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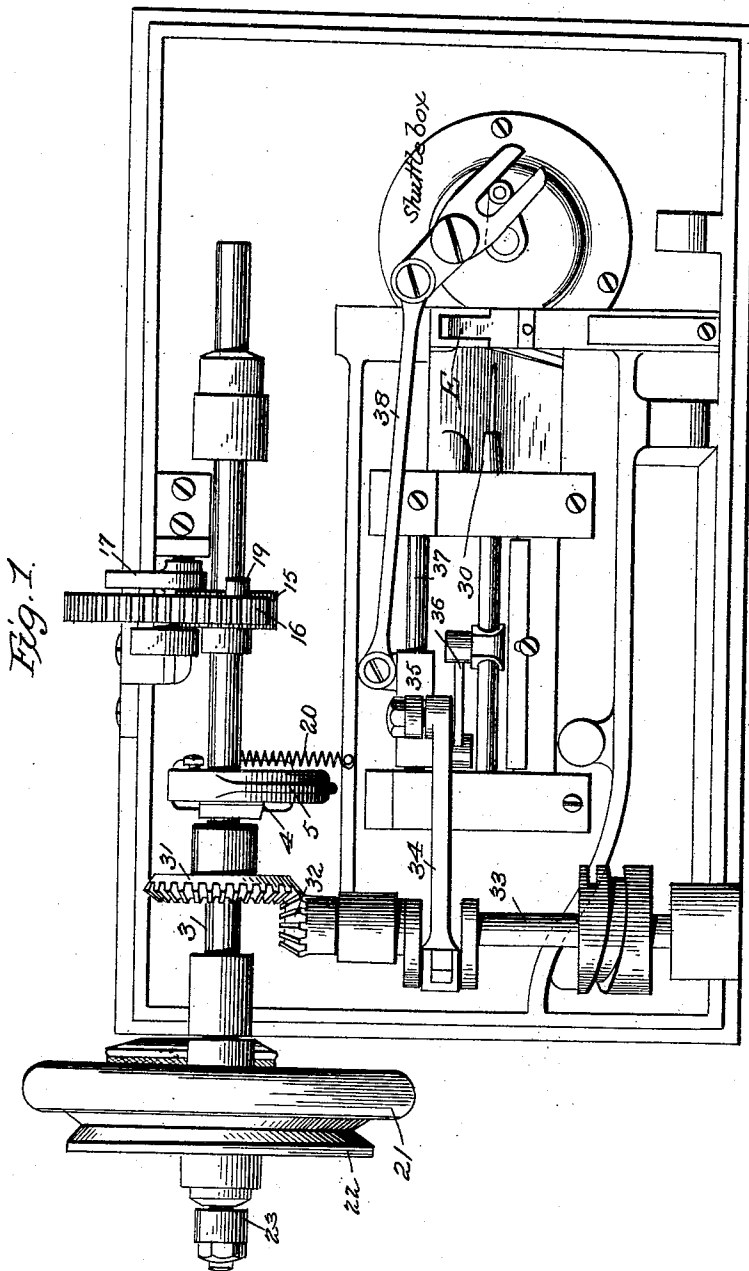
3 Sheets—Sheet 1.

E. M. PHELPS.

SEWING MACHINE FOR OVERSTITCHING BUTTONHOLE THRUMS.

No. 484,744.

Patented Oct. 18, 1892.



Attest
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Inventor
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(No Model.)

