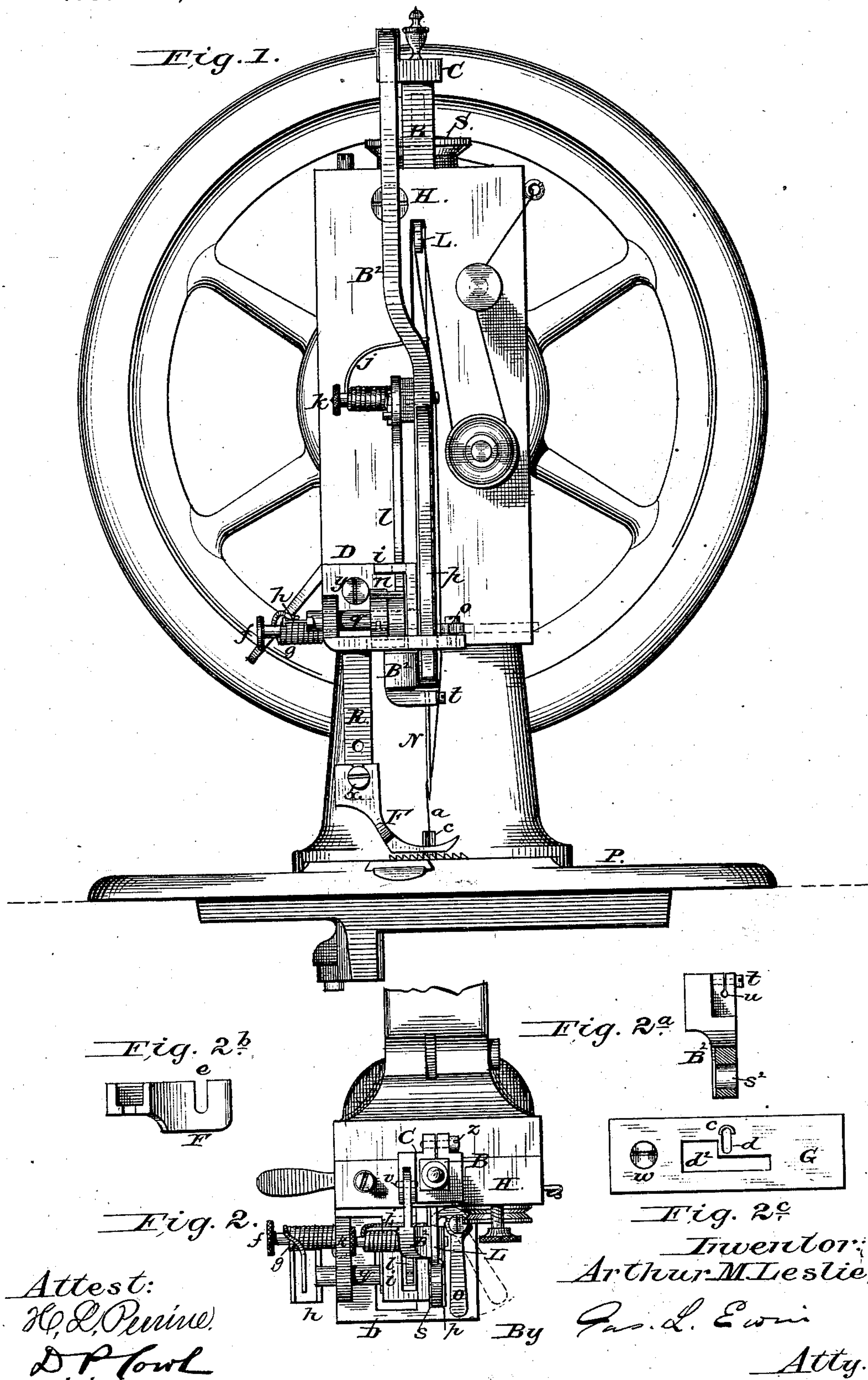


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Button-Hole Attachment for Sewing-Machines.  
No. 216,422. Patented June 10, 1879.

