

(No Model.)

2 Sheets—Sheet 1.

F. E. SCHMIDT. BUTTON HOLE SEWING MACHINE.

No. 299,168.

Patented May 27, 1884.

Fig. 1.

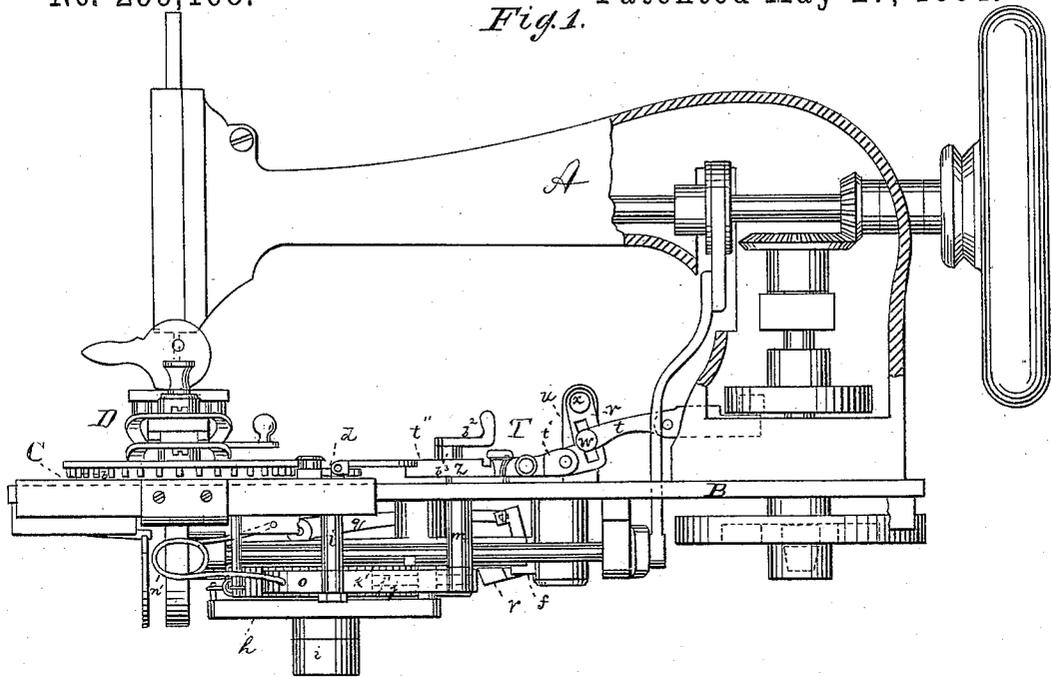


Fig. 2.

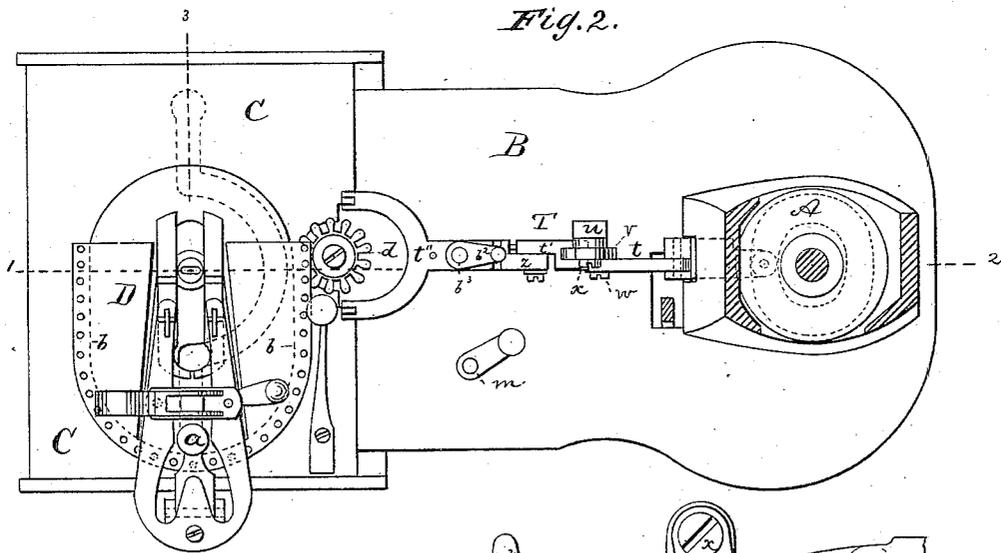


Fig. 3.