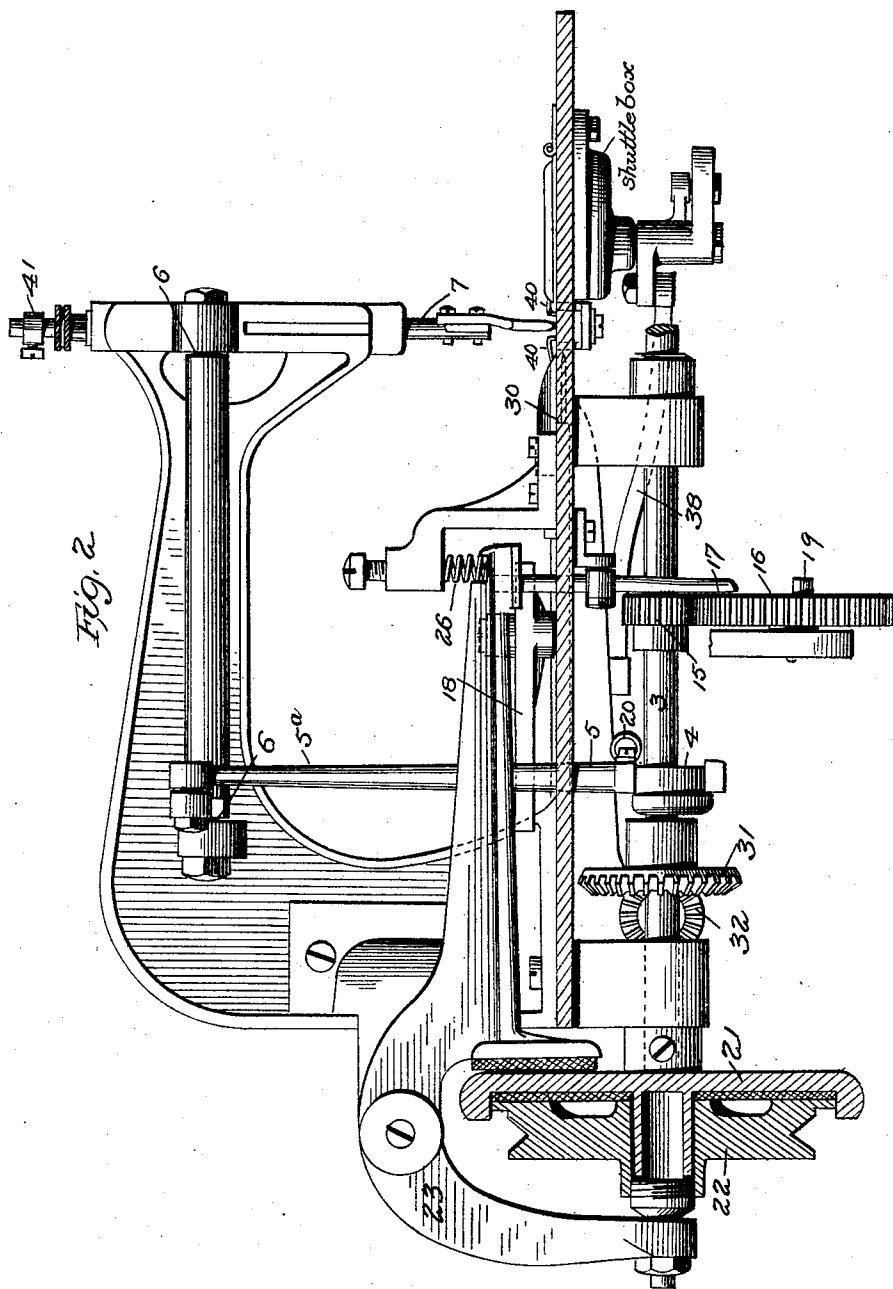
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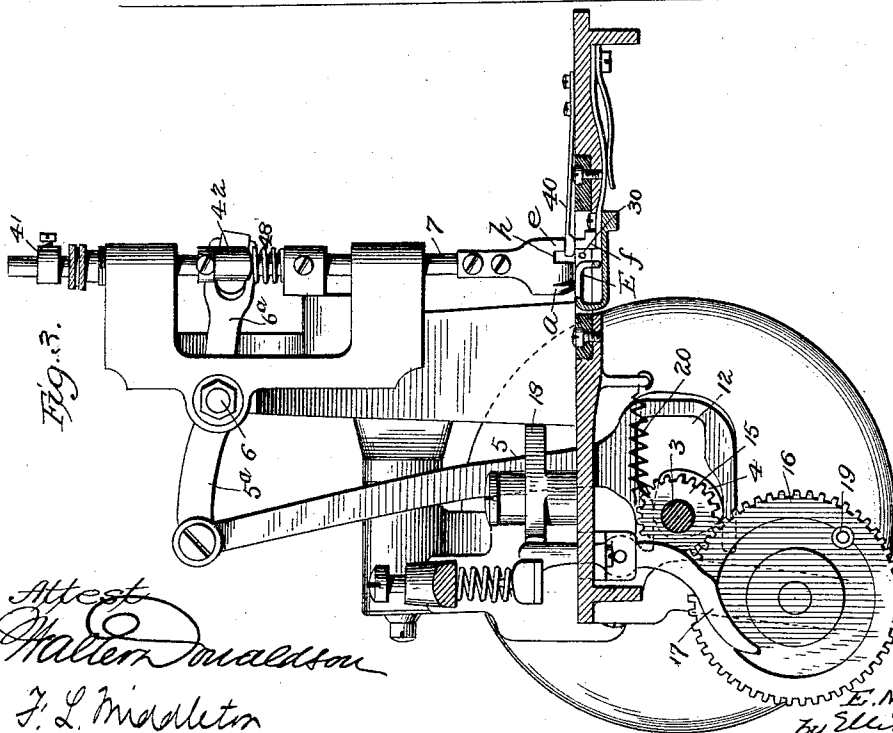