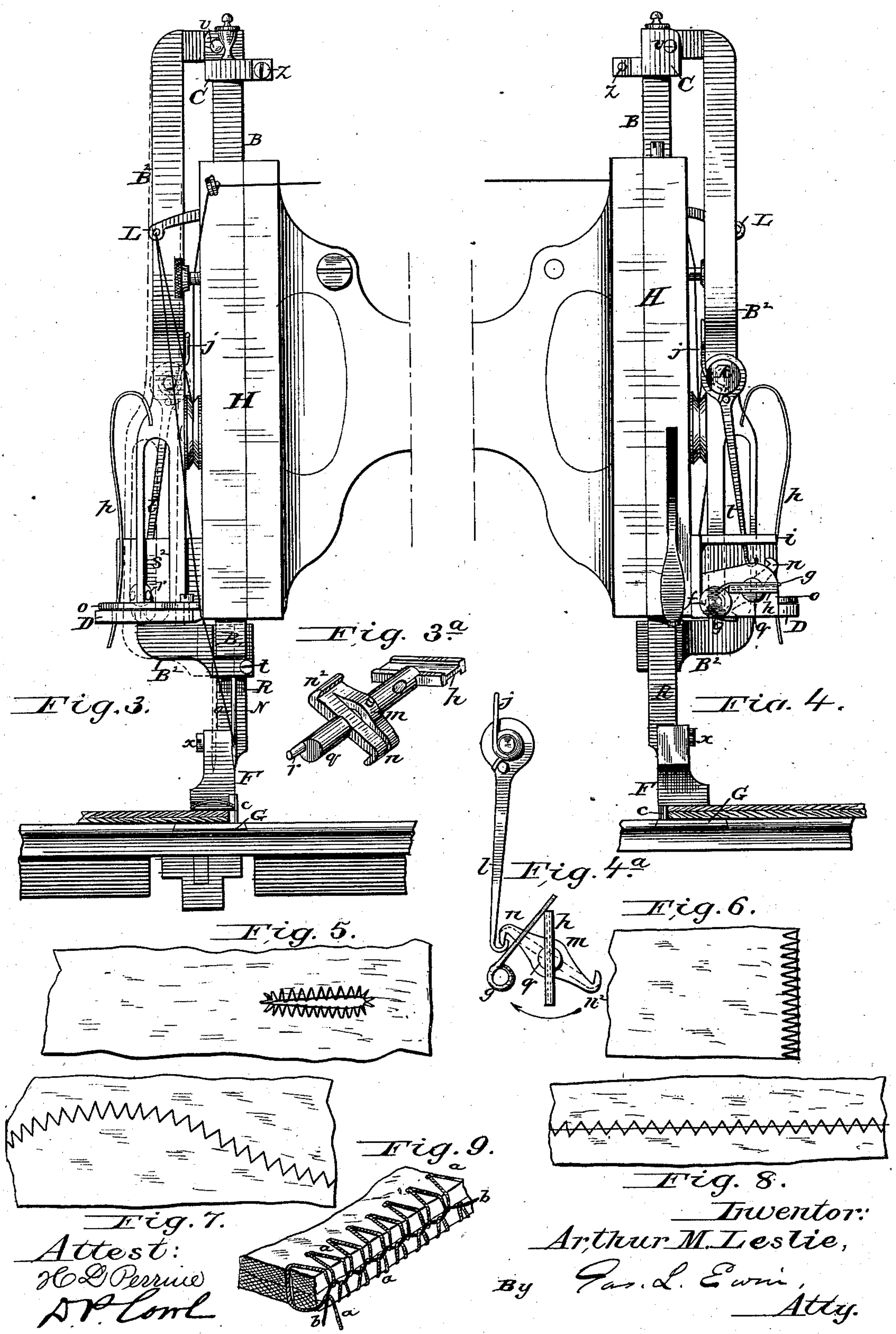
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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN BUTTON-HOLE ATTACHMENTS FOR SEWING-MACHINES.

Specification forming part of Letters Patent No. **216,422**, dated June 10, 1879; application filed March 6, 1879.

*To all whom it may concern:*

Be it known that I, ARTHUR M. LESLIE, of the city of Chicago, county of Cook, in the State of Illinois, have invented a new and useful Improvement in Button-Hole Attachments for Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This improvement relates to those mechanisms for making the button-hole stitch which are formed by attachments to ordinary sewing-machines.

