2 Sheets--Sheet 1.

C. S. CUSHMAN
Sewing-Machine.

No. 165,798. Patented July 20, 1875.

Fig. 1.

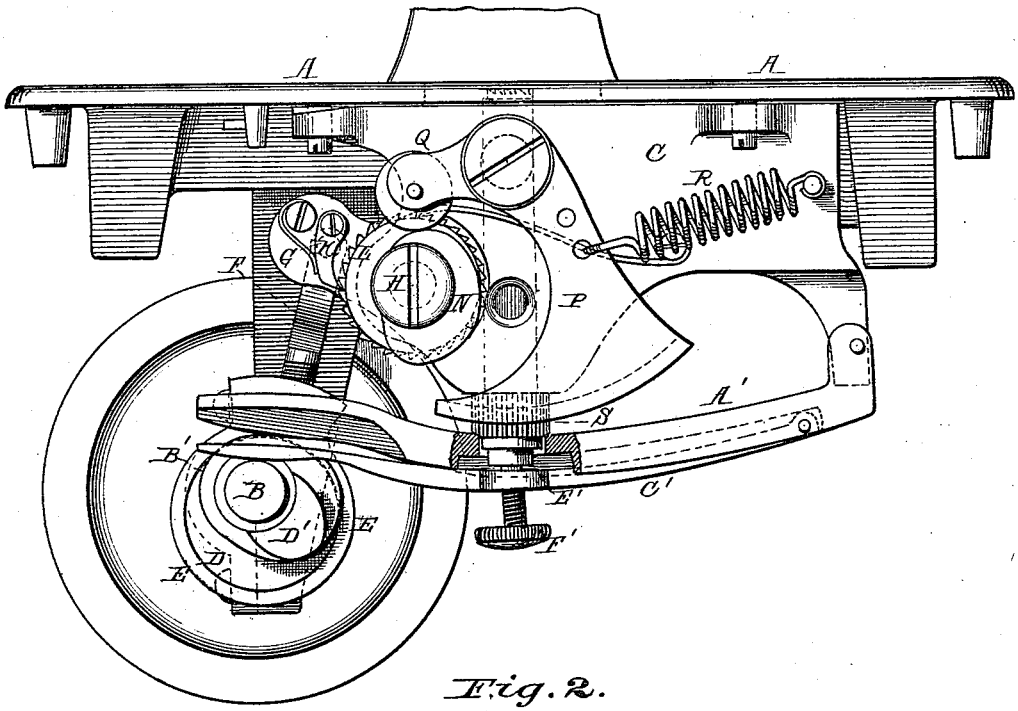
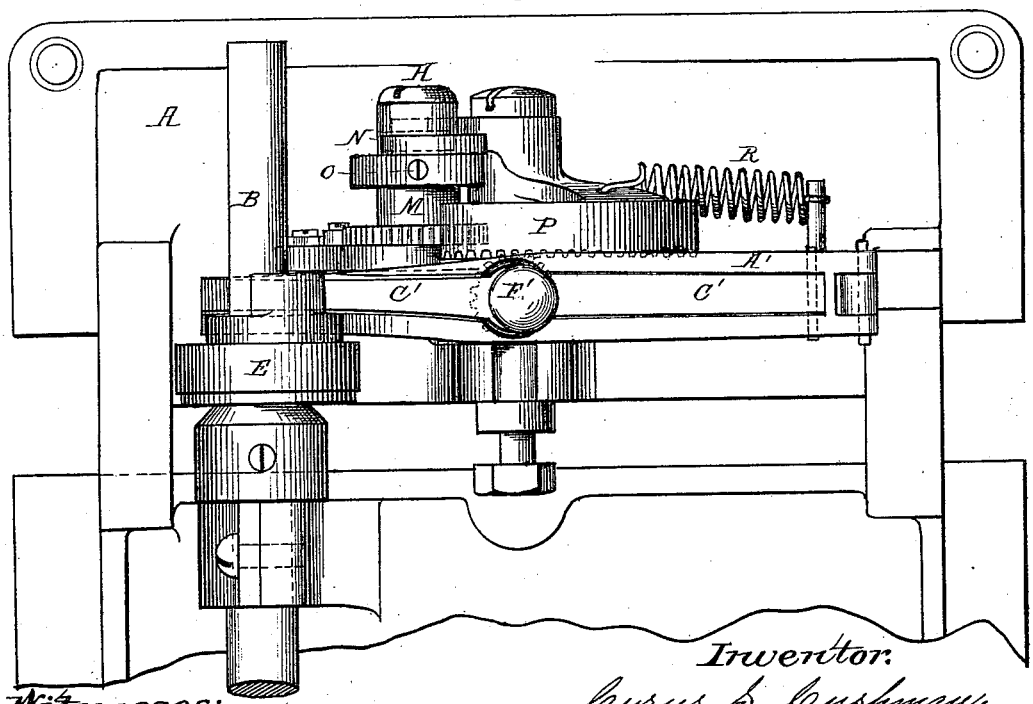


