2 Sheets—Sheet 1.

N. D. STOOPS & C. S. CUSHMAN.

Sewing-Machines.

No. 197,679. Patented Nov. 27, 1877.

Fig. 1.

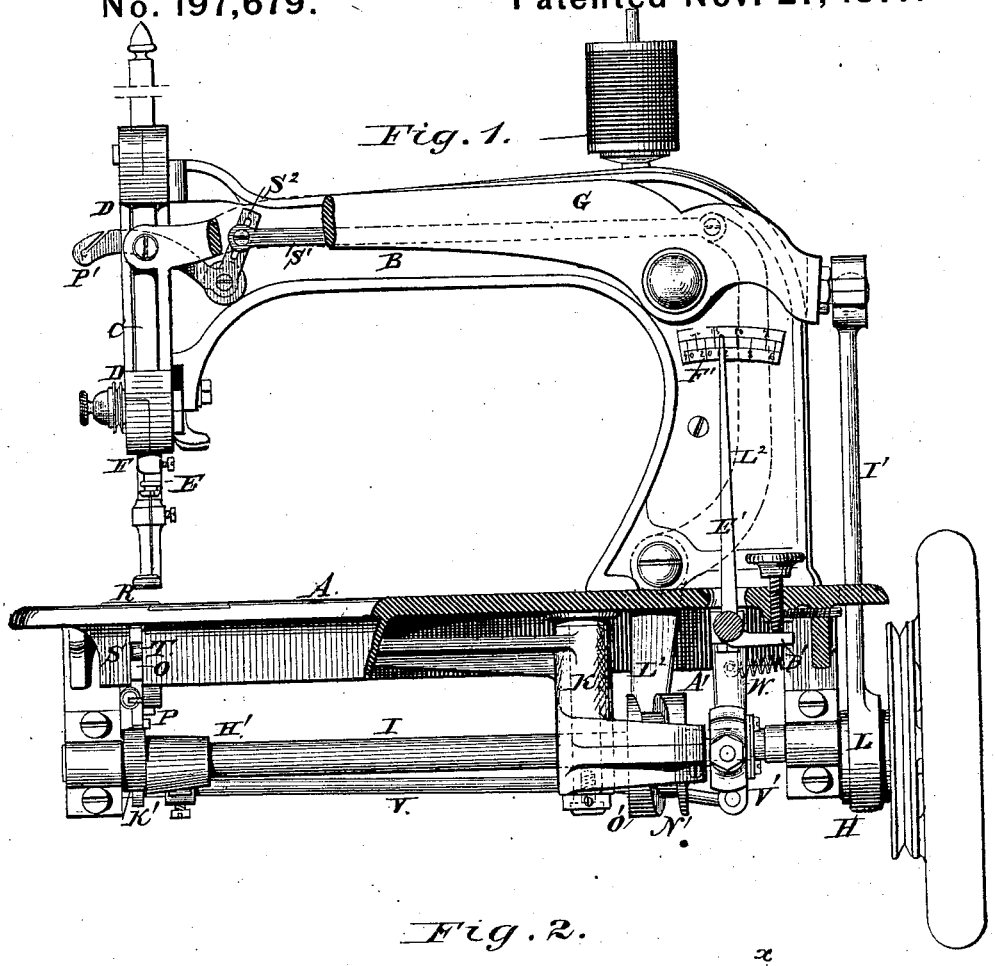
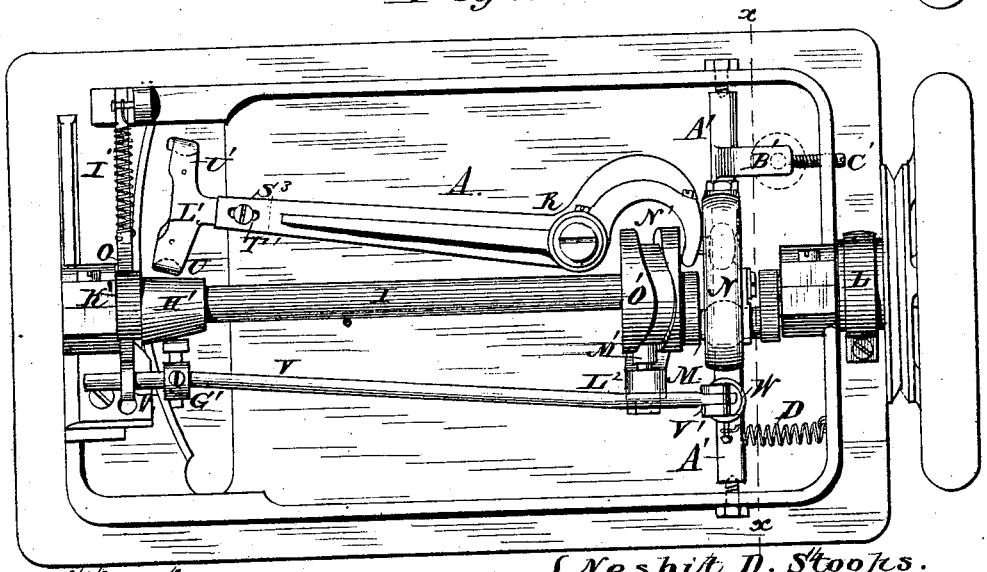


