J. A. DAVIS.
Sewing-Machine.

No. 208,967. Patented Oct. 15, 1878.

Fig. 1

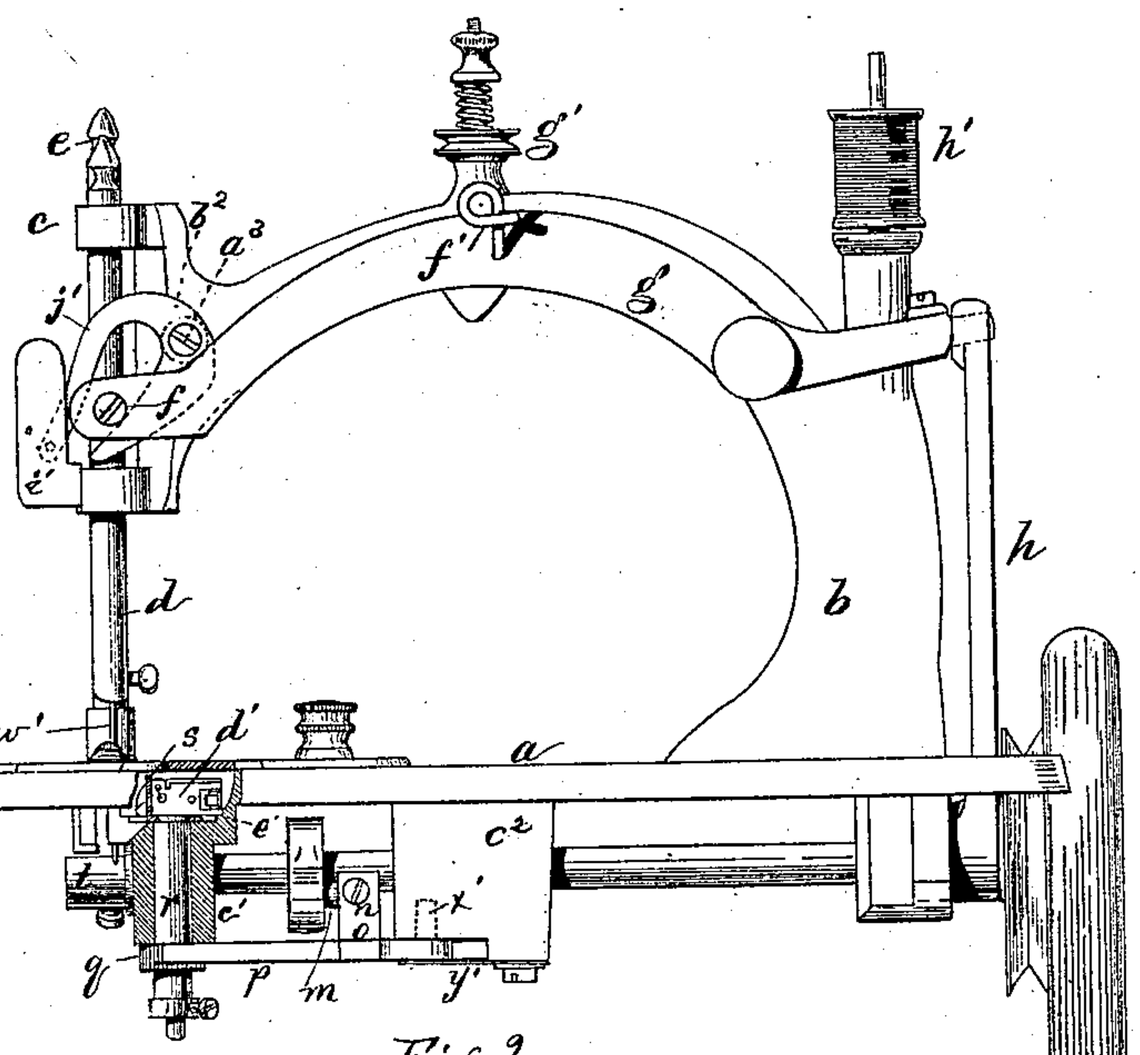


Fig. 2.