Fig. 2.



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2 Sheets--Sheet 2.

C. S. CUSHMAN
Sewing-Machine.

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Fig. 3.

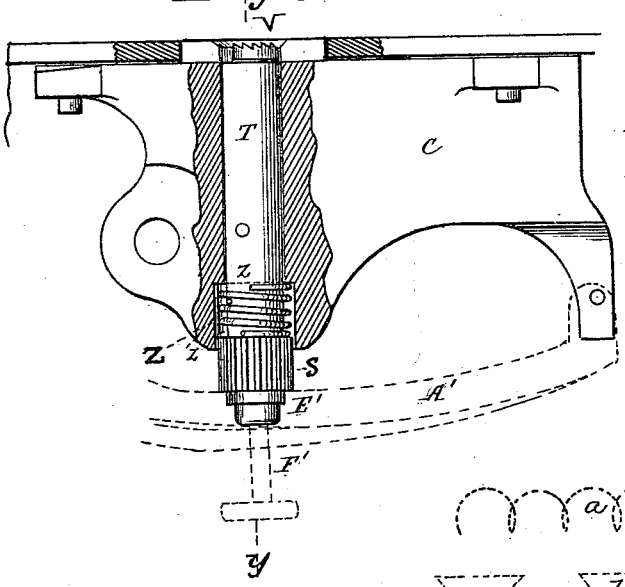
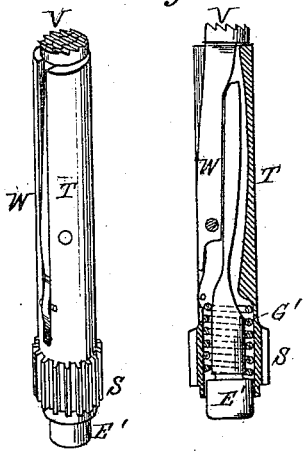


Fig. 5.



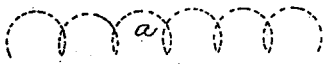


Fig. 8.

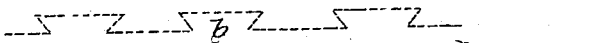


Fig. 4.

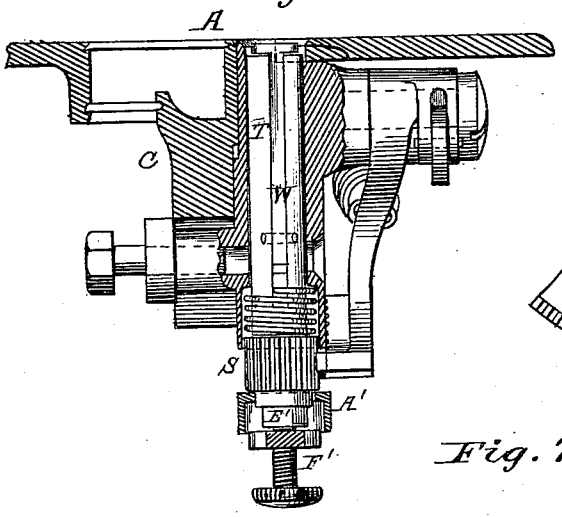


Fig. 6.