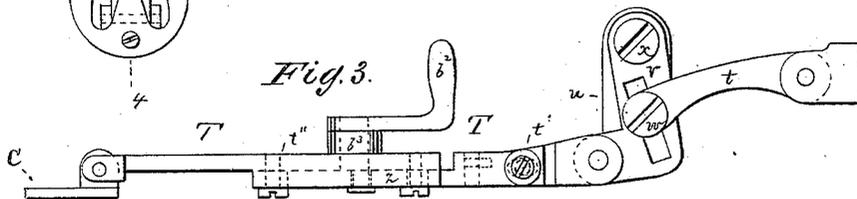
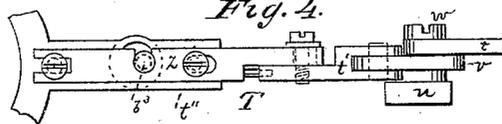


Fig. 4.



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Fig. 5.

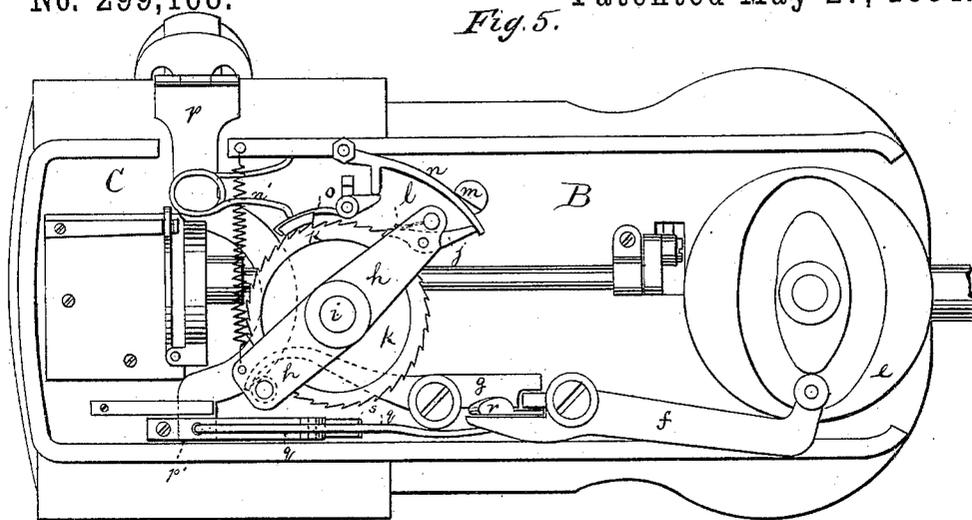


Fig. 6.

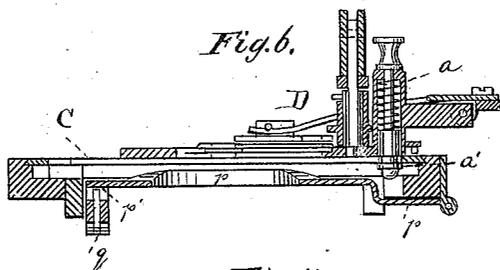


Fig. 7.

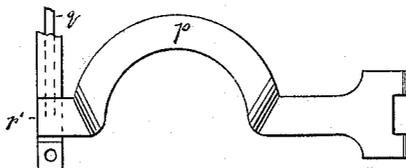


Fig. 8.