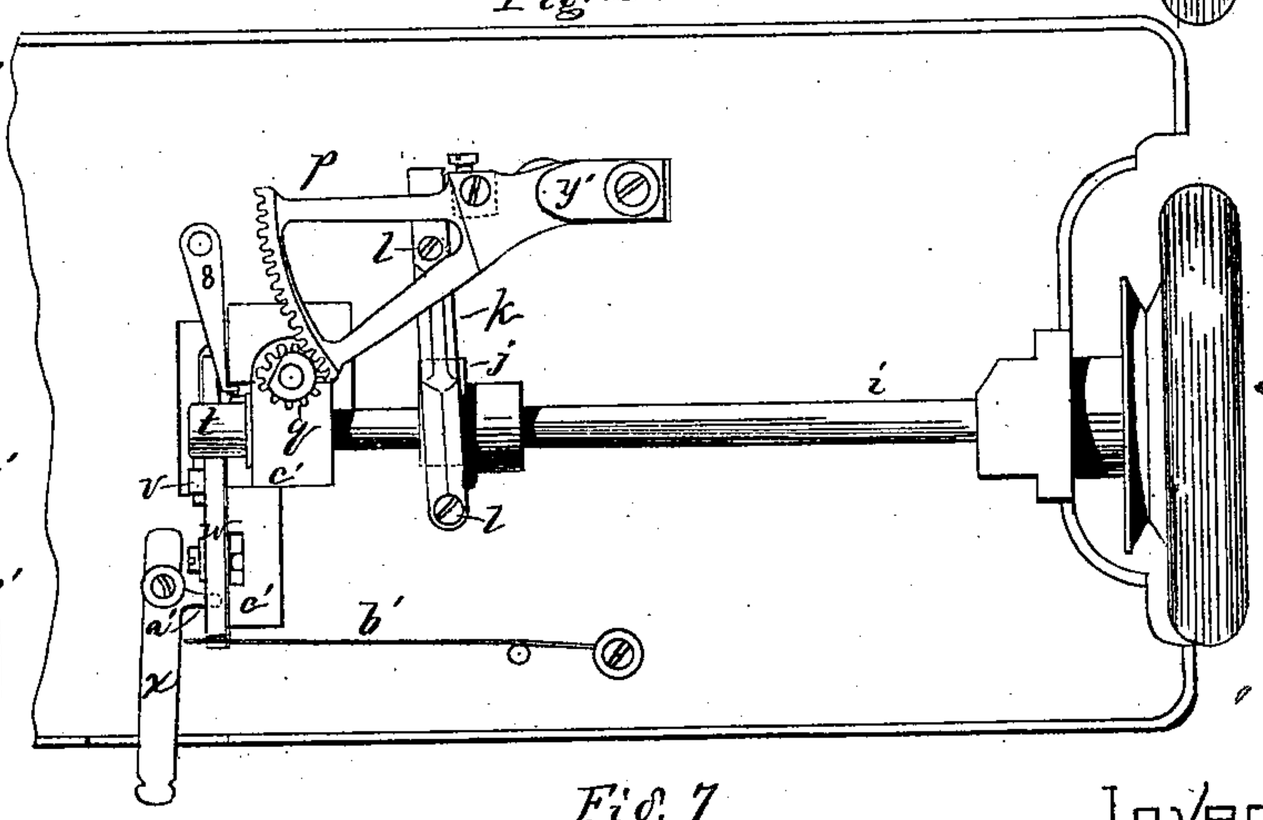


Fig. 3.

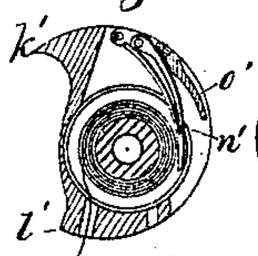


Fig. 4

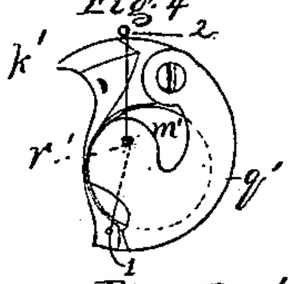


Fig. 5.

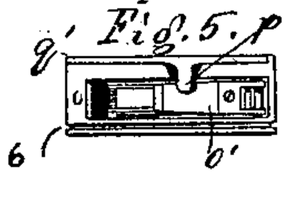


Fig. 8.

