

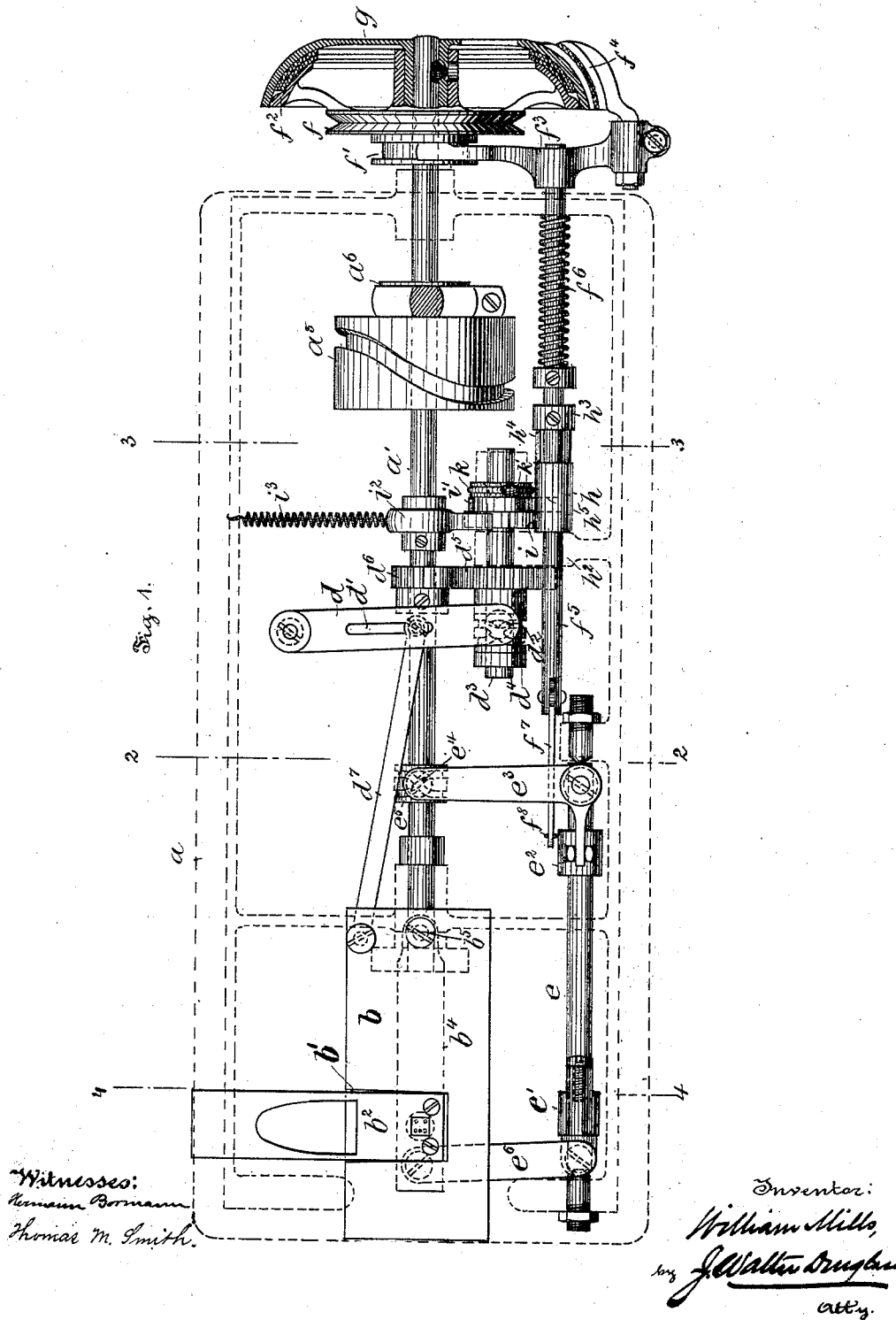
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3 Sheets—Sheet 1.