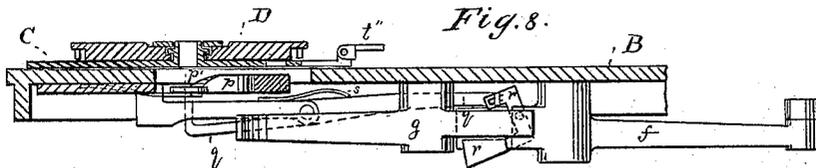
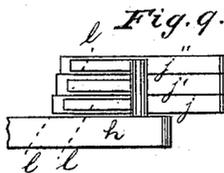


Fig. 9.



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FRIEDRICH E. SCHMIDT, OF BROOKLYN, NEW YORK.

BUTTON-HOLE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 299,168, dated May 27, 1884.

Application filed January 24, 1884. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH E. SCHMIDT, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Button-Hole Sewing-Machines, of which the following specification is a full, clear, and exact description.

This invention relates to a new feed for imparting motion to the cloth-clamp of a button-hole sewing-machine, and also to new mechanism for imparting reciprocating motion to the work-plate.

The invention consists, principally, in the combination of a cloth-clamp having curved toothed bar and receiving reciprocating motion, with a pinion receiving revolving but no reciprocating motion, the teeth of the pinion being longer than the extent of lateral motion of the cloth-clamp; also, in the various elements of improvement hereinafter more fully pointed out.

In the accompanying sheets of drawings, Figure 1, Sheet 1, is a vertical longitudinal section on line 1 2, Fig. 2. Fig. 2, Sheet 1, is a top view of my improved sewing-machine with the needle-arm removed. Fig. 3, Sheet 1, is a detail side view of the bar that reciprocates the work-plate; Fig. 4, Sheet 1, is a detail bottom view of the same. Fig. 5, Sheet 2, is a bottom view of portion of the sewing-machine, exposing the operating mechanism. Fig. 6, Sheet 2, is a vertical transverse section on the line 3 4, Fig. 2; Fig. 7, Sheet 2, is a detail top view of the spring acted upon by the pin of the cloth-clamp; Fig. 8, Sheet 2, is a side view, partly in section, of Fig. 5; and Fig. 9, Sheet 2, is a detail side view of the pawls which transmit motion from the operating-levers to the gear-wheel.

The cloth-clamp in a button-hole sewing-machine, as is well known, must expose the cloth to the needle in such a manner that the needle first sews one side of the button-hole, then the eye, and then the second side. For this purpose the work-plate is provided with a slot straight at its two ends and semicircular in its middle, and the cloth-clamp, having a guide-pin entering said slot, is fed first toward the needle to make first side of the button-hole, then in a semicircle to form the eye, and then away from the needle to make the

second side of the button-hole. While forming the eye, or, in other words, while describing the semicircle, the cloth-clamp, as is also well known, must be fed quicker than while exposing the side to the action of the needle. The object of the feed mechanism of the cloth-clamp is therefore to feed the same first slow, then fast, and then again slow. This motion I impart to the cloth-clamp direct by a toothed wheel, to which alternately slow and fast motion is imparted. In machines in which the needle reciprocates from right to left this feed is sufficient; but in those machines in which the needle makes only an up-and-down movement (as is the case with the machine illustrated in the drawings) mechanism must also be devised for reciprocating the work-plate, and with it the cloth-clamp. This mechanism, which consists of a bar receiving motion from a cam and transmitting it directly to the work-plate, will also be described. It is illustrated in Figs. 1 and 2, and also more particularly in Figs. 3 and 4, of the drawings.

I shall first describe the mechanism for feeding the cloth-clamp along the guide-slot of the work-plate.

