Sheet 1 – 2 Sheets.

W. O. Grover.

Sewing Machine.

No. 42284

Patented Apr. 12, 1864.

Fig. 1.

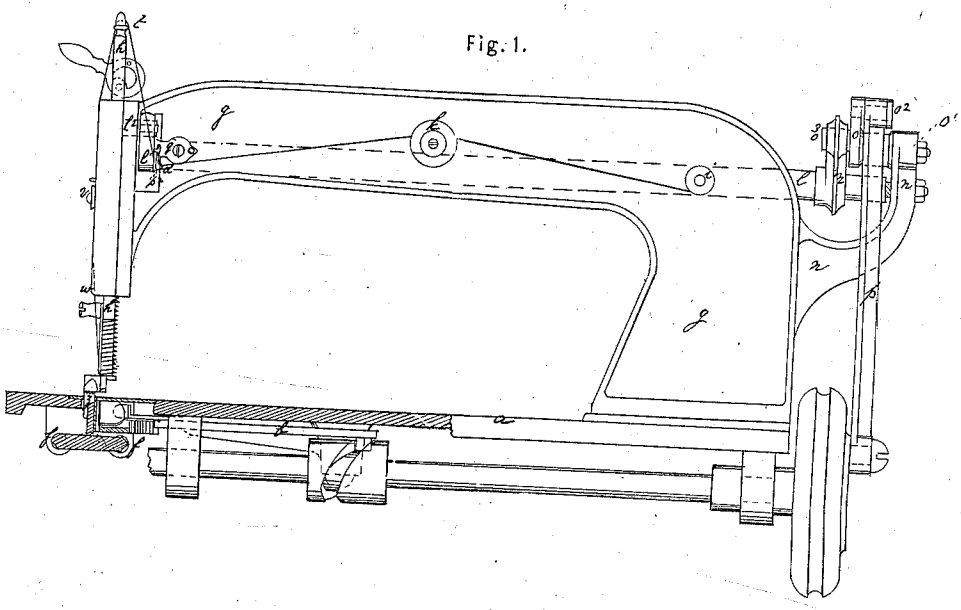
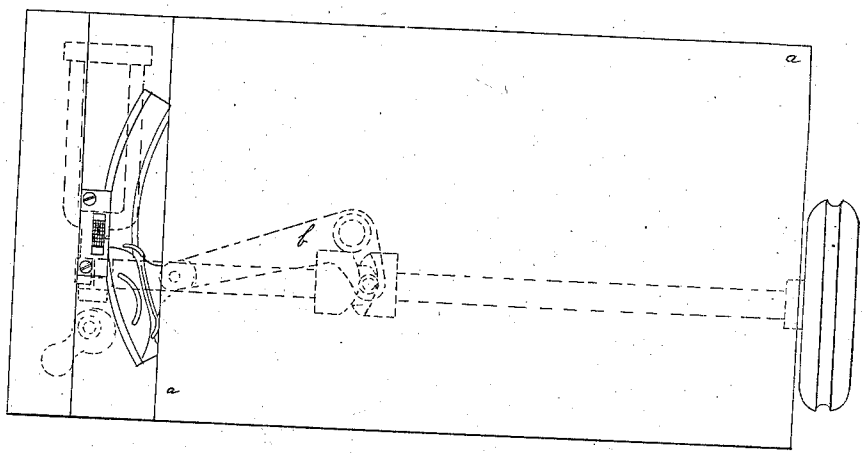


Fig. 2.



Witnesses.

James C. Wade

Saml H. Brown

Inventor.

W. O. Grover

Sheet 2 — 2 Sheets.

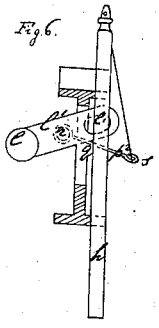
W. O. Grover.

Sewing Machine.

No. 42284

Patented Apr. 12, 1864.

Fig. 6.



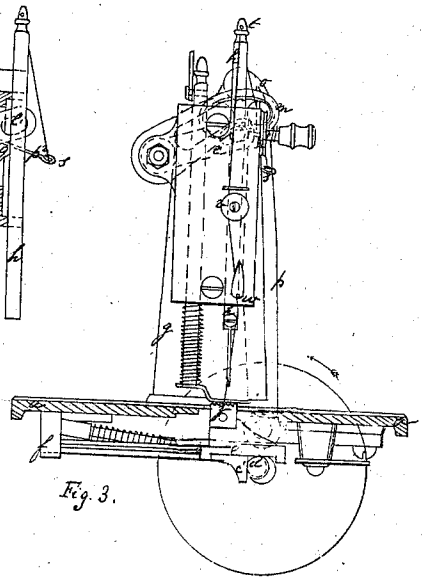


Fig. 3.

