F. E. SCHMIDT.

Button-Hole Sewing-Machine.

No. 197,528. Patented Nov. 27, 1877.

Fig: 1

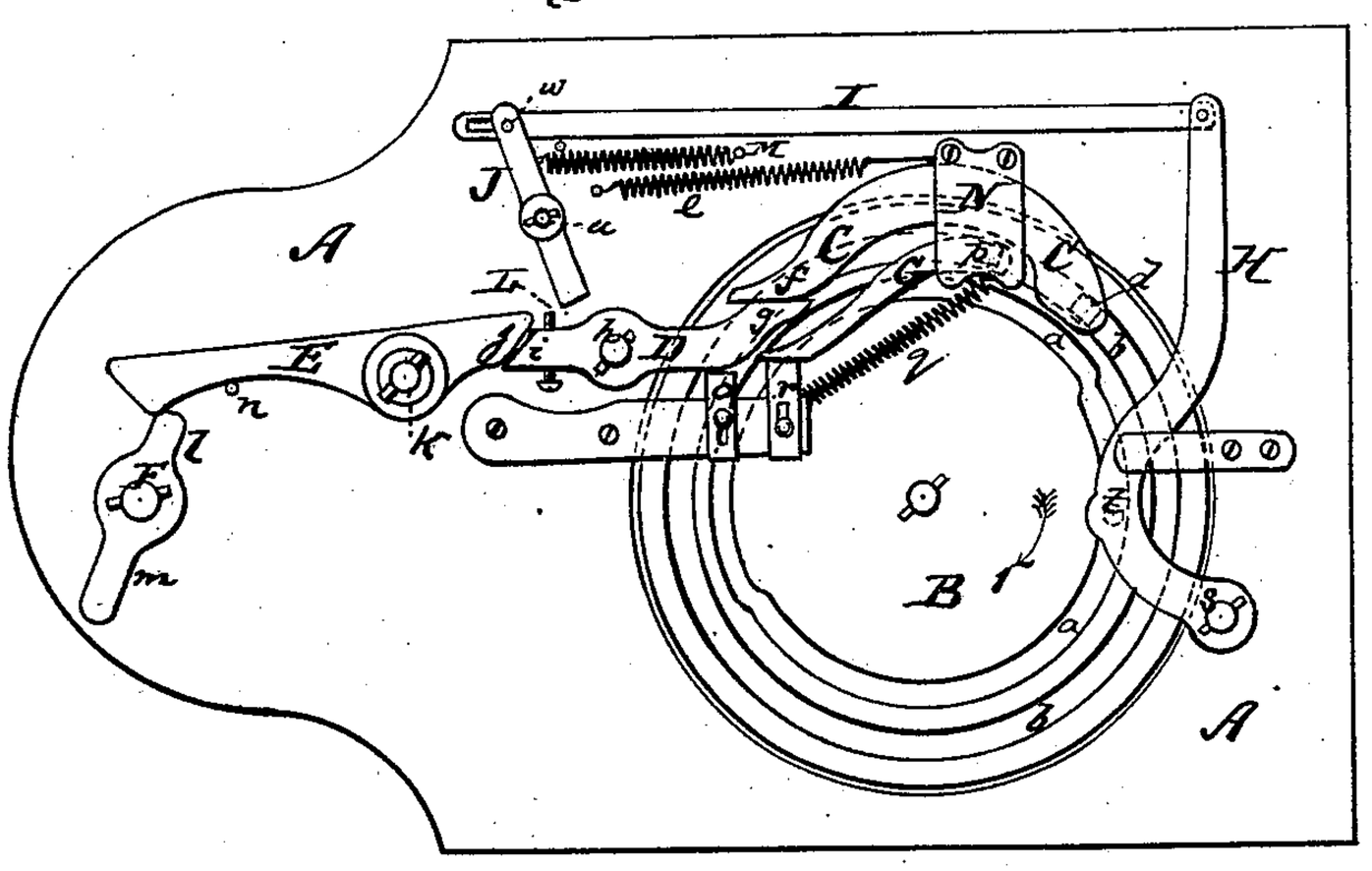
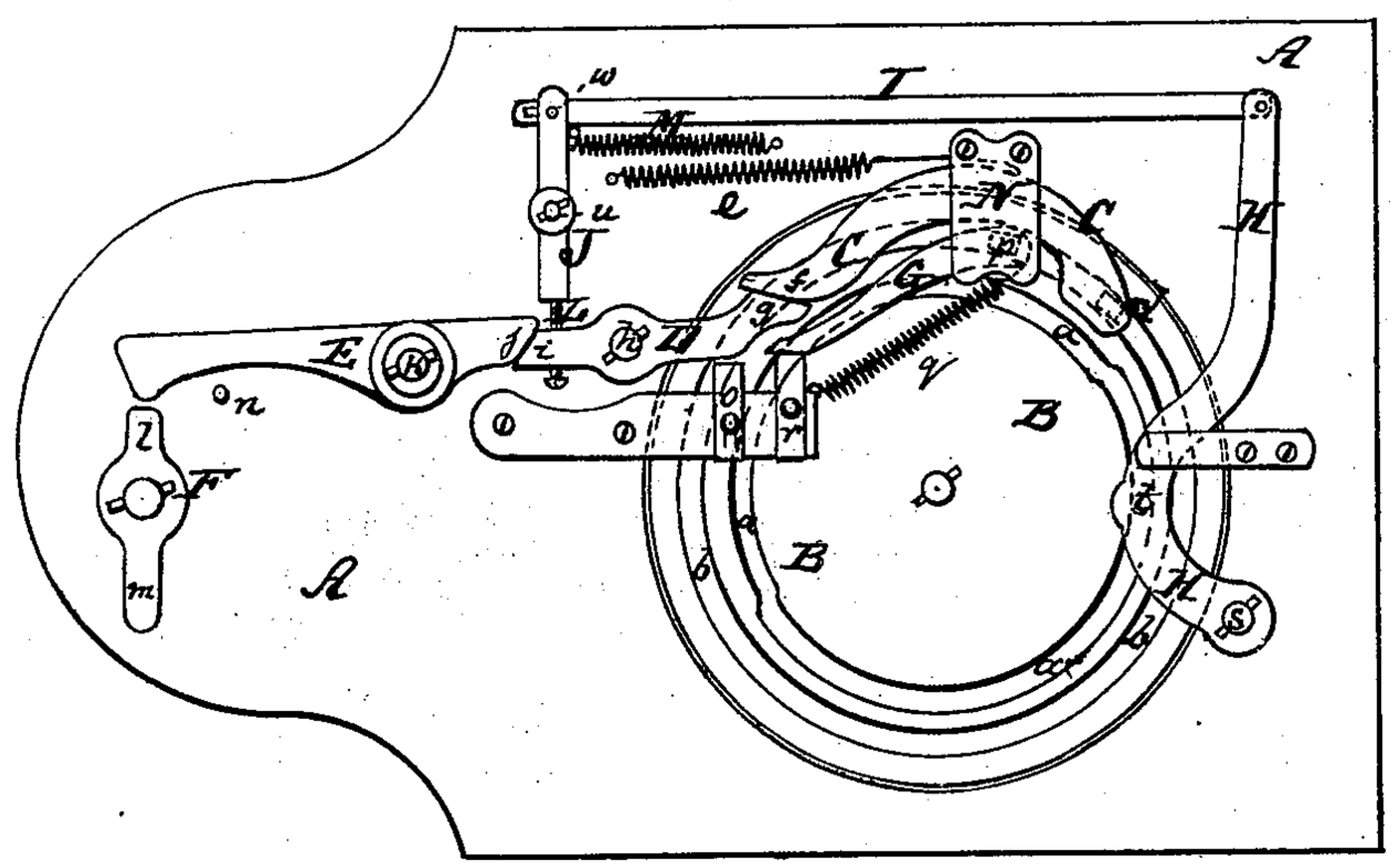