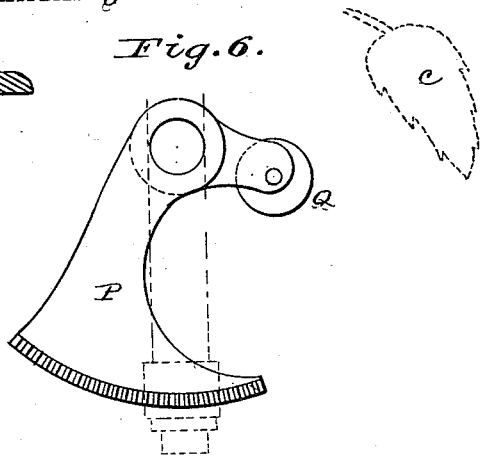
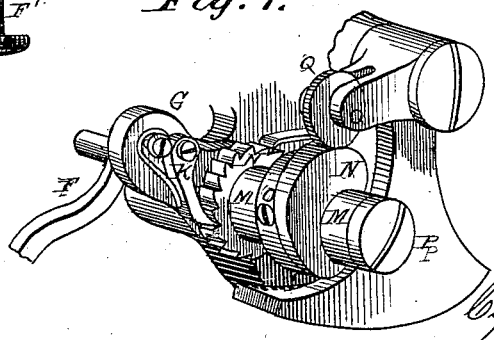


Fig. 7.



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By James L. Norris
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UNITED STATES PATENT OFFICE.

CYRUS S. CUSHMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO NESBITT D. STOOPS, OF SAME PLACE.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **165,798**, dated July 20, 1875; application filed May 14, 1875.

To all whom it may concern:

Be it known that I, CYRUS S. CUSHMAN, of Philadelphia, Pennsylvania, have invented certain Improvements in Sewing-Machines, of which the following is a specification:

This invention relates to certain improvements in the construction of the feed-movement of sewing-machines, whereby an intermittent and variable rotary motion, and a simultaneous horizontal and vertical reciprocating motion may be given to the feed-plate, in such manner as to carry the fabric in any direction over the bed-plate of the machine for the purpose of forming the stitches in various designs or patterns for ornamental work.

The invention consists, first, in the combination, with the driving-shaft of the sewing-machine, of certain devices for imparting an intermittent rotary movement to the feed-plate, consisting of an eccentric attached to said shaft, and connected with a pawl, which imparts an intermittent rotary movement to a ratchet-wheel, and a corresponding movement to a pattern-cam on the shaft of the same, said pattern-cam in turn imparting a reciprocating movement to a toothed segment gearing in a pinion-wheel upon the lower end of an upright shaft which carries the feed-plate, as more fully hereinafter described. Second, in the combination, with a driving-shaft of a sewing-machine, of certain devices for imparting a horizontal reciprocating motion to the dentated feed-plate, consisting of a cam attached to said driving-wheel, which operates a lever working against the lower end of an upright shaft, extending upward into the vertical shaft before mentioned, in such manner as to oscillate a lever to which the feed-plate is attached, as more fully hereinafter described. Third, in the combination of the devices above mentioned, for imparting a combined rotary and horizontal reciprocating movement to the feed-plate, as hereinafter more fully set forth. Fourth, in the combination, with the devices above mentioned for imparting a rotary and horizontal reciprocating movement to the feed-plate, of certain devices for imparting to the same a vertical reciprocating movement, consisting of a cam attached to the shaft of the machine, operating a lever, which, in turn, operates the vertical shaft carrying said feed-plate, raising the same at proper intervals, and a spring for depressing said shaft, as more fully hereinafter described. Fifth, in a pattern-cam, adapted to fit upon the shaft of a ratchet-wheel operated by the main driving-shaft of the machine, as hereinafter more fully described, in combination with a toothed segment gearing into a pinion-wheel on the shaft which carries the feed-plate, for the purpose of varying the rotary movement of the same, and to change the design or pattern of the stitches, as more fully hereinafter set forth. Sixth, in combination with the devices for giving a horizontal reciprocating movement to the feed-plate, of a device for regulating the throw of the same, for the purpose of adjusting the length of the stitches, as more fully hereinafter set forth.

