

W. O. GROVER.
Sewing Machine.

No. 42,576.

Patented May 3, 1864.

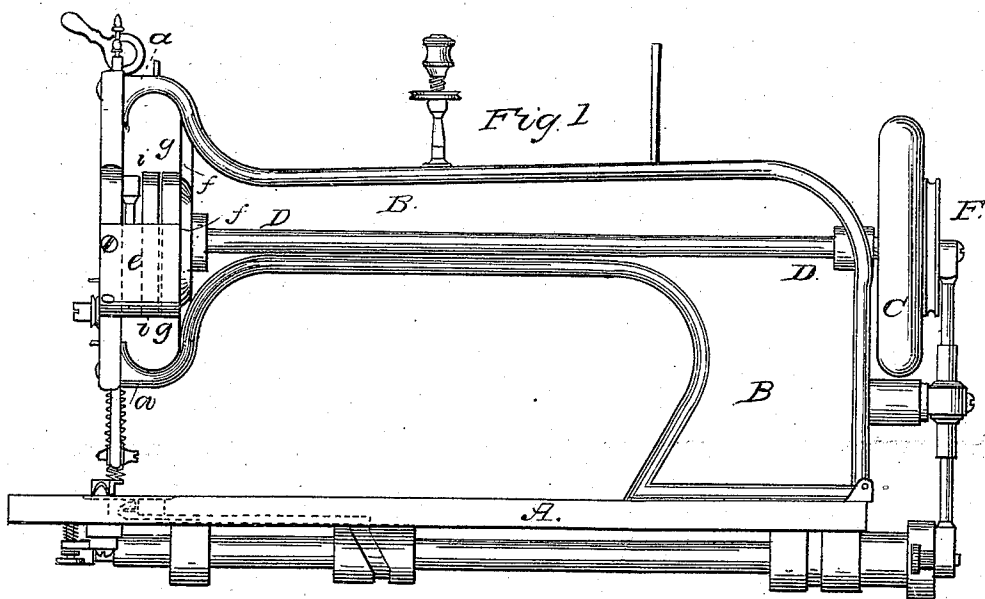


Fig. 2

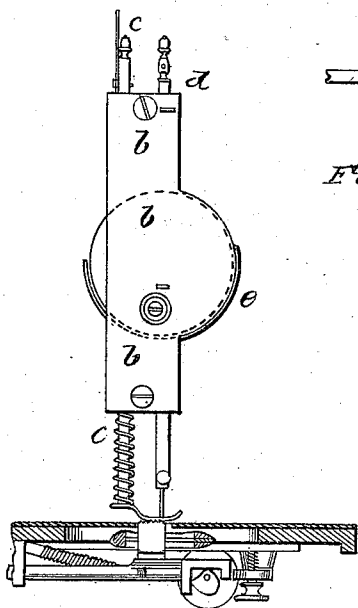


Fig. 4

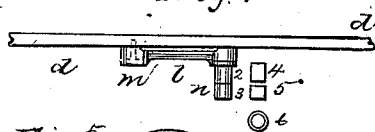


Fig. 5

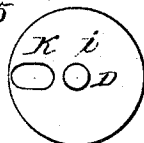


Fig. 6

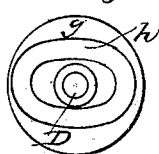
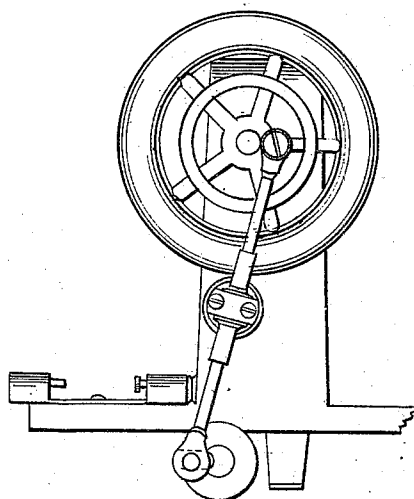


Fig. 3



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM O. GROVER, OF WEST ROXBURY, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 42,576, dated May 3, 1864; antedated April 26, 1864.

To all whom it may concern:

Be it known that I, WILLIAM O. GROVER, of West Roxbury, in the county of Norfolk and State of Massachusetts, have invented a certain new and useful Improvement in Sewing-Machines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, in which—

Figure 1 represents a view in elevation of one side of a sewing-machine embracing my improvement; Fig. 2, a front elevation thereof; Fig. 3, a rear elevation thereof. Figs. 4, 5, and 6 represent details of the needle-driving mechanism that involve the invention I desire to protect by these Letters Patent.

In all shuttle sewing-machines it is desirable so to regulate the motion of the needle as slightly to retract it after the end of its downward stroke to open the loop of its thread to secure the entrance of the shuttle between it and the thread; to hold the needle almost stationary while the shuttle is passing through the loop of the needle-thread, and then to cause the needle to retract rapidly to draw the stitch tight upon or within the cloth, and to pause long enough while at or immediately after the end of its upward stroke to permit the feed to operate before it again penetrates the material to be sewed.