W. MILLS.
MACHINE FOR SEWING ON BUTTONS.

No. 463,294.

Patented Nov. 17, 1891.



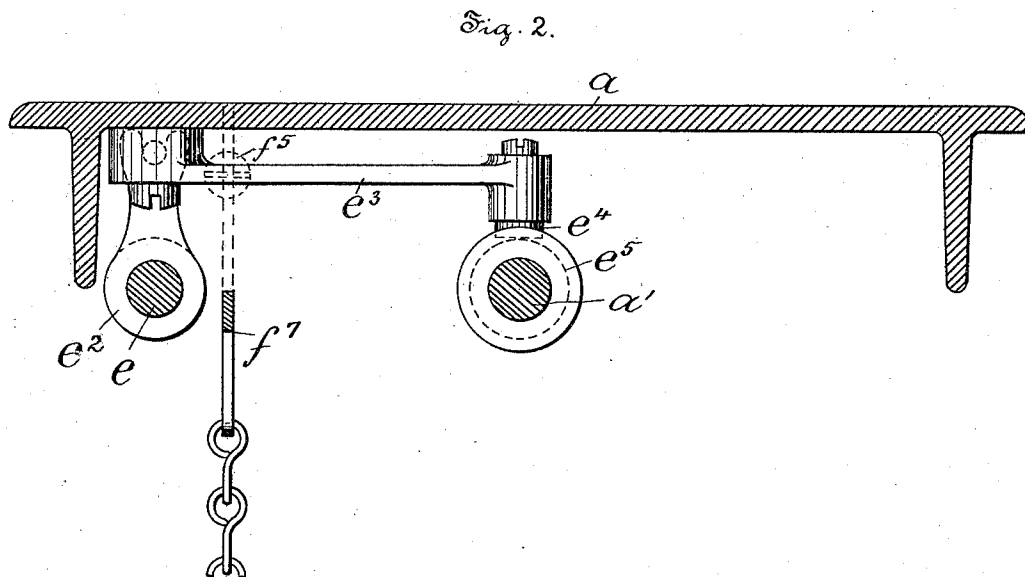
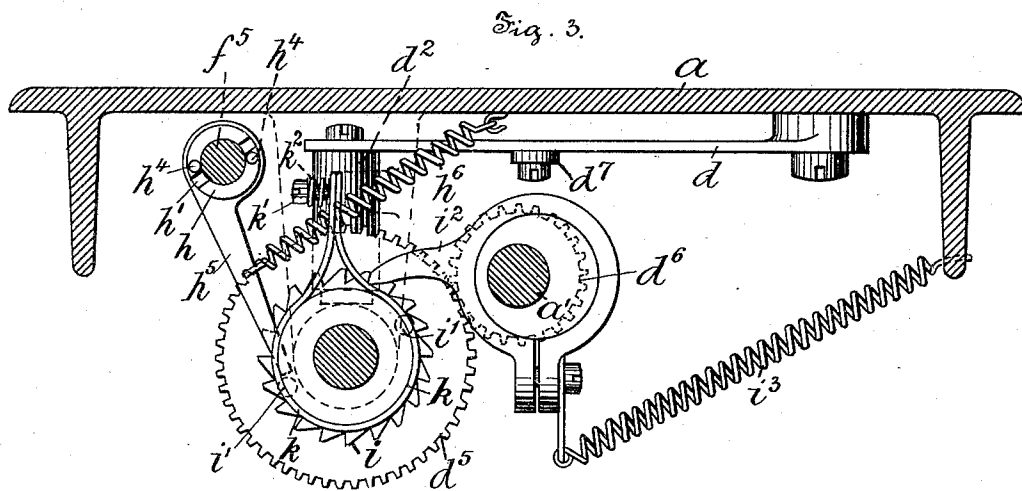
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3 Sheets—Sheet 2.

