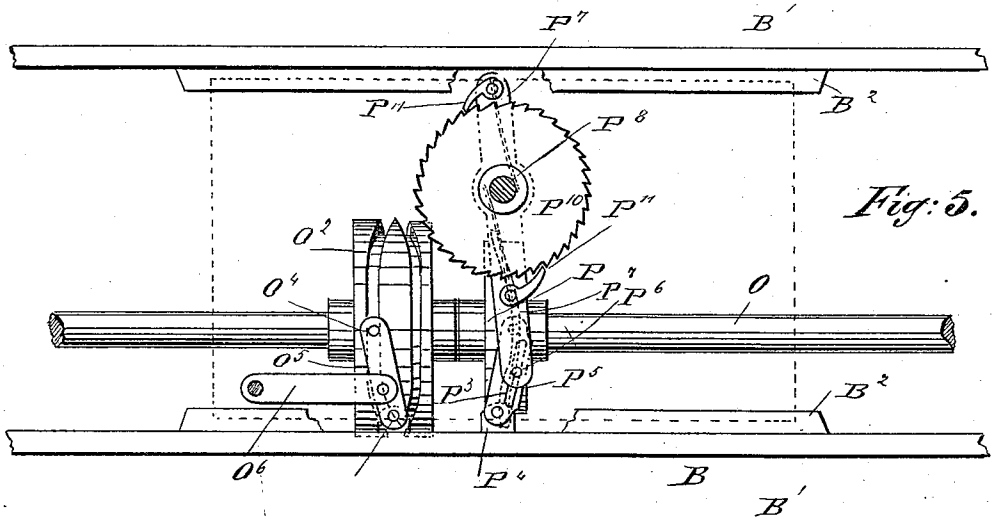


Fig: 5.

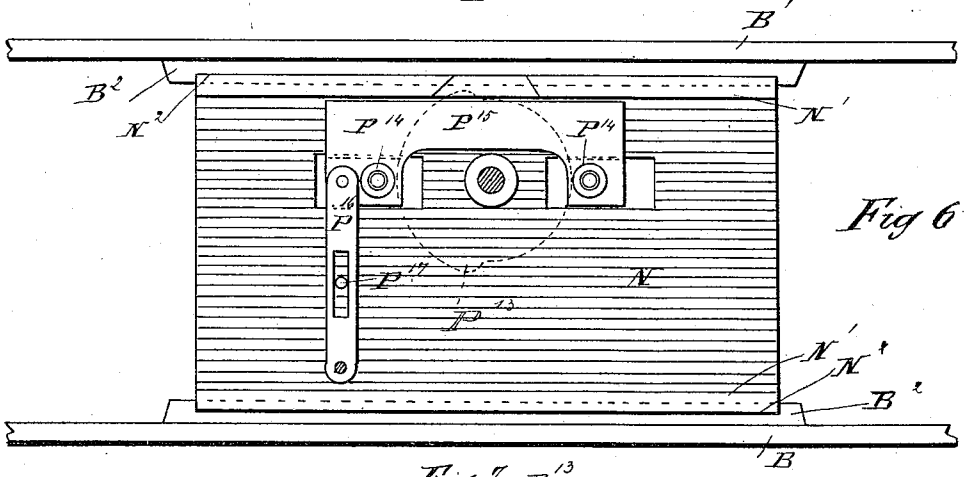


Fig 6

Fig: 7.

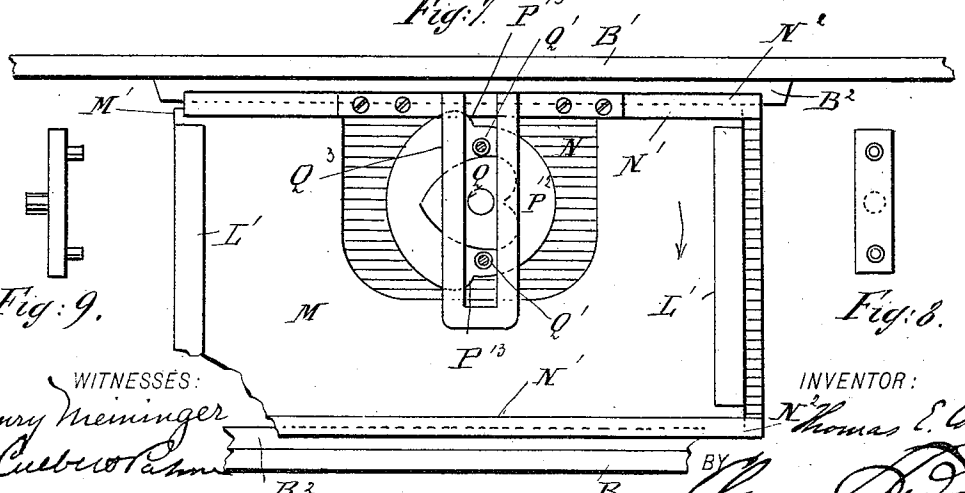


Fig: 9.