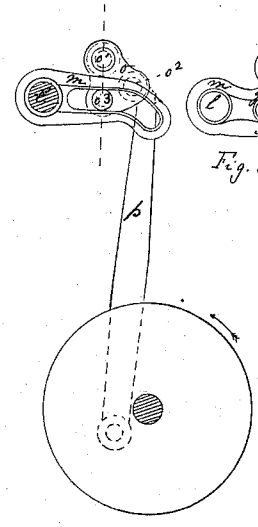


Fig. 5.

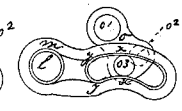


Fig. 8.

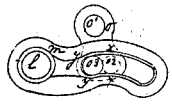


Fig. 9.

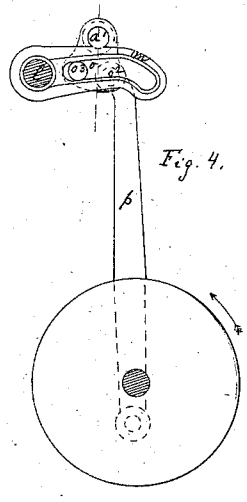


Fig. 4.

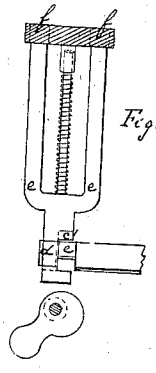


Fig. 7.

Witnesses.

James E. Wade

Jas. H. Ross

Inventor.

W. O. Grover

UNITED STATES PATENT OFFICE.

WM. O. GROVER, OF WEST ROXBURY, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **42,284**, dated April 12, 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 certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings, Figure 1 is a side elevation of the machine with parts of the platform cut away. Fig. 2 is a plan of the same, the bracket and parts carried by it being removed. Fig. 3 is a front elevation with parts of the platform cut away. Figs. 4 and 5 are front elevations, in detail, of the driving-pulley, connecting-rod, sector-piece, and slotted arm. Fig. 6 is an elevation in detail explanatory of the take-up. Fig. 7 is a plan of the feeding apparatus, and Figs. 8 and 9 are front elevations of the sector-piece and slotted arm, showing a modification of the same, which is in fact the plan on which it is preferred to construct the machine.

The machine is of the shuttle variety, and my improvements are applicable to machines of that class. They consist in certain new apparatus for actuating the needle.

The machine shown in the drawings is an embodiment of the invention in a working form, and it contains a bed-plate or platform, *a a a*, upon which the work is supported, with a revolving shaft beneath it, upon which is mounted a cam, which acts upon a pin or roller in the end of a bent lever, *b*, to the long arm of which the shuttle-driver is connected. The shuttle is embraced by the driver, and is supported by and moves in a race in the usual manner.

On the end of the revolving shaft is a crank-pin, *c*, and a cam, *d*, the former acting upon a stud, *c'*, and the latter against the lower surface of a frame, *e*. This frame has two prongs, each of which enters an ear, *f*, and the prongs are free to slide and oscillate up and down in the holes in the ears. The unattached end of the frame is forced downward and away from the ears by a spiral spring. (Clearly shown in the drawings.) When the shaft revolves this frame receives motion in four directions, and imparts these motions to the roughened feeding-surface Z, which is attached to the upper side of the frame. (See Fig. 3.) This surface causes the cloth to advance in the usual manner. Upon the table is secured a bracket or arm, *g*, supporting in its forward end, in proper guides, a needle-stock, *h*, and an ordinary presser-foot, with its usual accessories. This bracket supports also a bobbin for the upper thread, as at *i*, and a tension apparatus, as at *k*, which may be of any ordinary or proper construction; or, in place of a tension apparatus on the thread, it may be placed upon the bobbin.

So far there is nothing new in the construction of the machine.

A long rock-shaft, *l*, extends from the front to the rear of the machine, and is to be supported in any proper bearings on the bracket and its rearward projection, *m*. Near the front end of this shaft an arm, *l'*, is attached, and this arm has a slot in it, which embraces a pin, l^2, projecting rearward from the needle-stock. (See Figs. 1 and 6.) Upon the rear end of this rock-shaft is keyed or otherwise secured another arm, *m*, which I call a "slotted" arm, the slot in it being curved substantially as shown in the drawings. This slot, in the form shown in all the figures except the eighth and ninth, is curved in order that the motions of the needle may be slower at certain periods of the stroke and faster at others than would be the case if the slot were straight or of some other curve, thus making the machine more efficient; but the slot may be straight, and its precise curvature is not material when the pin o^3, hereinafter described, moves both downward and upward.