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MACHINE FOR SEWING ON BUTTONS.

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Witnesses:
Kernan Bormann
Thomas M. Smith.

Inventor:
William Mills,
by J. Walter Douglass
att'y.

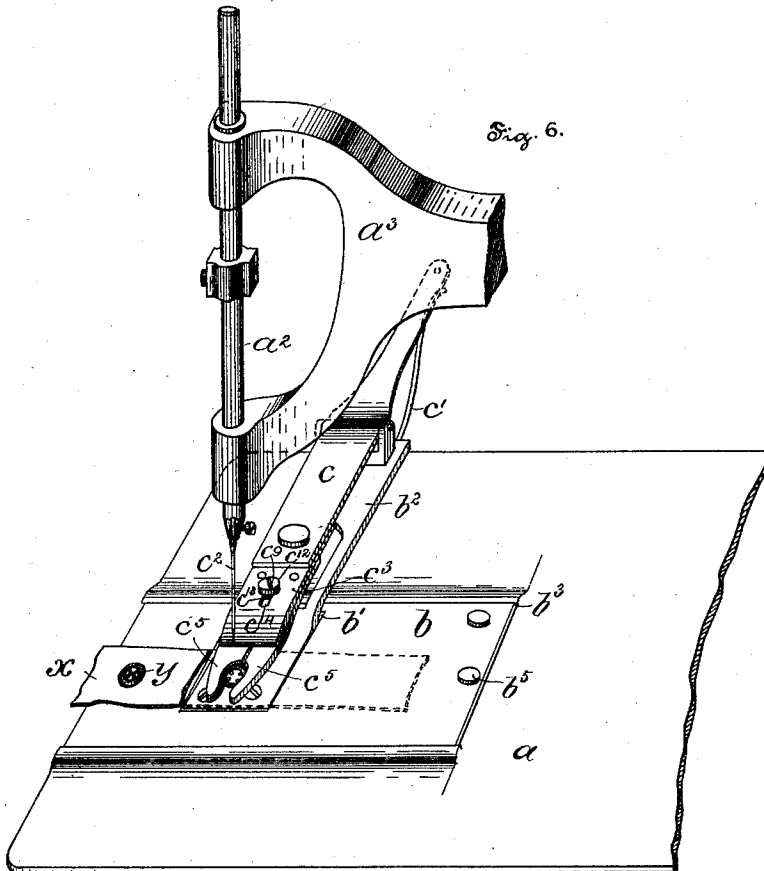
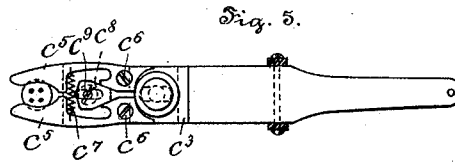
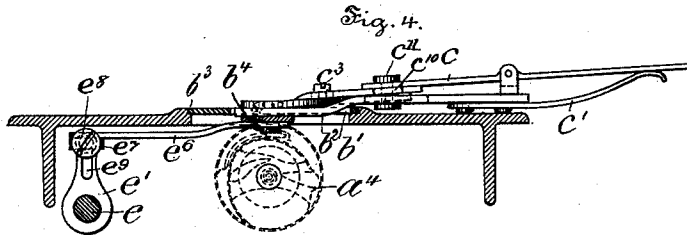
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3 Sheets—Sheet 3.

W. MILLS.
MACHINE FOR SEWING ON BUTTONS.

No. 463,294.

Patented Nov. 17, 1891.



Witnesses:
Hermann Bormann
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UNITED STATES PATENT OFFICE.

WILLIAM MILLS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO ELISON M. COOPER, OF SAME PLACE.

MACHINE FOR SEWING ON BUTTONS.

SPECIFICATION forming part of Letters Patent No. 463,294, dated November 17, 1891.

Application filed March 9, 1891. Serial No. 384,206. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MILLS, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Button-Sewing Machines, of which the following is a specification.