Fig: 8.

WITNESSES:
Henry Meininger
J. Cuebrio Paine

INVENTOR:
Thomas E. Colby
BY Clarence Cowles
ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

THOMAS E. COLBY, OF BROOKLYN, NEW YORK, ASSIGNOR TO J. COLBY & CO., OF SAME PLACE.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 441,058, dated November 18, 1890.

Application filed January 30, 1890. Serial No. 338,585. (No model.)

To all whom it may concern:

Be it known that I, THOMAS E. COLBY, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Button-Hole Sewing-Machines, of which the following is a specification.

This invention relates to button-hole sewing-machines in which the work is fed beneath the needle, so as to stitch the button-hole automatically, which is then cut either automatically or by hand.

The object of my invention is to conveniently provide for stitching a plurality of button-holes simultaneously at any desired or an equal distance apart in work requiring such a plurality of button-holes—as trouser-waistbands—by a machine in charge of only a single operator.

My invention by which I attain this end comprises various novel features, as hereinafter pointed out in the claims.

In order that my invention may be fully understood, I shall first describe in detail the mode in which I at present prefer to carry the invention into effect, and then particularly point out its various features in claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a cross-sectional elevation of a multiple button-hole sewing-machine embodying my invention on the line 1 1, Fig. 2, some parts not essential to the invention not being shown. Fig. 2 is a plan view of the said machine, some parts also not being shown and others broken away. Fig. 3 is a partial front elevation of the same, partly in section, on the line 3 3, Fig. 1. Fig. 4 is a plan view of the lower part of the work-clamp carriage of the same. Fig. 5 is a sectional plan view of the machine on the line 5 5, Fig. 1, illustrating part of the clamp-carriage-operating mechanism. Fig. 6 is a similar view on the line 6 6, Fig. 1, illustrating another part of the clamp-carriage-operating mechanism. Fig. 7 is a similar view on the line 7 7, Fig. 2, illustrating still another part of the clamp-carriage-operating mechanism. Figs. 8 and 9 are detail views of a part hereinafter referred to.

Like letters of reference designate corresponding parts in the various figures.

The supporting frame-work of the machine thus illustrated is constructed of end standards A A′, rigidly braced and connected by longitudinal members B B′, which are provided with parallel top guideways C C′, on which the several frames D of a plurality of independent stitching mechanisms E, which may be of any approved construction, as that indicated, are mounted to slide, so as to be adjustable relatively to each other for varying the distance between the several button-holes to be formed in the work.

The several stitching mechanisms E are arranged to be driven simultaneously and in unison by a longitudinal drive-shaft F, mounted to revolve in the end standards A A′ and carrying bevel-gears F′, which engage the usual bevel-gears E′ of the several stitching mechanisms E, and the gears F′ are also adjustable on the drive-shaft F for maintaining their engagement with the gears E′ when the stitching mechanisms are adjusted as and for the purpose above stated.

The drive-shaft F is provided, as usual, with a drive-pulley G, and may be started or stopped at will by means of the ordinary cone friction-gear, as desired.

The work-clamps H belonging to the several stitching mechanisms are adapted to hold and feed the work to the latter in the usual manner, so as to automatically stitch the button-holes, and in order that they may be operated simultaneously and in unison for simultaneously stitching the several button-holes in the work are severally attached at their rear ends to a single longitudinal square-sectioned bar I, which is rigidly secured at its ends to the upturned arms J′ of a U-shaped piece J, forming with the bar I a carriage which, when given the feeding motion common to button-hole machines, compels the several work-clamps H to take simultaneously and in unison a like feeding motion.

The several work-clamps H are socketed to the bar I, so as to be adjustable thereon rela-

tively to each other in varying the spacing of the button-holes, as before stated, and are provided, respectively, with binding-screws K, Fig. 1, for locking them to the bar I after proper adjustment thereon.

The clamp-carriage I J is provided on its under side with transverse guideways L, equally distant from its middle, which work on corresponding guideways L′ on a slide M, whereby the carriage, and hence the work-clamps H, are guided in the usual backward-and-forward motion imparted, as hereinafter described, lengthwise of the button-holes for forming the parallel lines of stitching at the sides of the same.

