2 Sheets—Sheet 1.

# J. C. DAY.

## Sewing Machine.

No. 39,892. Patented Sept. 15, 1863.

Fig. II

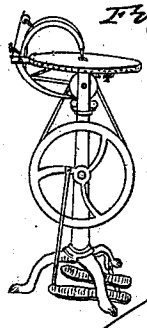

Fig. I




Witnesses
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Inventor
J. C. Day

2 Sheets—Sheet 2.

J. C. DAY.

Sewing Machine.

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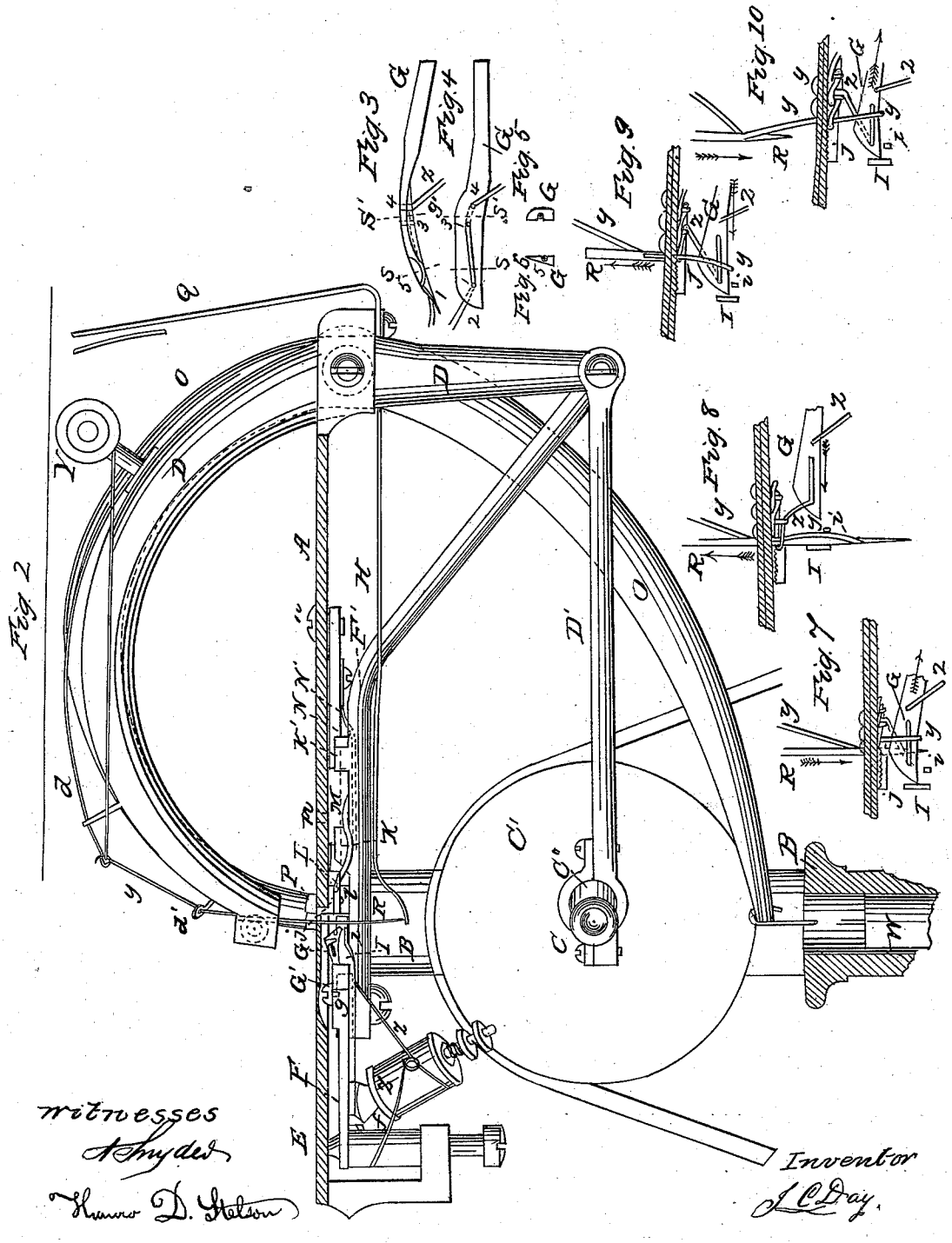

# UNITED STATES PATENT OFFICE.

JOSEPH C. DAY, OF JERSEY CITY, NEW JERSEY.

## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **39,892**, dated September 15, 1863.

*To all whom it may concern:*

Be it known that I, JOSEPH C. DAY, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, in which—

Figure 1 is a plan view with portions removed. Fig. 2 is a side elevation. Fig. 3 is a plan of the looper on a larger scale. Fig. 4 is an elevation of the same. Fig. 5 is a section through S′ S′ in Figs. 3 and 4. Fig. 6 is a like section through S S. Figs. 7, 8, 9, and 10 are diagrams illustrating the action of the needle and looper in the act of forming the stitch. Fig. 11 is a general perspective view of the machine complete.