Fig. 2.



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Inventors. { Nesbit D. Stoops.
Cyrus S. Cushman.

By James L. Norris Atty.

2 Sheets—Sheet 2.

N. D. STOOPS & C. S. CUSHMAN.

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Fig. 3.

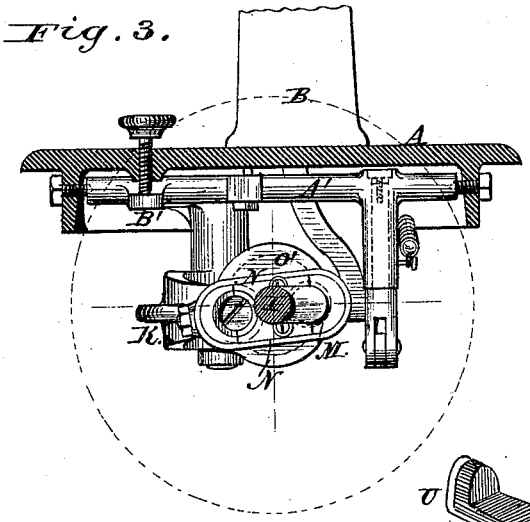


Fig. 8.

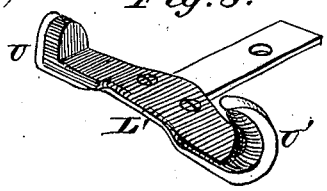


Fig. 4.

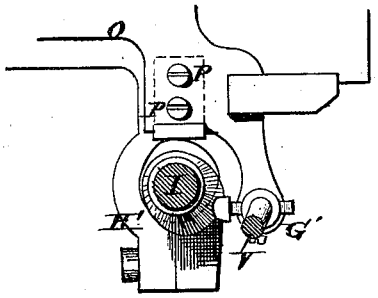


Fig. 6.

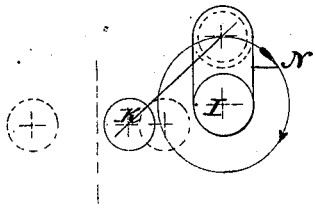


Fig. 5.