The slide M is provided on its front and back edges with longitudinal guideways M′, which work on corresponding guideways N′, formed on another slide N, whereby the slide M is guided in the usual movement, produced as hereinafter described, transverse to the button-holes, carrying with it the clamp-carriage I J and work-clamps H, by which movement the work is automatically shifted laterally as the lines of stitching on one side of the several button-holes are simultaneously completed, so that as the motion of the work-clamps lengthwise of the button-holes is reversed the lines of stitching on the other sides thereof will be formed. The slide N is likewise formed with front and back longitudinal guideways N^2, which work on corresponding fixed guideways B^2, formed on the longitudinal members B B′ of the frame-work of the machine, so as to guide the slide N, which is, as hereinafter described, given the usual short but rapid reciprocatory motion transverse to the button-holes, carrying with it the clamp-carriage and clamps, so as to form the individual parts of the lines of stitches on the sides of the button-holes. To impart this latter continuous reciprocatory motion to the slide N, and hence to the carriage I J and work-clamps, I mount a shaft O lengthwise in the frame-work of the machine and connect it with the drive-shaft F by multiplying gearing O′, so as to give the shaft O a rapid rotary motion. On the shaft O, I fix a cam-wheel O^2, having a peripheral return double groove O^3, in which is arranged to travel a rider O^4 on a lever O^5, which is pivoted to the frame-work, and is connected medially to the slide N by a pivotal link O^6, the adjustment and arrangement being such that as the cam-wheel O^2 revolves the slide N, and hence the clamp-carriage and clamps H, will be given the required rapid reciprocatory motion transverse to the button-holes.

To obtain the lateral shifting motion of the slide M, and hence of the work-clamps H as the ends of the lines of stitches at the sides of the button-holes are reached in turn, I fix another wheel P, having a cam-rib P′, on the shaft O, and mount on the cam-rib P′ a rider P^2, pivoted to one end of a lever P^3, which is pivoted at its other end to a fixed support P^4 on the frame-work of the machine, and is provided with a longitudinal slot P^5, in which rides and turns a pin P^6, fixed to the end of a pawl-carrying lever P^7. The said lever P^7 is fulcrumed medially and loosely on a short vertical shaft P^8, which is mounted to turn, and is held by collars in a bearing P^9 on the slide N, and on the lower part of the vertical shaft P^8 is fixed a ratchet-wheel P^{10}, which is alternately engaged on opposite sides by the spring-pressed pawls P^{11} on the opposite ends of the lever P^7 in such a manner that as the shaft O rapidly revolves, as before described, the cam-rib P′ on the wheel P will cause the lever P^3 to swing back and forth laterally on its fixed support P^4, and hence, by the pin-and-slot connection described, the pawl-carrying lever P^7 to slowly revolve the ratchet-wheel P^{10} and shaft P^8 continuously in one direction. On the upper end of the shaft P^8 is fixed a cam P^{12}, having opposite cam-shoulders P^{13}, which revolve between and alternately engage, as best shown in Fig. 6, stud-rollers P^{14}, mounted on a small follower P^{15}, which works loosely on the upper face of the slide N, and to the follower P^{15} is pivoted one end of a lever P^{16}, Fig. 6, which is pivoted medially by a pin-and-slot connection P^{17} to the slide N and at its other end to the upper slide M, which, with the clamp-carriage and work-clamps, is thereby shifted laterally and alternately in opposite directions as the shoulders of the cam P^{12} alternately engage the stud-rollers P^{14} on the small follower P^{15}.

The described motion of the clamp-carriage I J and clamps H lengthwise of the button-holes is here obtained by fixing a heart-cam Q to the upper end of the short vertical shaft P^8 above the cam P^{12} between two stud-rollers Q′, carried by a follower cross-head Q^2, which is mounted to slide transversely of the slide M, and hence in the direction of the lengths of the button-holes, in a slotted guide Q^3, fixed to the slide M, and the cross-head Q^2 is connected by a link Q^4 with the middle part of the clamp-carriage I J, so that as the heart-cam Q slowly revolves the clamp-carriage will by the said link-and-cross-head connection be moved alternately backward and forward, as required.

The relative adjustment and arrangement of the mechanism for imparting the gradual motion of the clamp-carriage lengthwise of the button-hole, the intermittent lateral shifting motion, and the continuous rapid lateral motion, are such that lines of stitches are first formed simultaneously on one side of the button-holes, the work then shifted so as to start the lines of stitches on the opposite sides of the button-holes, and the work then returned lengthwise of the button-holes, so as to complete the said opposite lines of stitches, all automatically and simultaneously and substantially as on the single button-hole machines at present in use, with the great advantage that one operator can by this invention work any number of button-holes simultaneously. At the completion of the

button-holes the machine, and hence all the button-hole stitching mechanisms, may be stopped by the single operator by the clutch in the usual manner or automatically by any approved form of stop-motion, as desired.