The present invention consists, first, in the combination, with an ordinary needle-bar reciprocating in a vertical path, of a swinging supplemental needle-bar, which is readily and strongly attached to the upper end of said ordinary needle-bar by a clamp, while it carries the single needle of the attachment beneath the lower end of said ordinary needle-bar, the former being adapted to reciprocate with the latter and to receive independent lateral motion for forming the button-hole stitch.

The present invention consists, secondly, in the combination, with a laterally-movable needle-bar, of an arbor provided with a crank-pin working in contact with a lateral edge of said bar and a reaction-spring pressing against an opposite edge of said bar for vibrating and guiding the latter.

The present invention consists, thirdly, in the combination of a laterally-movable needle-bar having a longitudinal slot, an arbor provided with a crank-pin working in said slot in contact with an inner lateral edge of the bar thus formed, a reaction-spring pressing against an opposite edge of said bar, and a lever-eccentric, or its equivalent, engaging with the parallel edge of the bar opposed to said spring for vibrating and guiding said bar and providing for varying the length of stitch.

The present invention consists, fourthly, in a certain combination of parts for imparting a half-turn to said arbor during each upstroke of the needle.

The present invention consists, fifthly, in a certain combination of parts for assisting said actuating mechanism.

The present invention consists, sixthly, in a certain combination of parts whereby said crank-pin is kept steady in its respective stationary positions.

The present invention consists, seventhly, in a certain combination of parts whereby said actuating mechanism is assisted and said crank-pin is kept steady, as aforesaid, by one and the same means, as hereinafter more fully set forth.

Figure 1 of the accompanying drawings is an end elevation of a sewing-machine provided with my attachment. Fig. 2 is a top view of the head of the machine, showing those parts which can be seen from above. Fig. 2<sup>a</sup> is a top view of the lower end of the needle-bar in cross-section. Fig. 2<sup>b</sup> is a top view of the substitute presser-foot, and Fig. 2<sup>c</sup> is a top view of the substitute throat-plate. Fig. 3 is a front elevation of the head end of the machine and the attachments. Fig. 4 is a rear elevation of the same. Figs. 3<sup>a</sup> and 4<sup>a</sup> are, respectively, a perspective front view and a rear elevation of certain parts detached. Figs. 5 to 8, inclusive, are top views of pieces of cloth, illustrating the varieties of stitching produced by the attachment. Fig. 9 is a sectional perspective view, on a larger scale, illustrating the form of the stitch.

Like letters of reference indicate corresponding parts in the several figures.

The terms "right" and "left" "right-hand" and "left-hand," hereinafter used, refer to the parts as viewed in Figs. 3 and 4.

H represents the head with its face-plate, B the needle-bar, and P the cloth-plate, of a Singer sewing-machine to which my attachment has been applied. The latter, with the usual modifications as to shape and proportions, are applicable in substantially the same way to other straight-needle shuttle-machines, and are intended to be so applied in practice.

In adapting a machine to receive the attachment the ordinary needle, presser-foot, and throat-plate are removed; also, the lower screw of the face-plate; and the needle-groove in the shuttle-race is widened, if this has not previously been done.



A split collar, C, is now clamped to the extreme upper end of the ordinary needle-bar B by a screw, *z*. Another screw, *y*, attaches at once the lower end of the face-plate and a small frame or bracket, D, projecting therefrom, and a substitute presser-foot, F, and a substitute throat-plate, G, are attached, respectively, to the presser bar or rod R and the cloth-plate P by screws *x w*.

A pivot, *v*, parallel to the face-plate of the machine, attaches to the collar C a depending supplemental needle-bar, B<sup>2</sup>, the upper end of which is bent, as shown in Fig. 1, so as to hang behind the take-up lever L, while its extreme lower end is bent, as shown in Fig. 3, so as to project horizontally beneath the lower end of the ordinary needle-bar B, being adapted to fit closely to the latter, but with freedom to move laterally. A plan view of the said lower end of the said bar B<sup>2</sup> is shown in Fig. 2<sup>a</sup>, as aforesaid.