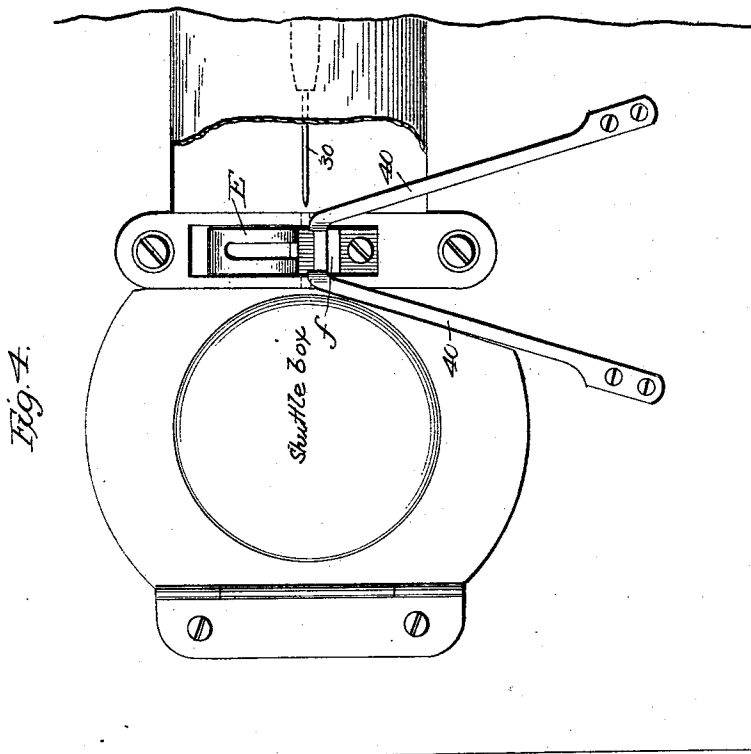
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UNITED STATES PATENT OFFICE.