Fig: 2



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FRIEDRICH ERNST SCHMIDT, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINES.

Specification forming part of Letters Patent No. **197,528**, dated November 27, 1877; application filed September 13, 1877.

To all whom it may concern:

Be it known that I, FRIEDRICH ERNST SCHMIDT, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Button-Hole Sewing-Machine, of which the following is a specification:

Figures 1 and 2 are bottom views of my improved button-hole attachment for sewing-machines, showing the parts which constitute it in different positions.

Similar letters of reference indicate corresponding parts in all the figures.

This invention relates to an improvement on the button-hole attachment for sewing-machines described in Letters Patent No. 183,333, dated October 17, 1876.

The principal object of the present invention is to simplify the mechanism for imparting motion to the feed-wheel and for regulating the motion of the same.

Instead of using a separate driving-wheel beneath the feed-wheel, as in said patent, I propose to use a doubly-grooved feed-wheel, thereby dispensing entirely with the driving-wheel, and instead of the jointed lever described in said patent for transmitting the motion of a rotary shaft having two toes to the feed-wheel, I use a system of independent levers, whereby I am enabled to attain a more perfect manner of regulating the stitches, or, rather, the degree of feed, and also enabled to use a sliding feed-dog instead of the rotary one. In conjunction with the sliding feed-dog, I also use a brake-dog, which answers the purpose of the pawl or other devices heretofore used for preventing a backward motion of the feed-wheel.

My invention consists in the several mechanical devices employed for attaining the above-mentioned objects, and also in a new arrangement of parts for setting the levers so as to vary the feed and for adjusting the several parts, as hereinafter more fully described.

In the accompanying drawing, the letter A represents the work-plate of the machine as it is always made in button-hole machines. B is the feed-wheel, which is provided on its under side with the usual groove *a*, of which one half or part is smaller in diameter than the other, as clearly shown in the drawing, and as already described in the aforementioned patent. The under side of the feed-wheel B is also provided with an annular groove, *b*, which is what I term the "feed-groove." Into this annular groove *b* enters a pin, *d*, that projects into it from the sliding feed-dog C. A spring, *e*, connects with the feed-dog, so as to hold the pin *d* in its normal position in the groove *b*. The pin *d* is applied to one end of the feed-dog. The other end of the same is more or less flattened, as shown at *f*, and is, by the spring *e*, held against the flattened end *g* of a lever, D, which I term the "intermediate lever," and which is, by a pin, *h*, pivoted to the work-plate or other part of the frame of the machine. The end *i* of the lever D bears against the end *j* of another lever, E, which I term the "operating-lever," and which is, by a pin, *k*, pivoted to the under side of the work-plate or other part of the frame of the machine. The lever E is subjected to the action of two toes, *l* and *m*, that project from a rotary shaft, F, and of which toes one, *l*, is shorter than the other, *m*. The tendency of the spring *e* on the feed-dog C is to hold the ends *f g* of the parts C D and the ends *i j* of the levers D E in contact with each other, and also to crowd the lever E against a fixed stop, *n*, which is so placed on the bed-plate A that when the lever E bears against it said lever will be within reach of the shorter as well as the longer toes of the shaft F. Now, when this shaft is rotated it alternately strikes the lever F by means of its said toes, and imparts to the same an oscillating motion, which motion is transmitted from the lever E to the lever D, and from the latter to the feed-dog C. Every time said feed-dog is thus struck and pushed by the lever D it imparts a short movement in the direction of the arrow 1, (shown in Fig. 1,) to the feed-wheel, and as soon as the feed-dog is liberated from the effect of the toe of the rotary shaft F the spring *e* draws said feed-dog back into its normal position, and also throws the lever E back against the stop *n*. Thus, by the rotation of the shaft F, intermittent rotary movement is imparted to the feed-wheel. The degree of stroke imparted by the feed-dog to the feed-wheel may be regulated by an adjustable slide, *o*, which bears against the lever D, as shown, and which may be set so as to cause

said lever, with the other parts affected by it, to move more or less under the action of the rotating toes *l m*.

G is a "brake-dog," as I term it, being a sliding rod or plate provided with a projecting pin, *p*, which pin also enters the groove *b* of the feed-wheel. A spring, *q*, connects with said brake-dog, and tends to hold the same so as to always crowd the pin *p* against the inner circumference of the groove *b*, and thereby relieves said pin from engagement therewith at each forward movement of the feed.

In this position the parts G *p* serve as a shoe or brake, to prevent the backward motion of the feed-wheel by any incidental friction that may be caused by the backward movement of the feed-dog.

The power of the brake-shoe G *p* may be regulated by regulating the tension of the spring *q*, and also by an adjustable slide, *r*, which bears against the free end of the shoe G, and may be used to vary the angle of the same to the feed-wheel.