In those sewing-machines in which hooks or loopers are used to form the stitch the motions of the needle must be governed with absolute precision to adapt its movements properly to those of the other parts of the sewing mechanism, and these motions of the needle in all machines should be smooth, without jerks, and noiseless. In the machines now in use these movements of the needle are effected by gearing, by rotating cams or slots, or by vibrating arms or bars; and each of these modes is liable to the inconveniences attendant on the ordinary mechanism used in converting rotary to reciprocating or reciprocating to rotary motions—that is to say, they all want smoothness and lightness of movement, jerk with more or less violence at the end of the stroke of the needle mandrel or bar in both ascending and descending, or the machine becomes distressingly noisy.

Now, it is the object of my invention to

remedy these defects; and to this end my improvement consists in the employment, in combination, of a stationary cam to give the needle-bar its variable motion, a rotating slot to give it a reciprocating motion, and a crank-arm to connect the needle-bar with the actuating-slot and guiding stationary cam.

In the accompanying drawings my invention is shown as attached to a machine having a bed-plate, A, and a supporting-arm, B, to sustain the needle-bar and its operating mechanism, the presser-foot, its spring and lifting-cam, and a rotating shaft, D, carrying a fly-wheel, C, and a driving-pulley, F; but it is obvious that my invention may be applied to all sewing-machines using the supporting-arm or its equivalent. The supporting-arm B is bifurcated at its front end, and its branches *a* and *a'* support the front plate, *b*, in which two parallel grooves are formed longitudinally to secure the needle-bar *d* and the bar *c*, that carries the presser-foot, and these bars or arms are let in flush with the back of the plate, which also sustains a shield, *e*, to exclude dust from the operative mechanism on the end of the supporting-arm, and to prevent the escape therefrom of the oil used in those parts for lubrication. Back of the plate *b*, and about centrally between the branches *a* and *a'*, the arm B is recessed to receive the mechanism constituting my invention. To the front of the arm B is cast a circular flange, *f*, to which is permanently secured in a perpendicular plane a cam-disk, *g*. (Shown separately in Fig. 6.) This disk has a central opening to permit the forward end of the driving-shaft D to pass through and rotate freely therein. The cam-groove *h* is so formed as to give the required pauses, rests, and rapid movements of the needle at the time required for the particular machine to which my invention is to be applied, and is made of a depth to give a bold supporting-face on both of its sides to the crank-pin which is to move in it. A disk, boss, or force-wheel, *i*, is secured to the front end of the driving-shaft and revolves with it. The edges of this boss and those of the permanent disk *g* match neatly with each other, and the boss *i* carries a radial slot, K, Fig. 5, of sufficient width to carry smoothly the central portion, 2, of the crank-pin *n*. (Shown in Fig. 4.) The boss *i* runs close to the face of the cam *g*,

and may have a curved instead of a radial slot; but I prefer the latter, though either can be made of a length to give all the required movements of the crank-pin with little friction. The crank-arm *l* is fastened by a pin or screw, *m*, on which it must vibrate freely, to the needle-bar *d*, and carries a stud or crank-pin, *n*, at its opposite end long enough to pass through the slot *K* in the boss and nearly to the bottom of the cam-groove *h* of the stationary disk *g*. The part 2 of the crank-pin, that moves in the slot *K* in the boss, and the part 3, that runs in the cam *h*, may carry friction bands or rollers 4 and 5, respectively to diminish the friction of the movement of the crank-pin within the boss and cam.

When the parts thus described are combined and the driving-shaft set in motion the boss *i* will rotate with it and carry the crank-pin *n* in the slot *K* around the center of the driving-shaft, while its movement, being governed by the stationary cam *h*, will describe an irregular ellipse or oval, due to the form of the cam and to the change of position of the crank-pin in the slot *K*, and thus this motion will vary the movement of the needle-bar to a perfect reciprocation and regulate its pauses and movements, so that the needle-movements will be properly timed to the wants of the stitching and feeding mechanism of all the machines in which it may be employed, for as the distance between the center of the driving-shaft and the center of the crank-pin may be varied, as

the length of the crank-arm may be varied, and the length and form of the driving-slot, as well as the form and size of the stationary cam, may also be varied without affecting the principle of my invention, its applicability and adaptability to all sewing-machines using a supporting-arm or requiring such changes of the needle-motion are clearly manifest.

This device for vibrating the needle-bar works smoothly, is attended with no jerking of the needle-bar, and moves almost without noise.

In Fig. 3 of the drawings I have shown one of my inventions for controlling the movements of other parts of the sewing-machine than those of the needle-bar; but as I do not claim this invention in the patent now granted I deem a more precise description of its parts here unnecessary.

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is—

The combination of a stationary face-cam and a revolving slot with a crank-pin, substantially in the manner described, to control the movements of the needle-bar in sewing-machines.

In testimony whereof I have hereunto subscribed my name.

W. O. GROVER.

Witnesses:

JAMES H. BROWN,
SETH M. BURGESS.