In the accompanying drawings, Figure 1 represents the lower portion of the front end of an ordinary sewing-machine, showing my improvements attached thereto. Fig. 2 represents a view looking at the bottom of the same. Fig. 3 represents a detached view of a portion of my device, with parts removed, showing the upright shaft which carries the feed-plate. Fig. 4 represents a section through the line *y y* of Fig. 3. Fig. 5 represents detached views of the upright shaft which carries the feed-plate, and the reciprocating shaft which imparts the horizontal reciprocating motion to the same. Fig. 6 represents a detached view of the toothed segment which operates the vertical rotating shaft carrying the feed-plate, and Fig. 7 represents a perspective view of a part of the devices, showing the segment, pattern-cam, ratchet-wheel, and pawl.

In the drawings, A represents the bed-plate of the machine, with the usual hangers below for carrying the lower working parts of the machine, and B the main driving-shaft of said machine. C represents an additional hanger for portions of my improved devices. D represents an eccentric secured to the main shaft B of the machine, and E an eccentric strap surrounding the same, connected by means of a rod, F, to a pawl, G, swiveled at one end to the shaft H, and carrying at the other a fin-

ger, K, which engages the teeth of a ratchet-wheel, L, secured to a sleeve or hub, M, journaled on the shaft H, which is securely fastened to the hanger C. N represents a removable pattern-cam of any desired configuration, secured by means of a set-screw, O, to the hub or sleeve M, so as to revolve with it. P represents a toothed segment, pivoted to the hanger C, and carrying at its upper end a friction-wheel, Q, which revolves in contact with the edge of the pattern-cam N, being kept in such position by means of the spring R, attached at one end to the segment P, and the other to the hanger C. The toothed portion of said segment gears into a pinion-wheel, S, secured to the lower end of a vertical shaft, T, as represented in Figs. 3, 4, and 5, journaled in a bore for the purpose of extending vertically through the hanger C, said shaft carrying the feed-plate V which projects through an opening above through the plate of the machine. Said feed-plate V is attached to the upper end of a spring-rod, W, which rests in a vertical slot in the shaft T, being secured to said shaft at its lower end by means of a pin, or in any other convenient manner. Z represents a spiral spring surrounding the lower end of the shaft T, and bearing against the upper face of the pinion-wheel S, and fitting in an enlarged recess at the lower end of the vertical bore in which the shaft T is journaled. A′ represents a lever pivoted at one end to the hanger C, extending under the pinion-wheel S, and terminating over a cam, B′, against which it rests, secured to the shaft B of the machine. Said lever is recessed on its lower side, and in said recess is pivoted at one end a shorter lever, C′, the front end of which falls over and rests in contact with a cam, D′, also secured to the shaft B. The lever A′ is bored at a point immediately under the pinion-wheel S, and through the opening extends the lower end of a shaft, E′, extending vertically into the shaft T behind the spring-bar W, the upper end being beveled, substantially as shown, and arranged to work in contact with corresponding bevel on the back of the spring-rod, just below the feed-plate. Immediately below the lower end of the shaft E′, projecting through the lever C′, is a set-screw, F′, which may be adjusted vertically at pleasure, the lower end of said shaft resting upon the same. Around the shaft E′, near the lower end, within the lower end of the shaft T, is a spiral spring, G′, Fig. 5, the lower end of which rests against a shoulder formed for the purpose on the said shaft E′, just above its lower end.