The letter A represents the needle-arm of a button-hole sewing-machine. B is the main table, C the work-plate, and D the cloth-clamp. The work-plate C has a slot, (dotted lines, Fig. 2,) into which a pin, *a*, of the cloth-clamp projects, as is customary. The cloth-clamp D is provided at its sides and its circular back with a series of pins, Fig. 2, so as to form a horseshoe-shaped rack, *b*, or curved toothed bar, into which meshes a pinion, *d*. In place of the pins, teeth may be cut into the cloth-clamp in a horseshoe line, or a rack be formed in other suitable manner. To the work-plate and cloth-clamp reciprocating motion is imparted in manner hereinafter described, while only revolving and no reciprocating motion is imparted to the pinion *d*. In order to enable this construction to be carried out, the teeth on the pinion must be of such a length that they will engage the rack *b* in all positions of the cloth-clamp, whether the same is at its greatest distance from or nearest to the pinion. The teeth on the latter are, for this purpose, made longer than the extent of lateral motion of the cloth-clamp. When the

pinion *d* is revolved, it will first feed the clamp D in a straight line toward the needle, then in a semicircular line, and then in a straight line away from the needle. Thus the requisite motion is imparted to the cloth-clamp direct; but the pinion *d* must first be revolved slow, then fast, and then again slow, in order that the clamp D travels fastest while describing the curve. I shall therefore now describe the mechanism for revolving the pinion *d* in this manner.

From a cam, *e*, Fig. 5, attached to the operating-shaft of the machine, a lever, *f*, receives oscillating motion, and imparts this motion to an oscillating bar or lever, *g*. The lever *g* transmits the motion to a vibrating bar, *h*, turning loosely on its arbor *i*, and to this bar are pivoted three (more or less) pawls, *j j' j''*, Fig. 9, held against the teeth of a gear-wheel, *k*, by springs *l*. The toothed wheel *k* is mounted firmly on the arbor *i*, which is also the arbor of the pinion *d*. The pawls *j j' j''* are one a little longer than the other, Fig. 9, so that when one does not catch exactly into a tooth of gear-wheel *k* another one will catch, and thus no dead motion is created.

It will be seen that by the mechanism described the pinion *d* is revolved in the direction necessary for properly feeding the cloth-clamp D. If it is desired to disengage the pawls *j* from gear-wheel *k*, this is done by turning a pin, *m*, which presses a spring, *n*, against ends of pawls *j*, and thus raises their engaging ends from gear-wheel *k*. A spring, *n'*, serves to hold a brake-shoe, *o*, against gear-wheel *k*. When the pawls are disengaged, the brake is also raised, and when the pawls are engaged the brake is also automatically applied, in order to prevent the gear-wheel *k* from being drawn around in the wrong direction by the pawls when they slip over the teeth.

The motion imparted to pinion *d*, as thus far described, is the slow motion of the pinion—to wit, its motion when it engages the two straight sides of the bar *b* of the clamp D. I shall now describe the mechanism for changing this motion into fast motion while the semicircular part of bar *b* is engaged by the pinion.

Directly beneath the slot of the work-plate C is a spring, *p*, Fig. 7, corresponding in general outline to the said slot. This spring is raised at its center or curved portion and depressed at its ends or straight portions. With one end, Fig. 5, it is attached to the sewing-machine frame, while its other end, *p'*, is loose and is situated directly above one end of a vibrating lever, *q*, Fig. 8. The pin *a* of clamp D passes over the upper side of the spring *p* during its travel along the work-plate slot. When the pin arrives at the curve of this slot, it encounters the raised portion of spring *p*, and will press said spring downward. As soon as the pin *a* has completed its curve the spring will be relieved, and will by its own elasticity be again thrown upward. Thus the free end *p'* of spring *p* will always be de-

pressed when the pin *a* describes the curve. While in this position the free end *p'* will press upon lever *q* and cause it to swing on its fulcrum, and to thereby introduce between the two contiguous ends of levers *f g* a small elbow-lever, *r*, Figs. 5 and 8. This, as is described in my Patent No. 219,656, of September 16, 1879, will cause the motion of lever *g* to be accelerated, and accordingly the motion which it imparts by vibrating bar *h*, pawls *j*, and gear-wheel *k* to the arbor *i* of pinion *d*, as already described, will also be accelerated. After the pin *a* ceases to press spring *p* downward, the free end *p'* of said spring automatically rises, as already described. A spring, *s*, Fig. 5, working against lever *q*, will cause the same to swing back into its first position, and to thereby withdraw elbow-lever *r*. Thus the motion is again automatically changed from fast to slow. A shoulder, *a'*, on pin *a*, bearing against under side of work-plate C, prevents said pin from being thrown out of the slot of plate C by spring *p*.