EUGENE M. PHELPS, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE HAND METHOD FINISHING MACHINE COMPANY, OF NASHUA, NEW HAMPSHIRE.

SEWING-MACHINE FOR OVERSTITCHING BUTTONHOLE-THRUMS.

SPECIFICATION forming part of Letters Patent No. 484,744, dated October 18, 1892.

Application filed February 6, 1891. Serial No. 380,421. (No model.)

To all whom it may concern:

Be it known that I, EUGENE M. PHELPS, of Lynn, in the county of Essex and Commonwealth of Massachusetts, have invented certain Improvements in Sewing-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in that class of sewing-machines which operate to form an overstitch; and this my present invention has for its object the adaptation of such a machine to the work of stitching thread-bars at the ends of buttonholes.

In the drawings, Figure 1 is a bottom plan view of the machine. Fig. 2 is a side elevation with parts in section. Fig. 3 is an end view with the bed-plate in transverse section at the throat-opening. Fig. 4 is a plan view of a portion of the machine, partly broken away, showing the throat-plate and adjacent parts.

In carrying out my invention I employ an ordinary straight eye-pointed sewing-machine needle and a needle-bar 30. Said needle-bar is supported in a horizontal plane and permits endwise reciprocating movements in its supporting-bearings, which movements are imparted from the main driving-shaft 3 to the needle-bar through an intermediate connecting mechanism composed of gears 31 32, crank-shaft 33, pitman 34, block 35, and pitman 36, as shown in Fig. 1. To this end the block 35 is mounted to permit endwise reciprocations on its supporting-bar 37. In connection with this needle I employ a shuttle mechanism known as the "Singer oscillating shuttle," and the same as is employed in the Singer zigzag-sewing machines. Said shuttle mechanism is socketed to permit oscillating movements in the machine bed-plate, and said oscillating movements are imparted thereto by a pitman 38, which to that end is connected with the block 35 and the shuttle mechanism, as shown in Fig. 1.

The machine is further provided with a grooved throat-plate, across which the needle is made to pass in order to interlock the needle and shuttle threads. The material in which stitches are to be formed is depressed from above into the throat-plate of the ma-

chine to the end that the needle may be passed through the fold thus formed in the material. To this end a folder is employed. Said folder is supported on the bottom end of a vertically-movable folder-bar 7, which bar is reciprocated vertically in order to depress the folder into the machine throat-plate for folding the material, and in order to lift the folder above the machine bed-plate to permit straightening or otherwise arranging the material. Said vertical movements are imparted from the machine main shaft 3 through an intermediate mechanism consisting of the cam 4, lever 5, arm 5^a, rock-shaft 6, arm 6^a, collar 42, and spring 48. In connection with the folder I employ spring-wipers 40, Figs. 2 and 3, arranged as shown. Said wipers operate to wipe and hold the material folded closely about the folder. The machine is provided with an ordinary take-up mechanism.

The construction and operation of the stitch-forming mechanism and the folder-operating mechanism, together with the construction of the machine throat-plate and wipers 40, are more specifically described in an application for Letters Patent therefor now pending in the United States Patent Office, Serial No. 278,826, filed July 2, 1889, to which further reference may be had.

Fig. 3 represents in side elevation the folder. It is provided with a downwardly-projecting portion *a*, designed for entering the buttonhole, and has a portion *e*, that projects outwardly over the material at the end of the buttonhole.

In operation of the machine the folder is depressed into the throat-plate of the machine and the material of the buttonhole-piece at the end of the buttonhole is depressed by the portion *e* of the folder downwardly in a manner to fold the material in the direction of the length of the buttonhole and hold it thus folded in position such that the needle moves forward through the fold thus formed, engages the shuttle-thread, and withdraws, leaving a bar of thread across the buttonhole end. The folder is then lifted, the material is straightened, and the next stitch is taken and the threads interlocked on the bottom face of the material. This operation is repeated un-

til an accumulation of thread is formed across the buttonhole end, giving a bar of any required size, whereupon the folder is lifted, the material moved to the next buttonhole, and the operation repeated.