Similar letters of reference indicate like parts in all the figures.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the accompanying drawings.

A is the table, supported by the standards B. This table may be circular, as represented, or of any other convenient shape.

In peculiar bearings in the standards B, I mount a shaft, C, having a pulley, C′, from a belt on which it receives its motion, and a crank, C″, from which all the motions of the machine are derived.

D is the needle-bar, hung in bearings at the side of the table, and connected by the connection D′ with the crank C″. At the other end of D the eye-pointed needle R is attached by means of groove U and screw-head V.

At the point E in front of the needle I hang the bell-crank lever F, which receives its motion from the end of D by means of the crooked connecting-rod F′. Upon the other end of F I attach the peculiar-shaped looper G by the screw G′ and groove *g*. This looper is shown enlarged in Figs. 3, 4, 5, and 6. It is bent in the arc of a circle struck from the center E, on which it turns. Its end is pointed, and at a little distance therefrom is the eye 1, from which, on the outside—the side toward the needle—runs a groove, 2, in which the thread lies when passing the needle to prevent abrasion therefrom. At a period farther from the end is another eye, 3, between which and 1 there is on the inner side another groove, in which the thread lies to prevent its being effected by the friction of the needle-thread moving along on the looper. Near to 3 is a third eye, 4, joined to 3 by a groove on the outer side of the looper and cut so deep as to be nearly in line with it, so that the thread lies in nearly a straight line from 1 to 4, from which latter it extends over a light spring, *f*, to the spool Z, which is placed on a spindle attached to F. The needle-thread *y* extends from a spool, Y, upon the needle-bar D over the end of a light spring, *d*, and guide *d′*, and thence through the eye of the needle R. A thin flat spring, H, is fastened under the table A with its end under the point of the needle R, against which it presses as the looper leaves the needle, remaining in contact with the needle until the looper again comes in contact with the needle, for the purpose of steadying the needle and preventing it from springing away from the looper or allowing the looper to go behind it, whereby a stitch would be missed or the thread broken. A forked spring, I *i*, is attached to the bell-crank lever F, which alternately presses with its longer prong, I, against the side of the needle and the end of the looper, and serves the important purpose of holding the loop for the looper to enter.

The stitch is what is known as the "double lock-stitch," composed of the interlocking loops of two threads, and the manner in which it is formed is clearly shown in Figs. 7, 8, 9, and 10. It will be observed that the needle and looper both receive their motions from the crank $C^2$, and consequently have both a continuously-reciprocating motion in the same time, though of different lengths of stroke. They are so arranged relatively each to the other that they cross each other's path alternately, thus interweaving their threads and forming a stitch. In Fig. 7 the looper G is retiring and the needle R has just punctured the cloth for a new stitch. As it passes the looper its point strikes the looper near the top of the recess 5 (see Figs. 3 and 6) and slides down in contact therewith, being deflected slightly outward thereby. In this operation the needle passes between the looper and the looper-thread, which extends from the eye 1 to the last stitch formed, in the manner represented by the twisted thread. As the looper retires from the needle and the

latter continues its downward motion the looper-thread Z is left around the needle, which carries its own thread *y* through the loop thus formed. When the crank passes its center and both the needle and looper commence their return movements the needle-thread is slackened and forms into a bow or loop, the forked spring I *i* retaining this loop in proper position for the entrance of G as the looper passes the path of the needle, the spring H holding the point of the needle and preventing any possibility of its springing out of the way of G as the latter approaches it. This position is shown in Fig. 8. It will be observed that the loop as it forms passes between I and *i*, and is thereby held and prevented from turning to either side until the looper has entered. The loop frequently has a tendency to twist around the needle, and thereby cause a mis-stitch by avoiding the looper; but by means of the forked spring I *i* such action is prevented. As the parts continue their motion the looper passes through the loop in *y*, and, striking the spring I, prevents any tendency of the loop to slip off, while the needle retires from the cloth and leaves the loop of *y* around the loop of Z, as shown in Fig. 9. As the several parts continue their motions to the end of their stroke and commence to return, the cloth is moved along to the right the length of a stitch, where it is firmly held, and the loop of *y* is slipped back upon the looper nearly to the eye 3. When the motion of R and G is now reversed the friction of the loop of *y* against the looper G tends to draw the former away from the path of the needle, so that the latter cannot again pass through it, as shown in Fig. 10, but allowing the needle to pass between it and the eye 1, in order to interlock the thread Z therewith, as in Fig. 7. As the looper recedes from the needle in forming the new stitch the former loop is slipped off, and is drawn up by the action of the needle around the loop just formed in the thread Z, and the stitch is finished. The spring F keeps the looper-thread tight during the motion of the latter, and prevents any tangling or kinking thereof; but when the tension of this spring becomes greater than the fricton on the spool, or when it is drawn around so far that the thread passes in a straight line from the spool Z to the looper, then a fresh quantity is taken from the spool. The spring *d* takes up the slack of the needle-thread and prevents the kinking thereof, but has not sufficient range to prevent the formation of a loop at the proper time for the passage of the looper.