It will be seen that by the mechanism described the first straight and slow, the second curved and fast, and the last straight and slow motion is imparted to the cloth-clamp. After the cloth-clamp has completed its motion and the button-hole is finished, the clamp is pulled back along the slot into its first position, and thus the machine is in condition to sew a new button-hole.

It now remains to be described in what manner reciprocating motion is imparted to the work-plate.

From a cam on the operating-shaft of the machine an arm, T, Figs. 1 to 4, receives reciprocating motion. This arm I prefer to make in three sections, *t t' t''*, connected in manner hereinafter specified. The section *t'* connects with the work-plate C and transmits reciprocating motion to the same. The connection between the arms *t* and *t'* has for its object to permit the length of lateral motion, or, with other words, the length of stitch to be adjusted. This mechanism is fully shown in Fig. 3. To an upright, *u*, is pivoted at *x* one end of a lug, *v*, having a longitudinal slot. The arm *t'* is pivoted to the other end of said lug, while the arm *t*, by a screw, *w*, may be clamped high up or lower down within the slot of the lug and between pivot *x* and the pivot of arm *t'*. The higher up the arm *t* is clamped, or the nearer to the fulcrum *x* the greater will be the oscillation of the lug *v* and the greater accordingly the amount of reciprocating motion of arm *t'*. In this way such motion may be accurately and easily adjusted. The connection between the arms *t' t''* is designed to enable the length of the entire bar T to be altered, making it longer and shorter. To this effect the arm *t'* is attached to a slide, *z*, working in a groove of arm *t''*, Fig. 4. The slide may be moved backward and forward and locked in position by turning a handle, *b'*, which has an eccentric pin, *b''*, working in slide *z* and passing through a

perforation of arm t' . The object of lengthening and shortening the arm is to shift the button-hole laterally, in order to bring its ends under the needle, to make what is known as the "tack" after the button-hole is otherwise completed. The tack is made after the button-hole has otherwise been finished. The needle at that time stands at the end of the last side of the button-hole. By now turning handle b^2 the bar T is shortened and the work-plate and cloth-clamp, with the button-hole, are moved slightly to one side. As the needle remains stationary, the relative position of needle and button-hole is changed and the former brought midway between the two sides of the button-hole, which is the place where the tack must be sewed. Thus the button-hole and needle are now in proper position for making the tack.

20 I claim as my said invention—

1. In a button-hole sewing-machine, the combination of cam e , reciprocating work-plate C, and reciprocating cloth-clamp D, having curved rack b , with the pinion d , to which revolving but no reciprocating motion is transmitted from cam e , the teeth of pinion d being longer than the extent of lateral motion of the cloth-clamp, substantially as specified.

2. In a button-hole sewing-machine, the combination of the following elements: work-

plate C, cloth-clamp D, pinion d , bar h , mechanism for transmitting motion from operating-cam to bar h , pawls $j j'$, ratchet-wheel k , spring l , and arbor i , substantially as specified.

3. In a button-hole sewing-machine, the combination of pinion d and cloth-clamp D, having pin a , that projects through slot of the work-plate C, and has shoulder a' , with spring p , having raised portion, all so constructed that when pin a bears on raised portion of spring p the motion of pinion d is changed by means of lever or levers acting upon the feeding device, substantially as specified.

4. In a button-hole sewing-machine, the combination of work-plate C with sectional arm T, having sections $t t'$, and with the upright u and slotted lug v , the lug v being pivoted at one end to upright u and at the other end to arm t' , and between the two to arm t , substantially as specified.

5. In a button-hole sewing-machine, the combination of work-plate C with arm T, which imparts to it reciprocating motion from a cam on operating-shaft, the arm T being provided with mechanism $z b^2 b^3$, for shifting the work-plate C, substantially as specified.

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Witnesses:

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R. H. ROY.