The principal objects of my present invention are, first, to provide an efficient, durable, and comparatively-simple sewing-machine for attaching or sewing buttons to fabrics more firmly and in a better manner than has heretofore been possible; second, to provide durable and convenient appliances for engaging and disengaging the peripheral edges of a button and for holding the same during the sewing operation by pressure exerted in the plane of the face of the button; third, to provide compact and efficient mechanism for shifting the buttons and button-retaining appliances beneath the needle twice as often in one direction as in the other in order to form twice as many straight as diagonal stitches, and, fourth, to provide inexpensive and positive mechanism for automatically throwing the driving-pulley out of engagement after the operation of sewing on each button has been completed.

My invention consists of a button-sewing machine such as hereinafter described and claimed.

The nature and objects of my present invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a top or plan view of a sewing-machine embodying features of my invention and showing a button-carrier support attached to a sliding-plate lever pivoted to a sliding-plate adapted to be reciprocated in the direction of the main shaft by means of a rock-shaft, cam, and link connections, and also showing link connections actuated by a cam on a counter-shaft for oscillating said sliding-plate lever in order to shift the button-carrier transversely of the main shaft, and also showing a spring-actuated shipper-rod and means for automatically releasing

the same. Fig. 2 is a transverse section on the line 2 2 of Fig. 1, showing means for imparting motion from the main shaft to the rock-shaft. Fig. 3 is a transverse section on the line 3 3 of Fig. 1, showing spur-wheels for rotating the counter-shaft, and also showing a ratchet-wheel provided with pins and controlled by a spring-brake, a cam-actuated pawl for rotating the ratchet-wheel, and a detent adopted to mesh with said pins for controlling mechanism for releasing the shipper-rod. Fig. 4 is a transverse section on the line 4 4 of Fig. 1, showing in dotted lines stitch-forming mechanism, and also showing the manner of attaching the button-carrier to the sliding plate. Fig. 5 is a plan view of the under side of a button-carrier with the lower portion thereof removed in order to show the pivotally-supported spring-jaws for holding the button; and Fig. 6 is a perspective view of the sliding plate, needle-bar, and button-carrier.

In the drawings, *a* is the bed-plate of the machine, provided with a centrally-located shaft *a'*, a needle-bar *a²*, and a bifurcated head *a³* for supporting the needle-bar. The front extremity of the main shaft *a'* is provided with stitch-forming mechanism, (not shown,) and the rear portion thereof is provided with a cam *a⁴* for actuating the take-up mechanism (not shown) and with an eccentric *a⁵* for actuating the needle-bar *a²*.

b is a sliding plate provided with a slot *b'* for the reception of a perforated button-carrier support *b²*, and supported in ways *b³*, formed integral with or attached to the upper face of the bed-plate *a*, so as to be susceptible of being reciprocated in the direction of the main shaft *a'*.

b⁴ is a sliding-plate lever carrying the button-carrier support *b²* and pivotally attached to the sliding plate *b* by means of a stud *b⁵*, so that the button-carrier support *b²* may be reciprocated transversely of the main shaft by the simple operation of reciprocating the sliding-plate lever *b⁴* and without affecting in any way the motion of the sliding plate *b*.

c is a button-carrier adapted to support, retain, and carry a flat button. This carrier or bar *c* is pivotally attached to the button-car-

rier support b^2 , and is provided with a spring c' for causing it to normally press the work x and button y into contact with each other and with the button-carrier support b^2 beneath the needle c^2 , and for permitting it to be raised in order to remove the work and button. A plate c^3 is attached to the forward extremity of the bar c by means of a slotted connection comprising a slot c^{10} and a set-screw c^{11} , so that the plate c^3 may be shifted with relation to the bar c .