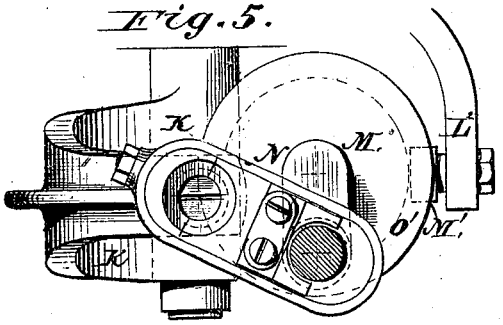
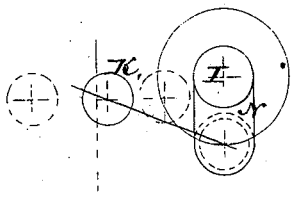


Fig. 7.



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By James L. Norris, Atty.

Attest
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Chas. L. Coombs.

UNITED STATES PATENT OFFICE.

NESBITT D. STOOPS AND CYRUS S. CUSHMAN, OF PHILADELPHIA, PA.; SAID CUSHMAN ASSIGNOR TO SAID STOOPS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **197,679**, dated November 27, 1877; application filed September 18, 1877.

To all whom it may concern:

Be it known that we, NESBITT D. STOOPS and CYRUS S. CUSHMAN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification:

This invention relates to certain improvements in sewing-machines; and it consists, first, in the combination, with the driving-shaft of a sewing-machine, of a lever for actuating the shuttle, connected to a crank on the said driving-shaft at a point below the axis of said shaft, whereby a variable, oscillating, or reciprocating motion is imparted to the carrier, in order to pass it properly through the loop of the needle-thread; second, in the combination, with the driving-shaft and the lever for actuating the needle-bar, operated by a rod secured to an eccentric on the driving-shaft, of a lever for actuating the shuttle-carrier, connected to a crank on the said driving-shaft by means of a link arranged in such relation to said crank and the driving-shaft that the greatest travel of the said link will take place at the time the shuttle is passing the needle, in order to carry it through the loop of the needle-thread, as more fully hereinafter set forth; third, in the combination, with the driving-shaft, the shuttle-carrier, and the mechanism for operating the same, of a take-up lever connected to a lever operated by a cam-cylinder on the driving-shaft, whereby the motion of the take-up lever is retarded as the shuttle passes through the loop of the needle-thread, and the tension of the needle-thread relieved during the passage of the shuttle, as more fully hereinafter set forth; fourth, in the combination, with the driving-shaft of a sewing-machine, and an irregular cam mounted thereon, and a swinging feed-dog, of a lever provided with an adjustable rider, and capable of a longitudinal movement with respect to said cam, whereby the backward and forward throw of the feed-dog may be regulated, as more fully hereinafter specified; fifth, in the combination, with the driving-shaft of a sewing-machine, the feed-dog, and the adjusting-bar, of the cams mounted on the driving-shaft, whereby the proper backward, forward, and vertical motions are imparted to the feed-bar, as more fully hereinafter set forth; sixth, in the combination, with the adjustable bar and the rock-shaft by means of which it is adjusted, of an index and scale for indicating the length of the stitch, as more fully hereinafter specified; seventh, in the combination, with the driving-shaft of a sewing-machine and a cylinder mounted thereon having a cam-groove in its periphery, of a lever connected with a bell-crank take-up lever, whereby a variable positive motion in both directions is imparted to said take-up lever, as more fully hereinafter described.

In the drawings, Figure 1 represents a side elevation of our improved apparatus, with parts broken away showing portions of the working mechanism in section. Fig. 2 represents a bottom view of our machine. Fig. 3 represents a transverse sectional view of the lower part of the machine on the line *x x* of Fig. 2. Fig. 4 represents a detached view of the mechanism for operating the feed-dog; Fig. 5, an enlarged view of the mechanism for transmitting motion from the driving-shaft to the shuttle-carrier; Fig. 6, a diagram showing the relative positions of the end of the shuttle-carrier, lever, link, and crank on the driving-shaft as the shuttle-carrier is passing the needle to take up the loop of the needle-thread; and Fig. 7, a similar diagram, showing the relative positions of the said parts on the passage of the shuttle-carrier by the needle on its return motion. Fig. 8 represents a perspective view of the shuttle-carrier detached, showing the rubber shuttle-seat thereof.