In carrying out my invention I have found it desirable to employ, in connection with the folder, some means whereby the material shall be lifted out of the throat-plate to permit the second stitch or interlocking the threads on the under face of the material. I have further found it desirable to have some device to co-operate with the folder for straightening the material prior to the taking of said second stitch, in order to prevent the material from being crimped or otherwise permanently distorted by the holding-tension of the barring-threads. To this end I employ the spring-supported block E, which is attached by means of its yielding spring-arm to the machine-bed, so as to permit vertical reciprocations conformable to the similar movements of the folder. It is provided with a socket to receive the projection *a* of the folder and has a bearing-surface *f* beneath the portion *e* of the folder. This block reciprocates within and below the throat-opening, yielding downwardly to the downwardly-moving folder and moving upwardly by reason of its springing arm to follow the upward movement of the folder and lift the material out of the throat-plate. In practice the material at the button-hole end is loosely clamped between the portion *e* of the folder and the bearing *f* of the block, and while thus clamped is lifted and depressed to straighten and fold the material during the stitching operations, as described. At the completion of each thread-bar it becomes necessary to lift the folder away from the block, in order that the material may be withdrawn and introduced. In order to effect this protracted upward movement of the folder the lever 5 is provided with a throat 12 and is arranged to permit swinging movement on its journal-pin to the end that the bottom end of the lever may be shifted from a position embracing the cam 4 in its mouth to a position embracing the cam 4 in its throat-opening. Said throat-opening is located between the plane of the mouth-opening and the lever-fulcrum, so that a shifting of the lever, as stated, moves the lever-fulcrum nearer to the cam, whereupon the next regular operation of the cam lifts the folder away from the block E to a position above the machine-bed. It is desirable to have the lever shifted thus automatically. To this end I secure to the machine-shaft 3 a gear 15, and in a bracket attached to the machine-bed is a gear 16, arranged to intermesh the gear 15. Said gear 16 carries a tripper-stud 19, which at each revolution of the gear lifts upwardly the horizontal arm of lever 17. Said lever 17 is pivotally supported in the machine-frame, with its vertical arm extending upwardly through an opening in the machine-bed and bearing near its top end against the lever 18.

The lever 18 near its opposite end bears against the lever 5, as shown. In operation of the machine as the gear 16 revolves the tripper-stud 19 is made to engage and lift the horizontal arm of lever 17. The vertical arm of lever 17 is thus moved against the lever 18 to turn the lever 18 on its pivotal stud and cause it to act upon and shift the lever 5 to a position embracing the cam 4 in its throat-opening, where it is held by the continuous action of stud 19 to enable the cam 4 to effect the protracted uplifting of the folder. The lever 5 when released is shifted back to its normal position and held thus by means of a spring 20 until the tripper-stud again uplifts the lever 17. By a suitable proportion of size between the gears 15 and 16 the machine will be allowed to take as many stitches with the lever 5 embracing cam 4 in its mouth as occasion requires, in order to give the desired buttonhole-bar before the protracted uplifting of the holder is made to take place.

It is further desirable to have the machine stop automatically during the protracted uplifting movement of the folder and remain thus with the folder uplifted while the operator shifts the material from one to the next succeeding buttonhole. To this end I employ a plate-wheel 21, fixed securely to the machine-shaft 3, and a driver-wheel 22, mounted to turn loosely on said shaft 3. The loose wheel receives the belt-power for driving the machine and permits movement on the shaft longitudinally to the end that it may be brought to contact with plate 21 to start or moved away from plate 21 to stop the machine. To this end the contiguous faces of the plate and driver-wheel are provided with frictional face formations.

The lever 23 is pivoted to permit tilting movement on a fulcrum-pin secured in the machine-arm and one end of said lever is curved downwardly to a position adjacent to the hub of driver-wheel 22. The opposite end of said lever is extended to a position directly over the end of lever 17 and connected with this arm of the lever is a treadle mechanism (not shown) of ordinary construction, which extends downwardly in position to be actuated by the foot of the operator in order to lift this arm of the lever 23 for setting the machine in action. This uplifting movement of the lever 23 is effected against the tension of a spiral spring 26, and this spring, being thus contracted, operates when permitted to do so to move downwardly the lever 23 in order to stop the machine. This stopping operation is effected automatically, as I will further describe.