c^5 are jaws provided with conical working faces for engaging the periphery of a button and pivotally attached to the adjustable plate c^3 by means of studs or screws c^6 . These jaws c^5 are drawn normally together by means of a spring c^7 , having its extremities attached respectively to said jaws.

c^8 is a wedge-shaped block adapted to be brought into engagement with the inner edges of the two jaws c^5 , as clearly shown in Fig. 5, by means of a threaded stud or screw c^9 , engaging a tapped orifice in the wedge c^8 and having its head c^{12} in engagement with the plate c^3 , and its shank c^{13} adapted to work in a slot c^{14} in the plate c^3 , in order that the respective jaws may be readily caused to assume the required positions for the reception of buttons of different diameters to be applied to fabrics.

It may be remarked that the hereinabove-described construction of the pivotally-supported spring-actuated jaws entirely obviates the disadvantages incident to the use of button-carriers in which both of the jaws are formed of one continuous piece of metal, because such piece of metal is in use exceedingly apt to split or crack at or near the shanks of the jaws, thereby rendering the whole device inoperative.

In use a button y is inserted in suitable recesses formed in the interior edges of the jaw c^5 , and these jaws are reciprocated in the direction of the main shaft and transversely thereof, so as to cause stitches to be formed both straight and diagonally across the eyes of the button, Fig. 6. Excellent results have been attained in practice by forming twice as many straight as diagonal stitches, and therefore preference is given to the employment of such stitches.

Having described the appliances for holding the button and the manner of attaching the same to a sliding plate, a description will now be given of the mechanism for shifting the sliding plate in the direction of the main shaft and afterward of mechanism for shifting the button-holding devices transversely of the sliding plate.

d is an oscillating lever pivoted to the under side of the bed-plate a , and provided at or near the center thereof with a slot d' and at or near the free extremity thereof with a traveler d^2 .

d^3 is a counter-shaft provided with a switch-cam d^4 , engaging the traveler d^2 , and with a gear d^5 , meshing with a gear d^6 on the main

shaft a' and having a smaller diameter than the gear d^5 , so that when the main shaft a' is revolved the counter-shaft d^3 is also revolved by the intervention of the differential gears d^5 and d^6 , and in the present instance one-half as fast as the main shaft. The revolutions of the shaft d^3 and cam d^4 cause the lever d to be oscillated back and forth around its point of pivotal connection with the bed-plate a in one direction or the other after every two succeeding revolutions of the main shaft a' .

d^7 is a link pivotally attached to the sliding plate b and to the oscillating lever d by means of a screw engaging the slot d' , so that the oscillations of the lever d are transmitted to the sliding plate b and cause the latter to reciprocate back and forth in the ways b^3 and in the direction of the main shaft a' , and inasmuch as the button-carrier c and button-carrier support b^2 are attached to the shifting-plate lever b^4 , which is pivoted to the shifting-plate b , it follows that the button-carrier c and button y are oscillated with the sliding plate, so that stitches are formed straight across two of the eyes of the button. Moreover the throw of the link d^7 , and consequently the amount of travel of the button y in the direction of the main shaft a' , may be increased or diminished, according to the distance between the eyes of the button, by the simple operation of shifting the point of connection between the link d^7 and the oscillating lever d nearer to or farther from the pivotal connection between the latter and the bed-plate a .

The button-carrier and button-carrier support are shifted transversely of the main shaft a' by the simple operation of reciprocating the free end of the sliding-plate lever b^4 about the stud b^5 , and this result is accomplished in the following manner:

e is a rock-shaft supported in bearings attached to the under side of the bed-plate a and provided at the respective extremities thereof with arms e^2 , Fig. 2, and e' , Fig. 4.

e^3 is a bell-crank lever pivotally attached to the under side of the bed-plate a and having one arm thereof in engagement with the arm e^2 and the other arm provided with a traveler e^4 , adapted to engage a switch-cam e^5 , attached to the main shaft a' , so that the shaft e is oscillated first in one direction and then in the other at each successive revolution of the main shaft a' .

e^6 is a link pivotally attached to the shifting-plate lever b^4 and provided with a nut e^7 . This nut e^7 is pivotally connected to the arm e' by means of a screw e^8 , working in a slot e^9 , so that the shifting-plate lever b^4 , button-carrier c , and button y are reciprocated transversely of the main shaft, and so that the throw of the link e^6 and extent of the travel of the button y may be adjusted by means of the slotted connection between the arm e' and link b^6 .