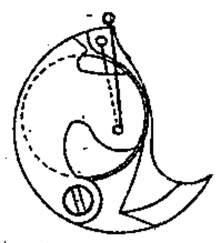


Fig. 6.

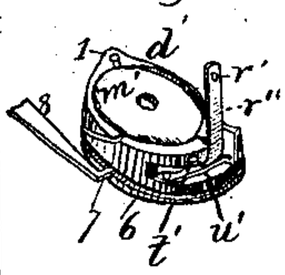
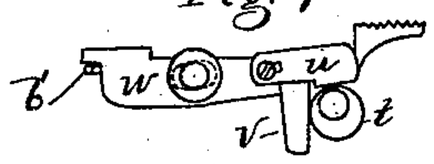


Fig. 7



Witnesses
L. H. Latimer.
W. A. Pratt.

Inventor.
Jos A Davis
per Crosby Gregory Attys.

UNITED STATES PATENT OFFICE.

JOB A. DAVIS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **208,967**, dated October 15, 1878; application filed August 29, 1878.

To all whom it may concern:

Be it known that I, JOB A. DAVIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Sewing-Machine, of which the following is a specification:

This invention relates to a sewing-machine wherein is employed a curved or circular shuttle having a rotary reciprocating motion in a circular race, and in connection therewith, to form the stitch, an eye-pointed needle deriving its motion from an eccentric.

The arm for imparting motion to the shuttle-driver is operated from an eccentric, and the machine may be run rapidly and with less power than were the motions derived from cams.

Figure 1 represents a side view of my improved machine; Fig. 2, an under-side view thereof. Figs. 3 to 6 represent the shuttle in different positions, and Fig. 7 represents the feed.

The bed-plate *a* has rising from it a standard, *b*, having at its outer end a head, *c*, in which reciprocates the needle-bar *d*, and this head also carries the presser-bar *e*. The needle-bar is connected by means of a pin, *f*, with a vibrating arm, *g*, pivoted to the standard *b*, and connected through a ball-joint with a link, *h*, fitted at its lower end to an eccentric on the main shaft *i*. This shaft rests in bearings on the under side of plate *a*, and has an adjustable eccentric-hub, *j*, to which is fitted a connecting-link, *k*, made preferably in two parts and connected by screws *l*, so as to tighten the parts after wear.

The forward ends of the pieces forming link *k* are adapted to grasp a curved, headed, or ball pin, *m*, held by a screw, *n*, in a projection, *o*, of the vibrating shuttle-actuating sector *p*, provided with teeth to engage teeth of a pinion, *q*, attached to a vertical shaft, *r*, having at top a shuttle-carrier, *s*, consisting in this instance of a flat plate, on which the shuttle rests, and a projection rising therefrom to bear against the straightest side of the shuttle.

At the end of the shaft *i* is secured a feed-actuating cam, *t*, adapted to bear against an adjustable wedge-block, *u*, on the feed-bar *w*, and against a finger, *v*. (See Fig. 7.) The cam, acting against the wedge-block, raises the feed to engage the material, and by adjusting it the feed-dog, which is serrated and of any usual form, is lifted more or less above the table, as is required for different kinds of material, and, also, the block permits adjustments to compensate for wear of feed-cam *t*.

The finger *v*, when acted on by the cam, moves the feed-dog forward the length of the feed, being governed by means of a lever, *x*, the end of which extends out beyond the edge of the cloth-plate *a*. One end of this lever carries a projection, a^1, which enters a notch in the feed-bar, and permits the bar to move under the action of a spring, b^1, forward only to a certain position, so as to permit the cam to act during more or less of its stroke on finger *v*. This spring b^1 also, by its action on the end of the feed-dog, throws its opposite end down against cam *t* and lowers the feed, which therefore has the usual four motions.

The shuttle-race is formed in a cast portion, c^1, of the bed-plate *a*, the part c^1 also serving as a holder for the feed-bar, and serving as a bearing for the forward end of shaft *r*. This part c^1 is bored out at top to afford an opening for the shuttle *d'*, a circular ledge, *e'*, being left, on which one edge of the shuttle bears, and as the shuttle is moved this ledge acts to hold the shuttle in opposition to the vertical portion *s* of the carrier and driver. At its outer side the wall of this shuttle-receiving chamber is cut away above the ledge *e'*, and this ledge is provided with a slot through which the needle descends, the needle when down presenting its inner side substantially in the line of the inner edge of the ledge *e'*, so that the point of the shuttle can easily and readily enter the loop of needle-thread spread or thrown out from the inner side of the needle into the path of the shuttle.