In order to start the machine, the operator by a suitable movement of the treadle-lever lifts the arm of lever 23, thereby contracting the spring 26, and at the same time causing the end of lever 23 to bear against and move the driver-wheel 22 into contact with the plate 21, whereupon the machine commences to move. At this time the material is supported by the operator with the projection *a* of the

folder centered in the buttonhole-slit and the projection *e* of the folder bearing upon the material at the end of the buttonhole-slit. The treadle is held with the arm of lever 23 thus uplifted until gear 16 moves sufficiently to disengage tripper-stud 19 from the lever 17, thereupon spring 20 shifts the lever 5 into its normal position—*i. e.*, into position with the cam 4 located in the mouth-opening of the lever. This movement of the lever 5 allows the cam to depress the folder to a position with the projection *a* of the folder extending through the material into the socket of block E and with the material at the end of the buttonhole-slit clamped loosely between the bottom face of projection *e* of the folder and the bearing-face *f* of the block E. Said shifting movement of the lever 5 further operates to set the end of lever 17 under the uplifted arm of lever 23, whereupon the treadle is released and the arm of lever 23 is supported in its uplifted position by the lever 17. Cam 4 is now positioned in the mouth-opening of lever 5, and as the machine moves this cam operates by revolving in the mouth-opening of lever 5 to reciprocate the folder between two horizontal planes—one located above and the other—located below the needle-path. Each complete revolution of the cam moves the folder from above to the plane below the needle-path and back to the starting-plane above the needle-path. These movements of the folder are so timed relatively to the stitch-forming mechanism that a stitch is formed while the folder remains below and a second stitch is formed while the folder remains above the needle-path. To this end the gear 31 has a proportion of two to one of gear 32. The block E by reason of its yielding spring-arm yields downwardly to the downwardly-moving folder and returns upwardly, conformable to the uplifting movement of the folder, so that the material adjacent to the buttonhole end remains continually in a loosely-clamped condition between the projection *e* of the folder and bearing *f* of the block E during all bar-stitching operations. As the folder moves downwardly, the material is folded in the line of the buttonhole-slit by the projection *e* of the folder and carried downwardly below the needle-path, so that the needle passes through the walls of the folded material, engages the shuttle-thread, and withdraws, leaving a bar of thread on the face side of the material across the buttonhole end. The folder is next lifted. The material is also lifted by the upwardly-moving block E to a plane above the needle-path, whereupon the needle is next passed through the groove and made to interlock the shuttle-thread, thus forming a stitch or interlocking of the threads beneath the material. This operation is repeated until a thread-bar of sufficient size is formed across the buttonhole end. At this point the tripper-stud 19 comes into engagement with and lifts the horizontal arm of lever 17. The top end of said lever 17 is thereby moved from under

the lever 23 and the lever 17 is made to turn the lever 18, causing it to shift the lever 5 to a position embracing in its throat-opening the cam 4, the cam being positioned to effect the protracted uplifting of the folder. The lever 23 is simultaneously depressed by the spring 26 to disengage the driver-wheel 22 from contact with plate 21 and allow the machine to stop. It is noted that the folder remains above the level of the machine-bed during the taking of the understitch, and in practice I make use of the time of taking the last understitch of the bar to effect the protracted uplift of the folder and stop the machine at any point during the taking of this stitch. As the machine next begins to move it first completes the stitch thus partially formed, during which the tripper 19 holds the lever 17 to prevent the lever 5 from being re-shifted to its normal position. As the partially-formed understitch is completed, the tripper 19 passes from under the lever 17 and permits the lever 5 being shifted, so that the cam 4 next produces a complete downward throw of the folder, so that the next regular bar-stitch is formed in the newly-presented material.

In practice I make the gear 16 in size three to one of the gear 15. This gives me six operations of the stitching mechanism to each complete revolution of the cam 16. These six operations of the stitching mechanism yield a bar of six lines of thread, and during the taking of the sixth stitch, which is the last understitch of the series, the tripper 19 holds uplifted the lever 17 to allow stoppage of the machine and arrangement of the material on the uplifted folder, as described. In case it is desired to produce a series of more or less than six stitches it may be done by a corresponding variation in the size of gears 15, 16.