The result of the above-described recipro-

cating motion is to cause the button *y* to be attached to the material *x* by means of straight and diagonal stitches.

In practice each button is attached to the work by ten stitches, after the completion of which the machine is automatically stopped, so that the work may be advanced and another button attached thereto.

The machine is automatically stopped in the following manner:

f is a positively-driven pulley provided with a shipper-groove *f'* and friction-wheel *f²* and mounted loosely on the shaft *a'*.

g is a friction-wheel keyed to the shaft and provided with a projecting peripheral portion for a purpose to be hereinafter described.

f³ is a shipper for shifting the loose pulley *f* into or out of engagement with the friction-wheel *g*, so as to cause the loose pulley *f* to drive the main shaft *a'* or to permit the loose pulley to run loose thereon.

f⁴ is a brake attached to the shipper *f³* and adapted to contact with the peripheral projection on the wheel *g*, so as to stop the main shaft from rotating after the wheel *f* has been shifted out of contact with the wheel *g*.

f⁵ is a shipper-rod carrying the shipper *f³* and supported in suitable bearings secured to the bed-plate *a*, so as to be capable of being shifted in the direction of its length.

f⁶ is a spring interposed between the bed-plate *a* and a collar attached to the shipper-rod *f⁵* in order to shift the latter normally toward the left in Fig. 1, so as to permit the pulley *f* to run loose on the shaft *a'*.

f⁷ is a bell-crank lever pivoted to the shipper-rod *f⁵* and having one arm thereof inserted in a recess formed in the bed-plate *a* and the other arm provided with a chain *f⁸* for shifting the shipper-rod *f⁵* toward the right in Fig. 1, in order to force the pulley *f* into engagement with the wheel *g*.

h is a loose collar or sleeve provided with notches *h'*, and mounted on the shipper-rod *f⁵*, but supported against end play by means of a projection *h²*, attached to the bed-plate *a*.

h³ is a collar keyed or screwed to the shipper-rod *f⁵* and provided with lugs *h⁴*, adapted to engage with the edge of the collar *h*, as shown in Fig. 1, in order to hold the shipper-rod *f⁵* in its extreme right-hand position, and also adapted to enter the notches *h'* when the collar *h* is turned so as to permit the spring *f⁶* to shift the shipper-rod *f⁵* into its extreme left-hand position.

h⁵ is a detent attached to the collar *h*, and provided with a spring *h⁶*, attached to the bed-plate *a*, so as to maintain the edge of the collar *h*, normally in contact with the lugs *h⁴*.

i is a ratchet-wheel supported loosely on an extension of the counter-shaft *d³* and provided with pins *i'* for engaging the detent *h⁵*, in order to slightly rotate the collar *h* so as to permit the lugs *h⁴* to enter the notches *h'*, and thus permit the shipper-rod *f⁵* to be shifted to the left (in Fig. 1) by the spring *f⁶*, thereby disengaging the wheels *f* and *g*.

i² is a pawl attached to an eccentric-strap embracing an eccentric on the main shaft *a'* and provided with a spring *i³*, attached to the bed-plate *a* in order to maintain the pawl *i²* in engagement with the ratchet-wheel *i*, so that when the shaft *a'* is rotated the pawl *i²* causes the ratchet-wheel *i* to be advanced the space of one tooth for each revolution of the shaft, and when the ratchet-wheel *i* has been advanced ten teeth, one of the pins *i'* contacts with and raises the detent *h⁵*, thus throwing the machine out of gear. In the present instance the ratchet-wheel *i* is provided with twenty teeth and two pins, so that the main shaft is rotated ten times and causes the formation of ten stitches before the shipper-rod is released and the machine thrown out of gear.