The arm *g* has an eye, *f'*, placed nearly opposite the thread-tension device *g'*, of any usual construction. The thread from the spool *h'* passes through this eye, then about the tension device and back through the eye, then through a hole in the arm *i'*, then through the hole at the end of the take-up *j'*, and to and through the eye of the needle.

The take-up is adapted to turn on the pivot a^3, which is a screw fitted to screw into the head. The screw has about its shank a spiral

spring, (see Fig. 1, where b^2, dotted lines, shows the end of the spring,) one end of which bears against the rear side of the take-up, and holds the take-up in position when not moved positively by the needle-bar. Any other suitable holding device might be used.

As the needle-bar completes its descent the eye f' draws on the thread between the tension device and spool, and draws off enough needle-thread for a succeeding stitch, and holds it in suspension between the tension and spool, ready to be drawn therefrom by the action of the needle and take-up, thereby relieving these parts from turning the spool, which requires always a varying amount of power, according to whether the spool is full or partially wound with thread.

The take-up j' is a forked arm, pivoted to the head, and moved by the connection between the needle-bar and the arm g. Commencing with the needle-bar down to its lowest position, as in Fig. 1, the take-up being also down, the needle-bar now rises and forms its loop, but the take-up is not moved until the eye of the needle is about out of the cloth. The width of the slot between the two arms of the take-up, being greater than the diameter of pin f, permits this dwell; pin f meets the take-up, and its motion is then rapid until the needle-bar completes its rise, this motion taking up the slack thread.

During the latter portion of the rising of the needle and the take-up the feed commences to operate to move the fabric, and the movement of the fabric draws the needle-thread at the point attached to the cloth out of the line of the needle, and just before the completion of the feed the needle-bar descends a little, and with it the take-up, giving a little slack to the needle-thread; then the take-up rests until the point of the needle enters or reaches the fabric holding the thread up, and then it moves down rapidly with the descending needle-bar, giving up slack for the formation of a new loop.

The shuttle d' is of the peculiar shape shown in the drawings, viz: Commencing at the point k' and ending with the heel l', the outline of the shuttle is a circle, or nearly so, and from the heel to a point within the shuttle, back from the point, the shuttle represents a double wave-line, and against this side the driver bears. The shuttle-block is bored to form a space for the reception of the bobbin m', it fitting preferably over a pin attached to the shuttle. A spring-finger, n', Fig. 3, bears on the thread on the bobbin, and a lever, o', acted upon by a projection, p', on the latch q', holds the lever and spring in action. This latch q' serves as the top plate of the shuttle. It has formed in it a thread-delivering hole, r', at the center of the shuttle's rotation, and the hole is larger than the diameter of the thread delivered by it. The thread is led from the bobbin through an eye, 1, at the heel of the shuttle, and then through the delivery-eye r'.

In Figs. 4 and 8, 2 represents the location of the needle-hole and needle. When the point of the shuttle enters the loop of needle-thread and the eye 1, at the heel of the shuttle, the delivering-eye r' in the latch and the needle-hole 2 are substantially in line, then a small amount of thread is drawn from the bobbin m' of the shuttle. At the time this thread is drawn from the shuttle the distance between the eye 1 at the heel of the shuttle on the line of the thread through the delivery-eye r' and to the needle-hole 2 is greater than at any other position of the shuttle, and consequently the thread is drawn off. The heel of the shuttle in its back motion approaches the needle-hole 2, (see Fig. 8,) and when the needle is completing its rising motion and the feed is commencing to act, then the distance between the eye 1 at the heel of the shuttle to the side of the delivery-eye next the needle, added to the distance from the needle-hole 2 to the same side of the delivery-eye, is less than the distance between the eye 1 at the heel of the shuttle and the needle-hole 2 when in a direct line, as just above described in Fig. 4, and the consequence is a little slack thread is formed in the shuttle-thread, ready to be taken up by the movement of the fabric by the feed, this movement drawing the shuttle-thread with it.