Having described the various parts of my improvements, I will now proceed to describe their operation.

When the machine is in motion the driving-shaft B of the same, by rotating the cam D, will impart a reciprocating motion to the rod F, which will cause the pawl G to oscillate and impart an intermittent rotary movement to the ratchet-wheel L. To the pattern-cam N, secured to the hub M of said wheel, will be imparted a corresponding motion. The said pattern-cam will move the segment P through the medium of the friction-wheel O, oscillating it back and forth, according to its configuration. The toothed portion of the segment as it oscillates, gearing into the pinion-wheel S, will impart an intermittent rotary motion to the shaft T in alternate directions, imparting a corresponding movement to the feed-plate, and moving the cloth or fabric alternately back and forth in a circular direction upon the table. The lever C′ and shaft E′ will at the same time be alternately elevated and depressed by the action of the cam D′ and spring G, causing the shaft E′, by reason of its beveled end working against the bevel on the spring-bar W, to give the feed-plate V a horizontal reciprocating motion. During the rotary and horizontal movements of the feed-plate V a vertical reciprocating movement is given to the same by means of the spring Z and lever A′, the latter being alternately lifted and dropped by the cam B′. This vertical reciprocating movement is for the purpose of allowing the feed-plate to fall below the surface of the bed-plate of the machine at each backward movement of the same, in order that it may not carry back the fabric while assuming the position for the next forward movement. By the combined rotary and reciprocating movements thus imparted to the feed-plate the cloth or fabric operated upon may be moved in any direction across the bed-plate of the machine, dependent upon the configuration of the pattern-cam, by which motion is imparted from the driving-shaft to the feed-shaft through the medium of the intermediate devices. By means of a set of interchangeable pattern-cams of different shapes or configurations, adapted to be fitted to the hub or sleeve of the ratchet-wheel, the rotary movement of the feed may be indefinitely varied, enabling the operator, at convenience, to form the stitches in various designs or patterns.

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

1. The combination, substantially as hereinbefore set forth, of an eccentric attached to the driving-shaft, a pawl and ratchet wheel for imparting motion to a pattern-cam, and a toothed segment and pinion-wheel for imparting an intermittent rotary motion to the feed-plate for the purpose of moving the same, as set forth.

2. The combination, substantially as hereinbefore set forth, of a cam attached to the driving-shaft, and a lever and spring for raising and depressing the spring W and imparting a horizontal reciprocating movement to the feed-plate.

3. The combination, substantially as hereinbefore set forth, of an eccentric attached to the driving-shaft, a pawl and ratchet for imparting an intermittent motion to a pattern-

cam, a segment and pinion-wheel for imparting a rotary motion to the shaft carrying the feed-plate, and a cam, lever, and spring for raising and lowering a shaft for imparting a horizontal reciprocating movement to the feed, simultaneously with the intermittent rotary movement of the same, as specified.

4. The combination, with the driving-shaft B, of the eccentric D, pawl G, ratchet-wheel L, segment P, and pinion-wheel S, on the shaft T, for imparting an intermittent rotary movement to the feed-plate, substantially as described.

5. The combination, with the driving-shaft B, of a cam, D′, lever C′, spring G′, and beveled lever E′, and spring-rod W, for imparting a horizontal movement to the feed-plate, substantially as described.

6. The combination of a cam, D, pawl G, ratchet-wheel L, segment P, and pinion-wheel S, attached to the shaft T, the spring-bar W, carrying the feed-plate V, and the shaft E′, spring G′, lever A′, and cam D′, substantially as described, for imparting a combined rotary and reciprocating motion to the feed-plate, as set forth.

7. In combination with the mechanism, substantially as hereinbefore set forth, for imparting a rotary and horizontal reciprocating motion to the feed-plate, the cam B′, lever A′, and spring Z for imparting a vertical reciprocating motion to the feed-plate, as set forth.

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Witnesses:

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