The letter A represents the bed of the machine, and B the standard which supports the upper work. C represents the needle-bar, mounted in ways D at the end of the standard, and E the presser-foot bar, mounted in similar ways, F, as usual. The letter G represents the lever which actuates the needle-bar, which is connected to an eccentric, H, on the driving-shaft I, by means of a rod, I′, provided with an eccentric-strap, L, at its lower end, which encircles said eccentric H.

The letter K represents a lever, pivoted to

the lower side of the table A, by means of which the shuttle-carrier L′ is actuated. In the present instance said shuttle-carrier is rigidly attached to the forward end of the lever K, but in case the shuttle-carrier is arranged to travel in a race, as in some classes of machines, it may be loosely attached to the end of the lever, as usual. The rear end of the lever extends below the driving-shaft, and is connected with a crank, M, thereon, by a link, N, by means of which an oscillating motion is imparted to said lever as the shaft is rotated.

As the eccentric H imparts a uniform movement to the lever which drives the needle-shaft, and as said lever imparts, in turn, a uniform reciprocating movement to the needle-bar, it is necessary, in order to pass the shuttle through the loop of the needle-thread, that a variable motion should be imparted to the shuttle-carrier, so as to accelerate its movement while the shuttle is being carried through the loop of the needle-thread, and a retarded motion on the return movement of said shuttle. This variable movement is effected by the peculiar arrangement of the lever K in respect to the crank M on the driving-shaft, the end of said lever to which the link N is attached being constructed to fall below the axis of the driving-shaft, so that the greatest travel of said link will occur at the time the shuttle-carrier is passing the needle, as shown in Figs. 3 and 5.

The essential feature of this part of our invention consists in the relative length of the connecting-link N and the throw of the crank, and the location of the point of connection of said link to the lever with respect to the axis of the driving-shaft. The said link, in order to give the proper variable movement, must be of a length about equal to the length of the throw of the crank, and thus, it will be seen, that this cannot be effected by an eccentric—the means usually employed for actuating the shuttle-lever—for the reason that the throw of the eccentric would necessitate the employment of a link or strap of much greater proportionate length.

The letter O represents the feed-dog, formed in two parts, adjustably secured together by means of the set-screws P P, by means of which the upward throw of the feed-surface R may be regulated. One end of said feed-dog is slotted, as shown at S, said slot setting over a pin, T, in the bed of the machine, upon which said feed-dog rides when in motion. The lower end of said feed-dog is provided with an aperture, U, through which extends one end of a rod, V, the other end of which is attached to an arm, W, extending downwardly from a rock-shaft, A′. Said rock-shaft is provided with a horizontal arm, B′, against which the end of a set-screw, C′, is adapted to bear, by means of which the said rock-shaft may be shifted in one direction, so as to project the rod V forward, its return movement being effected through the medium of a spring, D′.

To the rock-shaft is attached an arm, E′, extending upward alongside of the standard B, which is provided with a scale, F′, by means of which the length of the stitch is indicated, as hereinafter explained. The forward end of the bar V is provided with an adjustable rider, G′, which bears against an irregular cam, H′, on the driving-shaft, by means of which a forward motion is imparted to the bar V and the feed-dog, the distance varying according to the position the rider G′ occupies longitudinally with respect to the cam H′, the return motion of said feed-dog being effected by means of the spring I′.

The letter K′ represents a cam mounted on the driving-shaft, and bearing against the lower side of the feed-dog, by means of which a vertical movement is imparted to said dog.

In order to provide for the proper motions of the bar V on the arm of the rock-shaft, said arm is provided with a swiveled end, V′, to which said bar is pivoted, forming a universal joint, by means of which the bar is adapted to move in the two directions required.