As thus far described the parts operate when the degree of motion of the feed-wheel is to be largest—that is to say, while the feed-wheel is moved during the stitching of the straight sides of the button-hole; but, as already stated in the above-mentioned patent, it is necessary that when the cloth describes the curve, and while the rounded part of the button-hole is being stitched, the feed should be much slower. This I effect by the arrangement of the parts H, I, J, L, and M, hereinafter specified. H is a lever, pivoted at *s* to the work-plate, and provided with a pin, *t*, that enters the groove *a* of the feed-wheel. The free end of the lever H is, by a rod, I, connected with another lever, J, which is at *u* pivoted to the under side of the work-plate, and of which the free end is at a short distance from the intermediate lever D. A spring, M, is connected with the lever J, or, if desired, with the rod I or lever H, so as to have the tendency to draw the free end of the lever J toward the pivot *k* of the lever E. L is a screw or adjustable projection applied to the intermediate lever D, near to the end *i* of the same, and projecting toward the lever J. Now, while the parts are operating for the long stitch, or, rather, the long feed, the parts H, I, J, L, and M have no effect whatever on the feed mechanism, and are in the position shown in Fig. 1; but as soon as, during the rotation of the feed-wheel, the pin *t* is caused to enter that portion of the groove *a* into which the spring M seeks to crowd the same, which, in this instance, is the larger portion of the groove *a*, (I mean the portion having the larger diameter,) the motion imparted by the consequent displacement of the pin *t* into such larger portion of the groove *a* will cause a corresponding displacement and movement of the rod I and lever J, bringing the latter in line with the projection or pin L of the lever D, as shown in Fig. 2. In this position the lever J will hold the lever D, so as to cause the latter to hold the lever E away from the stop *n*, and out of reach of the shorter toe *l* of the shaft F, but still within reach of the longer toe *m* of said shaft, all as indicated in Fig. 2. Consequently, while the pin *t* is in said larger part of the groove *a*, the rotary shaft F will only affect the feed by means of its larger toe—that is to say, only one-half the number of feed-strokes will be exerted upon the feed-wheel by the feed-dog as if the parts were in the position shown in Fig. 1, and the strokes thus reduced in number will also be shorter than those produced by the larger toe *m* while the parts are in the position shown in Fig. 1. The pin *w*, which joins the lever J to the rod I, passes through a slot in the rod, as shown, to allow a certain degree of independent play to the lever J, and permit the same to be swung into line with the stop L, if at the time of transferring the pin *t* into the larger part of the groove *a* the shorter toe *l* should be within reach of the lever E; for if it were not for the provision thus made for independent play of the lever J, said lever might be drawn simply against the side of the screw L, and the parts would be therefore strained, injured, or broken during the subsequent movement of the feed mechanism. But by providing for this independent play the lever J will be drawn into its proper place against the projection L as soon as, even by the short toe *l*, the lever D is moved after the transition of the pin *t* into the larger part of the groove *a*.

It will be observed, from the foregoing specification, that I dispense entirely with the separate driving-wheel referred to in the foregoing patent, also with the ring-shaped feed-plate described in the same, and that I, furthermore, much simplify the mechanism which is used for feeding and regulating the motion of the feed-wheel B. The feed-dog C and the brake-dog G are held in proper contact with the wheel B by a suitable fixed plate, W, beneath which these parts are permitted to slide. Instead of having the slot for the free movement of the pin *w* in the rod I, it may be at the connection of the lever H with the rod I, or in the feed-wheel itself, for permitting a corresponding displacement of the pin *t* during that portion of the movement which necessitates, as already described, a certain independent play of the lever J, (by which I mean a play independent so far as not to strain the connection between said lever J and the feed-wheel B.)

I claim as my invention—

1. The combination, with the feed-wheel B, provided with the grooves *a* and *b*, of the lever D, provided with the adjustable projection L, sliding feed-dog C, levers H and J, and connecting-rod I, as and for the purposes specified.

2. The sliding feed-dog C, combined with the intermediate lever D, operating-lever E, and with the shaft F, having the toes *l* and *m*, substantially as specified.

3. The intermediate lever D, provided with the adjustable screw or projection L, and combined with cam B, having groove *a*, and with

the setting-lever H, rod I, regulating-lever J, and spring M, substantially as herein shown and described.

4. The lever J, combined with the lever D, having a projection, L, with the cam B, having groove *a*, with the rod I, lever H, and spring M, the rod I being slotted to allow a certain amount of independent play to the lever J, substantially as specified.

5. The sliding brake-dog G, having the pin *p*, entering the feed-groove *b* of the wheel B, and combined with the spring *q* and regulating-slide *r*, substantially as specified.

6. The combination of the regulating-slide *o* with the intermediate lever D, projecting screw L, feed-dog C, regulating-levers H and J, rod I, and grooved wheel B, substantially as specified.

7. The combination of the fixed stop *n* with the operating-lever E, intermediate lever D, feed-dog C, and spring *e*, substantially as herein shown and described.

FRIEDRICH ERNST SCHMIDT.

Witnesses:

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