I have described the block E as provided with a socket to receive the downwardly-projecting end of the folder; but I would not be understood as stating that this socket is strictly necessary to the operation of the machine. It is a convenience, and, I think, facilitates the holding of the material. I am also aware that the machine would be capable of performing the work without the uplifting-block E, the material being in that case lifted out of the groove and straightened by the operator; but I prefer to employ the block E, as described, and I further prefer to provide it with the bearing-face *f*, which, co-operating with the folder, keeps the material straightened beneath the bar, so that it is prevented from being crimped by the stitches.

It will be observed that the folder is provided with a recess *h*, through which the needle is able to pass, while the folder is depressed, with its bearing-face *e*, holding the material below the plane of the needle-path, in order to bring the bar-threads through to the face side of the folded material.

The folder-bar is limited in its downward movement by means of a stop 41, which, be-

ing adjustable on the bar, allows the machine to be set for different thicknesses of material. To this end the folder-bar is connected with its operating-lever by means of a collar 5 42, which permits loose sliding movements on the bar against the tension of a spiral spring 48, through which spring the lever acts to force downwardly the bar, thus giving a yielding tension to the downward movement of the bar. Said spring further acts to 10 take up any excessive movement of the operating-lever applied after the complete downward throw of the bar is reached.

I claim—

15 1. In a sewing-machine for barring buttonholes, a folder having a projection to enter the buttonhole and a portion to bear upon the material at the end of the buttonhole, combined with a lifter to lift the material as 20 the folder retreats or is moved from the material, a straightener, as *f*, to bear upon the under side of the material at the end of the buttonhole and prevent crimping of the material while the folder is in retracted position and 25 the material is elevated to permit of the formation of the understitch, a grooved throat-plate, in the groove of which the straightener operates, and stitch-forming mechanism, substantially as described.

30 2. In a sewing-machine for barring buttonholes, a folder to bear upon the material at the end of the buttonhole, devices to actuate said folder, and a shifter co-operating with the folder and its actuating devices to vary the 35 movement of the folder, combined with a throat-plate and stitch-forming mechanism, substantially as described.

40 3. In a sewing-machine for barring buttonholes, a driven shaft, a clutch member fast on said shaft, a co-operating clutch member loose on said shaft and having longitudinal movement thereon, devices operating to cause engagement of the clutch members, stitch-forming mechanism, a work-folder, and a slot- 45 ted throat, combined with devices to limit the number of barring-stitches to be made before stoppage of the machine and connections between said devices and the clutch members, including a support or member to maintain 50 engagement of the clutch members, and a trip

for said support to permit disengagement of said clutch members when the required number of barring-stitches at the end of a buttonhole shall have been made, substantially as described.

55 4. A folder to bear upon the material at the end of a buttonhole, devices to actuate said folder, and a shifter co-operating with the folder and its actuating devices to vary the movement of the folder, combined with a 60 grooved throat-plate, stitch-forming mechanism, and devices, including a trip, to limit the number of barring-stitches to be made at the end of a buttonhole before release of the material by variation in the movement of the 65 folder and to determine the time of variation of movement of the folder, substantially as described.

70 5. In a sewing-machine provided with a grooved throat-plate and stitch-forming mechanism, substantially as described, a folder, a driving-shaft, a connecting mechanism between the said shaft and folder for imparting reciprocating movements to the folder in 75 order to bend the material in the throat-plate, and an automatically-operating shifter and stop mechanism whereby the folder-operating mechanism is shifted to vary the movement of the folder and the machine stopped, as 80 described.

85 6. In a sewing-machine provided with a grooved throat-plate and stitch-forming mechanism, as described, a driver-shaft, a folder, a connecting mechanism between the shaft and folder for moving the folder to bend the material in the throat-plate, and a shifter mechanism 90 for shifting the folder-operating mechanism to vary the length of movement of the folder, combined with a clutch mechanism and intermediate devices actuated by the shifter mechanism as it shifts the folder-operating mechanism to simultaneously stop the machine, substantially as described.

Signed at Lynn, Massachusetts, this 22d day of December, A. D. 1890.

EUGENE M. PHELPS.

Witnesses:

C. B. TUTTLE,
JOHN B. GRAVES, Jr.