In that portion of said bar B<sup>2</sup> just described a vertical hole, *u*, is drilled to accurately fit the shank of the needle N. Besides being fitted to said hole the needle may be of any approved construction. To provide for securely clamping the needle in its holder, which is necessarily short, a slit intersects said hole *u*, and a clamping-screw, *t*, crosses said slit. Said bar B<sup>2</sup> works vertically and laterally within a guide-slot, *s*, Fig. 2, in the horizontal floor of the bracket D, and to a short distance above that portion of said bar which so works said bar is made flat, and provided with a longitudinal slot, *s*<sup>2</sup>. The latter accommodates an intermittently-revolving pin, *r*, like a crank-pin, which projects into said slot *s*<sup>2</sup> from the end of a little horizontal shaft or arbor, *q*, mounted on the bracket D.

The crank-pin *r* assists in guiding the needle N vertically, and by its movement shifts the needle from right to left, as indicated by dotted lines in Fig. 3, so as to cause the needle to pierce the goods back from the edge or at the left-hand edge of the stitching alternately with its descent at or beyond the edge, or in line with the right-hand edge of the stitching.

The movement of the needle from left to right is accomplished, when the said crank-pin changes its position, by means of a reaction-spring, *p*, which is attached to the outer edge of the bar B<sup>2</sup>, and presses against the left-hand end of the said slot *s* in the bracket D.

For varying or regulating the width of the stitching, (except when the attachment is used for edge-sewing, including button-holes,) a little lever-eccentric, *o*, is attached by a pivotal screw to the said floor of the bracket D, with its toe at the right-hand end of said slot *s*. By moving the handle of this lever forward more or less, as indicated by dotted lines in Fig. 2, the stitching may be made as much narrower than the maximum as may be desired, said toe of the lever forming the right-hand guide of the needle.

By transposing and otherwise modifying

the parts last described, so that the needle shall be moved positively from left to right, and by spring from right to left, the toe of the lever *o*, or its equivalent, engaging with the left-hand edge of the bar B<sup>2</sup>, said lever, or its equivalent, can be made to regulate the width of the stitching in edge-sewing, as well as in embroidering and the like. This modification is proposed, also the employment of other forms of springs instead of the form shown at *p*, and a gage-screw instead of the lever *l*.

The mechanism by which the arbor *q* is intermittently rotated is shown in position in Figs. 1, 2, and 4, and detached in Figs. 3<sup>a</sup> and 4<sup>a</sup>. A pair of ratchet-arms, *n n*<sup>2</sup>, united by a hub, *m*, are attached to said arbor near its front end, said hub being slipped on said arbor and pinned thereto. Said arms terminate in claws projecting rearwardly with reference to the direction in which the shaft rotates, and a like claw at the lower end of a pivoted hook-bar, *l*, engages therewith alternately. This hook-bar is attached by a long pivotal stud, *k*, to the back of the supplemental needle-bar B<sup>2</sup>, and a spring, *j*, coiled around said stud, tends to engage said hook-bar with said ratchet-arms. The lower end of said hook-bar is guided by a slotted portion, *i*, of the bracket D, and in every upstroke of the needle-bars its claw engages with that of one of said ratchet-arms *n n*<sup>2</sup>, and, through the engaged arm and its hub *m*, imparts a half-turn, or nearly a half-turn, to the arbor *q* and its crank-pin *r*. (See Fig. 4<sup>a</sup>.)

To facilitate the completion of said movements of the crank-pin, and to hold the latter steady while at rest, as also to hold said ratchet-arms in proper position to engage with said hook-bar, a flat tail-piece, *h*, is attached to the rear end of the shaft *q*, and a straight end of a coiled spring, *g*, is made to engage therewith, said tail-piece having grooved sides to preclude the displacement of said spring end. A stud, *f*, screwed into the bracket D, supports the spring *g*. The tail-piece *h* is set at such an angle with relation to the ratchet-arms *n n*<sup>2</sup> that it passes its centers beneath the spring *g* before the completion of the upstroke of the hook-bar *l*, and thus enables said spring *g*, in combination with said tail-piece, to disengage the claws of said hook-bar and arms, and complete the motion of the latter and of the arbor *q* and crank-pin *r*, as aforesaid. At the end of each movement said spring end rests within the grooved upper side of the tail-piece, and holds the parts in position until the next upstroke of the needle, when the operation above-described is repeated.