In other shuttle-machines, when the feed acts the length of thread is drawn from the bobbin by the action of the feed to equal the distance between the last stitch and the needle-hole, and the thread is often subjected to too much strain and is broken, whereas by this my invention I form a little slack in the shuttle-thread prior to the movement of the fabric by the feed, and when the feed takes place the thread is not strained, for it is not obliged to turn the bobbin, enough thread to allow the fabric to be fed having been drawn off, and being held slack for this movement of the fabric.

The delivery-eye r' is substantially at the center of motion of the shuttle, yet the eye is of a diameter greater than the size of the largest thread, and as the shuttle changes from the position shown in Fig. 4 to the position shown in Fig. 8, where its heel is next the needle-hole 2, the quantity of slack then made in the shuttle-thread is increased by the distance between what would be the exact center of the eye if of the exact size of the thread and that side of the enlarged eye next the needle-hole 2 in Fig. 8. This distance and the length of the slack thread, in practice, is about one-half the diameter of the delivery-hole in the shuttle-latch. This hole should be enlarged beyond the size of the thread to form slack for the shortest stitch and thinnest fabric, and for any particular class of sewing. This hole in the latch may be so proportioned to the thickness of the fabric as to give the slack desired.

Fig. 6 shows a form of shuttle which I prefer to the one shown in Figs. 3 and 4. The latch r'' is a lever pivoted at t' to the shuttle, and

its shorter end is arranged in connection with a spring, w', so that the latter both presses the latch r'' on the side of the shuttle to prevent the bobbin from turning only at the proper time, and, when elevated as in Fig. 6, holds up the latch.

The shuttle is provided with a peripherical groove, 6, about its lower edge, into which projects a stud, 7, on a finger, 8, fastened to the machine, and extended into the shuttle-race. This finger catches the needle-thread just as or immediately after it is entered or taken by the point of the shuttle, and holds it while the shuttle passes into the loop, thereby preventing the loop from being caught and broken by the point of the shuttle in its rapid rotation.

Tension on the shuttle-thread is produced by the latch r'' bearing on the bobbin-head, and the amount of this tension is regulated by a screw adapted to bear against the under side of spring w'. The needle w' is an ordinary eye-pointed needle.

The sector p has a pin, x', (see dotted lines, Fig. 1,) that enters a hole in the block c^2, and a spring, y', presses the sector upward and holds its pin in this hole.

I claim—

1. The shuttle-body provided with an eye, 1, at its heel, in combination with the latch provided with a thread-delivery hole in line with the center about which the bobbin turns, and at the side of the center of the bobbin, and made larger than the diameter of the thread, to operate to form slack in the shuttle-thread, as and for the purpose set forth.

2. The lower shaft, i, provided with an eccentric to actuate the needle mechanism, and with an eccentric, j, in combination with the link k and the horizontally-vibrating toothed sector p, pinion q, vertical shaft r, and shuttle-driver, all connected and adapted to operate substantially as described.

3. The feed-dog w, provided with finger v, in combination with adjustable wedge-piece u, cam t, spring b^1, and adjusting-lever x a^1, projecting beyond the cloth-plate and above the frame on which the machine rests, substantially as described.

4. The arm g and its eye f', adapted to draw off the thread between the spool and tension device, in combination with the needle-bar and needle and take-up j', adapted to be operated, as described, by the pin f on the needle-bar.

5. The shuttle body and bobbin, in combination with the lever-latch r'', adapted to hold the bobbin in place and produce tension thereon, and with spring w', adapted to hold the latch open or closed, substantially as described.

6. The pivoted take-up j', slotted as described, and its frictional holding-spring, in combination with the pin f, of less diameter than the slot between the arms of the take-up, and adapted to allow the take-up to rest at the beginning of the ascent and descent of the needle-bar, as and for the purpose described.

7. The rotary reciprocating shuttle, provided with an eye, 1, and with a bobbin-holding latch having a thread-delivery eye central with the axis about which the shuttle turns, and with a peripherical groove, 6, in combination with a stationary finger, 8, and an eye-pointed needle to hold the loop of needle-thread, and prevent it from being broken by the shuttle, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOB A. DAVIS.

Witnesses:
NERI PINE,
T. L. ARMS.