k is a spring-brake contacting with and embracing the periphery of the hub of the ratchet-wheel *i*, in order to prevent the latter from being rotated when the pawl *i²* is being drawn back over the teeth of the ratchet-wheel *i* before each successive forward stroke. The respective extremities of this spring-brake are formed into loops and surround a screw-stud *k'*.

k² is a spring interposed between the head of the screw-stud *k'* and the loops of the spring-brake *k* in order to increase the elasticity thereof. It may be remarked that the spring-brake is much more positive and reliable in action than a leather washer or analogous device and therefore much better results are attained by its use than were heretofore possible.

The mode of operation of the hereinabove-described machine is as follows: After a button has been properly inserted between the spring-jaws *c⁵* the machine is thrown into gear by pulling the chain *f⁸*, so that the subsequent revolutions of the shaft *a'* cause the button to be shifted beneath the needle in such manner that ten stitches are formed straight and diagonally across the eyes of the button. When the ten stitches are completed, one of the pins *i'* contacts with the detent *h⁵* and rotates the collar or sleeve *h* slightly, thus permitting the spring *f⁶* to shift the shipper-rod *f⁵* toward the left, so as to throw the machine out of gear, whereupon the above-described operations are repeated in order to effect the operation of sewing on additional buttons.

Although I have described my invention in connection with a so-called "Wheeler & Wilson Sewing Machine No. 10," still it will be obvious that it can with slight modifications in the details thereof be applied to other types of sewing-machines, and hence I do not limit myself to the exact arrangement of parts herein set forth and illustrated; but,

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a sewing-machine having needle-actuating and stitch-forming

mechanisms, of a button-carrier having spring-actuated pivotal jaws adapted to operate in the plane of the face of the button, a shifting plate, a shifting-plate lever attached to said button-carrier and pivoted to said shifting plate, and means for shifting said plate and lever beneath and with relation to the needle, substantially as and for the purposes set forth.

2. The combination, with a sewing-machine having needle-actuating and stitch-forming mechanisms and a main shaft for driving the same, of a shifting plate provided with a slot, a shifting-plate lever pivoted to said plate, a button-carrier attached to said lever and adapted to work in said slot, a rock-shaft supported by the bed of the machine and connected with said shifting-plate lever by means of a link, a cam on said main shaft, a bell-crank lever pivotally attached to the bed-plate and having one arm engaging said cam and the other arm connected to said rock-shaft to shift the button-carrier transversely of the main shaft, and means driven by the main shaft and connected with said sliding plate for reciprocating the button-carrier in the direction of the main shaft, substantially as described.

3. The combination, with a sewing-machine having needle-actuating and stitch-forming mechanisms and a main shaft for driving the same, of a shifting plate, a shifting-plate lever pivoted to said plate, a button-carrier attached to said lever, a rock-shaft, an adjustable link connected with said shifting-plate lever and rock-shaft, a cam on said main shaft, a bell-crank lever having one arm engaging said cam and the other arm connected to said rock-shaft to shift the button-carrier transversely of the main shaft, and means connected with said sliding plate for reciprocating the same in the direction of the main shaft, substantially as described.

4. The combination, with a sewing-machine having needle-actuating and stitch-forming mechanisms and a main shaft for driving the same, of a shifting plate provided with a slot, a shifting-plate lever pivoted to said plate, a button-carrier attached to said lever and adapted to work in said slot, means actuated by the main shaft for oscillating the shifting-plate lever, a counter-shaft supported by the bed-plate and driven from the main shaft by differential gears, a cam on said counter-shaft, an oscillating lever having one extremity thereof pivoted to the bed-plate and the other extremity in engagement with said cam, and a link connecting the oscillating lever and sliding plate for reciprocating the sliding plate, substantially as and for the purposes set forth.