The needle N, Figs. 1 and 3, carries a thread, *a*, from a spool, S, on the regular holder, said thread passing through the regular guides, including that of the take-up lever L, but so as to bear a light tension; and said needle works back and forth beneath the ordinary needle-bar, as aforesaid, so as to produce the laterally-extended button-hole stitch.

The presser-foot F, Fig. 2<sup>b</sup>, has a deep



notch, *e*, in its right-hand edge to accommodate said lateral movement of the needle, and the throat-plate *G*, Fig. 2<sup>c</sup>, has a correspondingly-elongated needle-hole, *d*, with a grooved guide-pin, *c*, which projects upward at the right-hand end of said hole or slot and into said notch in the presser-foot when the latter is lowered. Said throat-plate has also a slot, *d*<sup>2</sup>, to accommodate the ordinary feed-dog.

The ordinary shuttle works beneath the throat-plate, carrying a thread, *b*, which need only be of the desired color, the tension on the latter being enough stronger than that on the upper thread, *a*, to cause said shuttle-thread to draw all the loops of the upper thread to the locking-line, as illustrated by Fig. 9. The shuttle-thread is drawn from the bobbin as fast as needed by the feed of the cloth. A tight lock is thus secured. The shuttle-thread is not exposed, and by locating the guide-pin *c* at the locking-point the stitching is locked along the edge as in hand-sewing. The length of the feed determines the openness or compactness of the stitching.

In working button-holes, Fig. 5, the guide-pin *c* is inserted through the hole; and in edge-sewing or working edges, Fig. 6, the edge to be worked rests against said guide-pin, as shown in Figs. 3 and 4. In other embroidering, Fig. 7, and in zigzag stitching, Fig. 8, for uniting pieces of cloth and for other purposes, a throat-plate without any guide-pin is used.

I am aware that supplemental needle-bars have been attached for various purposes so as to slide laterally with reference to the ordinary needle-bar, and these I disclaim.

My swinging supplemental needle-bar is securely attached by means of a simple clamp applied to the upper end of the ordinary needle-bar, and works with much less friction than a sliding attachment.

I am also aware that button-hole attachments have before been devised for ordinary lock-stitch sewing-machines. This is not, therefore, broadly claimed as a novel feature of my present invention.

Neither do I claim as new a lever-eccentric or its equivalent, *per se*, as means for varying the length of the button-hole stitch.

Having thus described my said improvement, the following is what I claim as new and of my own invention, and desire to secure by Letters Patent, namely:

1. The combination, with an ordinary needle-bar reciprocating in a vertical path, of a clamp applied to the upper end of said ordinary needle-bar and a supplemental needle-bar depending from a pivot in said clamp, said supplemental needle-bar being adapted to carry a needle beneath the lower end of said ordinary needle-bar and to be moved back and forth laterally, substantially as herein described, for the purpose set forth.

2. The arbor *q*, provided with the crank-pin *r*, in combination with a reaction-spring and a laterally-movable needle-bar, substantially as herein described, for the purpose specified.

3. The combination of the supplemental needle-bar *B*<sup>2</sup>, provided with the slot *s*<sup>2</sup>, the arbor *q*, provided with the crank-pin *r*, the lever-eccentric *o*, or its equivalent, and a reaction-spring, substantially as herein described, for the purpose set forth.

4. The combination of the supplemental needle-bar *B*<sup>2</sup>, the hook-bar *l*, and the arbor *q*, provided with the ratchet-arms *n* *n*<sup>2</sup> and crank-pin *r*, substantially as herein specified.

5. The combination of the supplemental needle-bar *B*<sup>2</sup>, the hook-bar *l*, the arbor *q*, provided with the ratchet-arms *n* *n*<sup>2</sup> and tail-piece *h*, and the spring *g*, substantially as herein set forth.

6. The combination of the arbor *q*, provided with the crank-pin *r* and tail-piece *h*, and the spring *g*, substantially as herein described.

7. The combination of the arbor *q*, provided with the crank-pin *r*, ratchet-arms *n* *n*<sup>2</sup>, and tail-piece *h*, and the spring *g*, substantially as herein specified, for the purpose set forth.

ARTHUR M. LESLIE.

Witnesses:

O. W. BOND,  
J. C. POLLEY, Jr.