For rasing all the presser-feet R simultaneously, in order to introduce the work at the beginning or to remove it when the button-holes are stitched, I mount a rock-shaft R′ at its ends in the upturned arms of the body J of the clamp-carriage in front of the clamp-carrying bar I, so that said rock-shaft will be carried with the clamp-carriage in its feeding motion. The rock-shaft is formed with cams R^2, respectively, beneath the arms of the several presser-feet R, which are pivoted to swing vertically to lugs R^3, carried by the respective work-clamps H above the same, and are normally pressed downward by springs R^4, coiled on screw-rods R^5, carried by the work-clamps and provided with tension-nuts R^6, the arrangement being such that when the rock-shaft R′ is rocked all the presser-feet R, the treads R^7 of which are connected to their arms by swivel spring-joints R^8, so as to give the treads always an even bearing on the work-clamps H, are simultaneously raised by the cams R^2 against the pressure of the springs R^4. The rock-shaft R′ is also provided at its ends with arms R^9, which are connected by flexible connections, as the chains R^{10}, to the arms R^{11} of a rock-shaft R^{12}, which is mounted longitudinally of and at the lower part of the frame-work of the machine, and is provided medially with a treadle R^{13} in reach of the single operator, by which the latter is enabled to work all the presser-feet, as described, irrespective of the motion or position of the presser-feet as they are carried or adjusted with the work-clamps, as before described.

I claim as my invention—

1. In a multiple button-hole sewing-machine, the combination, substantially as hereinbefore set forth, of a plurality of stitch-forming mechanisms arranged side by side, their work-clamps and driving-shafts, a carriage holding the several work-clamps, a button-hole-feed mechanism to operate the clamp-carriage, and a cam-shaft to drive the button-hole-feed mechanism extending transversely to the said driving-shafts.

2. In a multiple button-hole sewing-machine, the combination, substantially as hereinbefore set forth, of a plurality of stitch-forming mechanisms, their work-clamps, a button-hole-feed mechanism comprising a transversely-vibrating guide-plate, and a U-shaped carriage mounted to reciprocate longitudinally on said guide-plate and having a bar connecting its upright arms, on which bar the clamps are held.

3. In a multiple button-hole sewing-machine, the combination, substantially as hereinbefore set forth, of a plurality of stitch-forming mechanisms, means for adjusting the same laterally, their work-clamps, a button-hole-feed mechanism, and a carriage operated thereby having a transverse bar, on which the work-clamps are mounted to slide laterally for adjustment.

4. In a multiple button-hole sewing-machine, the combination, substantially as hereinbefore set forth, of a plurality of stitch-forming mechanisms, their work-clamps, a button-hole-feed mechanism, a U-shaped carriage operated by the same and having a bar connecting its upright arms, on which the several clamps are held, a rock-shaft mounted to turn in said upright arms and having a plurality of cam-arms adapted to engage the presser-feet of the respective work-clamps, and means for turning the rock-shaft.

5. In a button-hole sewing-machine, the combination, with a frame-work having guideways B^2 and a driving mechanism, of a slide N, having guideways N′ and working in the guideways B^2, mechanism whereby the slide N is reciprocated on the guideways B^2, a driven shaft O, a cam-wheel P, a cam-rider P^2, a cam P^{12}, mounted to revolve on the reciprocatory slide N, operating-connections between the cam-rider P^2 and the cam P^{12}, whereby the latter is revolved on the slide N while moving therewith, a slide M, working in the guideways N′ of the slide N, a cam-follower P^{15}, acted upon by the cam P^{12}, and operating-connections between the slide M and the cam-follower P^{15}, whereby the slide M is reciprocated in the guideways N′ of the slide N, and a clamp-carriage carried by the slide M in said movement, whereby the said clamp-carriage is given an intermittent shifting motion, substantially as set forth.

6. In a button-hole sewing-machine, the combination, with a frame-work having guideways B^2 and a driving mechanism, of a slide N, having guideways N′ and working on the guideways B^2, mechanism whereby the slide N is reciprocated thereon, a slide M, having guideways L′ and working on the guideways N′ of the slide N, and mechanism whereby the slide M is alternately shifted thereon, a clamp-carriage working on the guideways L′ of the slide M, a driven shaft O, a cam Q, mounted to turn on the slide N, operating-connections between the driven shaft O and said cam Q, whereby the latter is rotated, a cam-follower Q^2, and operating-connections between the said cam-follower Q^2 and the clamp-carriage, whereby the latter is reciprocated on the guideways L′ of the slide M, substantially as set forth.

THOMAS E. COLBY. [L. S.]

Witnesses:
CLARENCE L. BURGER,
J. CULBERT PALMER.