A rocking sector, *o*, is pivoted upon the projection *n* at *o'*. A pin, o^2, projects rearward from this sector and is embraced by one end of a connecting-rod, *p*, whose other end surrounds a crank-pin upon the main shaft. From the front side of the sector projects another pin, o^3, and this pin enters and works in the slot of the arm *m*. Now, the pins o^2 and o^3 in the form of the machine shown in all the figures except the eighth and ninth bear such relation to each other and to the location of the main shaft that a revolution of the latter causes the pin o^3 to move downward till it reaches a point vertically below the center *o'*, (see Fig. 5,) and then upward till it reaches the position shown in Fig. 4. Here the pin stops and reverses its motion, descending again to the position shown in Fig. 5, and then rising again to the position shown in Figs. 1 and 3. The slotted arm, the rock-shaft, the arm *l'*, the needle-stock, and the needle, all being in connection with this pin, partake of these motions, and the needle will descend to its utmost limits, rise a little to spread a loop, then descend a

little while part of the shuttle is passing through the loop, and then rise again to its highest limits, and this second or partial descent and consequent rise occupy the time during which the needle usually stands still or at rest after having opened a loop below the cloth in ordinary shuttle-machines, and this partial descent and rise effect the same purpose as the rest of the needle. Precisely the same motions may, however, be imparted to the needle by a modification of the position of the pins and of the shape of the slot in the slotted arm, all other parts of the machine remaining the same. In this modification, which is the preferred plan, the pins are arranged relatively to each other substantially as shown in Figs. 8 and 9, and the connecting-rod oscillates the pin o^2 upward and downward much as in the previously-described arrangement. The pin o^3 in this case is so arranged in relation to the oscillations of the sector that it moves downward and toward the shaft l till it reaches a point vertically below the pin o', or nearly so, and then retreats and rises on the same side of a vertical line drawn through the center of pin o'. The pin o^3 does not pass that vertical line, as in the first-described arrangement; but in order to effect a slight rise of the needle after it has reached its lowest point and a corresponding and immediately succeeding descent the slot is curved downward, as from x to y in Figs. 8 and 9, and this part of the slot is so curved that as the pin o^3 descends and moves toward the shaft l it lifts the slotted arm, and consequently the needle. When the pin o^3 is at the end of the slot (see Fig. 9) the needle has been slightly elevated from its lowest position, and as that same pin oscillates backward away from the shaft l its first action is to depress the needle again to its lowest position. When the pin thus moving reaches the position shown in Fig. 8 the needle is again at its lowest point of depression, and as the pin o^3 moves further away from the shaft l it lifts the needle until the pin ceases to oscillate in that direction, the needle at that moment being at its greatest elevation.

Various degrees in the curvature of the slot will alter the motions of the needle in degree, and to such extent the curvature is not of great importance; but it is essential that the slot in this modification of the machine, Figs. 8 and 9, should be so curved that the pin o^3, while oscillating toward the shaft l, shall first depress the needle to its extreme limit and then lift it again slightly.

The motions of the slotted arm, rock-shaft, and needle are substantially the same in both modifications. In the one first described the slight rise of the needle depends upon the fact that the pin o^3 oscillates on each side of a vertical line draw through the center of the pin or shaft o'. In the latter this same slight rise is consequent upon the before-described curve of the slot in the slotted arm.

Just in rear of the arm l' a lever, p^2, is passed through a hole or orifice in a supporting piece, q. One end of this lever embraces a pin, r, upon the arm l', and the other end has an eye in it, as at s. The lever is free to rock and slide in its supporting-piece, and the arm l', when in motion, causes the eye s to descend as the needle-stock ascends, and vice versa. The upper thread passes from the bobbin through the tension apparatus, thence through the eye s in the vibrating lever p^2, thence through an eye, as at t, in the top of the needle-stock, thence between the two plates of a friction apparatus, as at v, then through an eye in the bracket, as at w, and finally through the eye of the needle. When the stock ascends it lifts thread upward from the cloth twice as fast as the stock rises, owing to the fact that the thread leads in a bight through the eye in the stock, and as the stock thus rises the eye s descends and pulls thread through the eye in the stock as fast as the eye s descends and to the extent of its descent. These actions on the thread are reversed as the needle and stock descend, and it follows that the eye in the stock and the eye in the lever, by their joint action, control an amount of slack thread equal in length to twice the rise of the needle-eye above the cloth added to the range of motion of the eye in the lever p^2. By thus controlling a large amount of slack thread in proportion to the extent of motion of the needle a comparatively-large shuttle can be used in connection with a needle having a comparatively-small range of motion, and the machine is therefore more efficient in its action.

The friction apparatus v consists of two small disks, pierced at their centers and supported upon a screw or pin. The disks are forced toward each other by a spiral spring, and the thread passes and is nipped between them. This nip on the thread is a very slight one, merely sufficient to prevent the slack thread dropping below the needle-point as the latter descends. When the eye of the needle passes below the cloth the slack thread is pulled downward through this friction apparatus, and when the stock rises and the eye s descends to take up slack the thread renders easily through the friction-disks.

I claim as of my own invention—

1. The combination, substantially as described, of a slotted arm attached to a rock-shaft, a vibrating sector provided with pins, and a connecting-rod, acting in combination, substantially as set forth, to move a sewing-machine needle, substantially in the manner described.

2. The arrangement of these devices, as described, at the rear end of a bracket, in connection with the arrangement of a rock-shaft extending along the bracket and carrying an arm that actuates the needle-stock, in the manner specified.

In testimony whereof I have hereunto subscribed my name.

W. O. GROVER.

In presence of—

JAMES C. WADE,

JAMES H. BROWN.