The letter L^2 represents a lever pivoted in the standard B, and extending through the bed of the machine, its lower end carrying a friction-roller, M′, which sets in a cam-groove, N′, in a cylinder, O′, mounted on the driving-shaft of the machine. To the upper end of said lever L^2 is pivoted one end of a horizontal rod, S^1, extending along the horizontal arm of the standard B, its forward end being pivoted to the bell-crank take-up lever P′. Said cam-groove is so constructed as to give a variable movement to the take-up lever, retarding the same while the shuttle is passing through the loop of the needle-thread, so as to relieve the tension on the needle-thread during the passage of the shuttle through the loop of the same. The take-up lever is slotted at the end to which the bar S^1 is attached, and is connected to said bar by means of a screw, S^2, and nut, by means of which the relative positions of the rod and take-up lever can be adjusted to vary the throw of the take-up, as may be required.

The letter L′ represents the shuttle-carrier, which, as before mentioned, is rigidly attached to the end of the lever K, being adjustably secured thereto by means of a set-screw passing through the shank S^3 of said shuttle-carrier, and a longitudinal slot, T′, in the end of the lever. The shuttle-seat in said carrier is faced with rubber, as shown at U′ U′, to prevent the noise consequent upon the change of direction imparted to the shuttle in its reciprocation.

What we claim, and desire to secure by Letters Patent, is—

1. In combination with the driving-shaft of a sewing-machine, the lever for actuating the shuttle, connected with the crank on the driving-shaft, at a point below the axis thereof, substantially as herein shown and described, whereby an accelerated motion is imparted to the shuttle on its forward movement, while

passing through the loop of the needle-thread, and a retarded movement on its return stroke, as and for the purpose set forth.

2. In combination with the driving-shaft of a sewing-machine and the lever which actuates the needle-bar, a lever for actuating the shuttle-carrier, connected to a crank on the driving-shaft by means of a link, arranged, substantially as described, in relation thereto, whereby an accelerated movement is imparted to the shuttle on its forward movement, as it is passing through the loop of the needle-thread, and a retarded movement is imparted to said shuttle on its return movement, as and for the purposes specified.

3. The combination, with the driving-shaft, shuttle-carrier, and mechanism for operating the same, of a take-up lever connected to a lever operated by a cam-cylinder on the driving-shaft, and operating independently of the needle-bar, whereby a variable positive motion with respect to the needle is imparted to the take-up, and said take-up is retarded during the passage of the shuttle through the loop of the needle-thread, substantially as and for the purposes set forth.

4. In combination with the driving-shaft of a sewing-machine, the feed-dog O, and adjusting-bar V, the cam H′, acting upon the adjusting-bar, and the cam K′, acting directly upon the feed-dog, substantially as described, whereby the requisite vertical and horizontal reciprocating motions are imparted to the feed-dog, substantially as described.

5. In combination with the driving-shaft of a sewing-machine, and the feed-dog, and adjusting-bar, the cams mounted on said driving-shaft, whereby the proper backward, forward, and vertical movements are imparted to said feed-dog, substantially as set forth.

6. In combination with the adjusting-bar of the feed-dog, the rock-shaft, and its operating mechanism, the index-lever and scale, whereby the length of the stitches can be determined, substantially as set forth.

7. In combination with the driving-shaft of a sewing-machine and the cam-cylinder mounted thereon, the bell-crank take-up lever and its operating-lever, whereby a variable positive motion in both directions, with respect to the needle-bar, is imparted to the take-up, substantially as and for the purposes set forth.

8. The combination of the slotted bell-crank lever P′, its actuating-rod S^1, and the set-screw and nut by which the two are adjustably connected, substantially as described, whereby the throw of the take-up may be regulated as desired.

In testimony that we claim the foregoing we have hereunto set our hands in the presence of the subscribing witnesses.

NESBITT D. STOOPS.
CYRUS S. CUSHMAN.

Witnesses:
S. W. REEVES,
LUTHER E. HEWTIT.