5. The combination, with a sewing-machine having needle-actuating and stitch-forming mechanisms and a main shaft for driving the same, of a shifting plate, a shifting-plate lever provided with a button-carrier and pivoted to said plate, means actuated by the main shaft

for oscillating said shifting-plate lever, a counter-shaft driven from the main shaft by suitable gears, a cam on said counter-shaft, an oscillating lever having one extremity thereof pivoted to the bed-plate and the other extremity in engagement with said cam, and an adjustable link connecting the oscillating lever and sliding plate for reciprocating the sliding plate, substantially as and for the purposes set forth.

6. The combination, with a sewing-machine having needle-actuating and stitch-forming mechanisms and a shaft for driving the same, a shifting plate provided with a slot, a shifting-plate lever pivoted thereto, a button-carrier attached to said lever, a rock-shaft supported by the bed-plate, a link connected to an arm on said rock-shaft and to the shifting-plate lever, a cam on said main shaft, a bell-crank lever pivotally connected with the bed-plate and having one arm engaging said cam and the other arm attached to said rock-shaft for shifting the button-carrier transversely of the main shaft, a counter-shaft supported by the bed-plate and driven from the main shaft by suitable gears, a cam on said counter-shaft, an oscillating lever having one extremity thereof pivoted to the bed-plate and the other extremity in engagement with said counter-shaft cam, and a link connecting the oscillating lever and sliding plate for shifting the button-carrier in the direction of the main shaft, substantially as and for the purposes set forth.

7. The combination of a sewing-machine, having needle-actuating and stitch-forming mechanisms and a shaft for driving the same, a shifting plate, a shifting-plate lever pivoted to said shifting plate and provided with an adjustable button-carrier, a rock-shaft supported by the bed-plate, an adjustable link connected to an arm on said rock-shaft and to the shifting-plate lever, a cam on said main shaft, a bell-crank lever having one arm engaging said cam and the other arm attached to said rock-shaft for shifting the button-carrier transversely of the main shaft, a counter-shaft driven from the main shaft by differential gears, a cam on said counter-shaft, an oscillating lever having one extremity thereof pivoted to the bed-plate and the other extremity in engagement with said counter-shaft cam, and an adjustable link connecting the oscillating lever and sliding plate for shifting the button-carrier in the direction of the main shaft, substantially as and for the purposes set forth.

8. The combination of a sewing-machine having needle and button-carrier actuating and stitch-forming mechanisms, a main shaft for actuating the same, a two-part driving-wheel on said main shaft, a spring-actuated shipper-rod for shifting one member of said driving-wheel for throwing the machine into and out of gear, a ratchet-wheel provided with pins, a peripheral brake for said ratchet-wheel, a pawl driven by a cam on said main

shaft for actuating said ratchet-wheel, clamping devices for releasing said shipper-rod, and a spring-actuated detent on said shipper-rod for actuating said clamping devices, substantially as and for the purposes set forth.

9. The combination of a sewing-machine having needle and button-carrier actuating and stitch-forming mechanisms, a main shaft for actuating the same, a two-part driving-wheel on said main shaft, a spring-actuated shipper-rod for shifting one member of said driving-wheel for throwing the machine into and out of gear, a ratchet-wheel provided with pins, a peripheral brake for said ratchet-wheel, a pawl driven by a cam on said main shaft for actuating said ratchet-wheel, a

slotted collar loose on said shipper-rod and supported against end-play, a collar fast on said shipper-rod, lugs attached to said fast collar for engaging the loose collar and for entering the slots therein, and a spring-actuated detent attached to the loose collar and adapted to engage said pins, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

WILLIAM MILLS.

Witnesses:

THOMAS M. SMITH,
RICHARD C. MAXWELL.