I will now describe the feeding mechanism and the manner of its action.

A bar, J, carrying the comb *j*, which projects through a slot in the table near the middle, is loosely attached beneath the table A, so that it is free to move to a limited extent either vertically or longitudinally, but not in any other direction. One end of J comes in contact with an inclined projection, K, on connecting-rod F′. This projection, by the motion of F′, is alternately forced under J and removed therefrom, thereby lifting the latter and bringing *j* into contact with the cloth at the proper time and then releasing it therefrom. To J, I attach a bar, L, by a pivot, *l*. This bar passes also over F′, and at its other end is attached a slide or sleeve, M, which slides upon a bar, N. This latter bar is attached to A by a pivot, *n*, and is adjustable to various angles relatively to L by a screw, *n′*, working in a slot in A. The slide M is kept in contact with N by a bar or spring, N′. L receives its motion from the projection K and K′ upon F′, which alternately come in contact with it and force it in opposite directions. If, now, the bar N is perpendicular to L at the center of its movement, the latter receives little or no endwise motion, and consequently does not move J; but if N is placed at an angle thereto J receives an endwise motion just in proportion to the obliquity of N, and consequently the length of stitch is graduated simply by the adjustment of N by the screw *n′*. The distance between K and K′ is such that K′ does not come in contact with L until K has raised J, and consequently *j* into contact with the cloth. K′ then strikes L and feeds along the cloth to the extent of the motion transmitted to *j*. In the interval between the completion of the stitch and the return for the next the cloth is held firmly until the point and eye of the needle have passed through the cloth by the peculiar connection of the bar N with the sleeve M. When F makes its return-stroke K does not come in contact with L until it has first passed from under J and the feeder *j* is removed from contact with the cloth. The parts of the feed-motion are then returned to their first position without affecting the cloth. The reciprocating movement of the connecting-rod *d′* is divided into four parts. The first half forward elevates the feed-bar, the second half forward gives the forward end movement of the feed-bar, starting it with a comparatively quick motion, but finishing with a comparatively easy slow one, thus insuring that the momentum of the feed-bar shall not carry itself beyond the right point.

O is a curved arm hung upon pivots at the back of the frame, one end, P, of which is shaped into a foot and bears upon the cloth just over the feeder *j*, while to the other end, directly underneath P, is attached a weight, W, which keeps the foot P in contact with the cloth and supplies the necessary pressure for the proper feeding of the cloth. The spring Q, attached to the table at any convenient point, is so adjusted as to come in contact with the spool Y just before the needle-bar finishes its stroke, increasing the tension upon Y and straining the thread in such a manner that the last stitch is drawn tight at a time when the needle-thread is not subject to abrasion either in the eye of the needle or in passing on or off the looper.

The manner in which I construct my machine is simple and very cheap, while it is strong and little liable to wear or get out of

order. Nearly all the bearing-points in the portions made of cast-iron—as the shaft C, needle-bar D, pressure-bar O, and bell-crank lever F—are cast within nicely-fitted wrought-iron cores or molds, which give them form and smoothness, while it "chills" the bearing-surface and renders it as hard as hardened steel. These points therefore require no fitting, and they are so hard as to become but little worn with long use, and being so hard and smooth the machine runs with less power than any other machine with which I am acquainted. That peculiarly-smooth reciprocating motion which is the well-known property of that derived from a crank, being communicated to all the moving parts of this machine, also contributes to the ease of its operation, while all the motions being derived from one crank, it is perfectly immaterial in which direction the machine is turned. This is a great advantage in all machines which receive their power from a treadle, as they are constantly liable to be reversed.

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

1. Obtaining the required uniform vertical and adjustable horizontal movements necessary for an adjustable feeding mechanism from a continuous reciprocating motion by means of the reciprocating wedge-face K, dog K′, radial arm L, sleeve M, and adjustable bar N, or equivalent link, substantially as herein described.

2. The groove 2 and the inclined recess 5 in the looper G, in combination with such arrangement and operation of needle and looper, as shown and specified, that the needle in descending shall touch the looper above the looper-thread, and shall be deflected outward by the surface of the recess 5 and made to pass between the looper and the looper-thread, as described.

3. The spring I, whether single or forked, mounted on the looper-carrier F and arranged to operate with the needle R and looper G, or their equivalents, in the manner and for the purpose herein set forth.

4. I do not claim the use on sewing-machines of a lever arranged to be struck by the point of the needle and carried along therewith, for such has been used for the purpose of giving motion to a looper; but I claim the use of the guide-spring H, in combination with a looper driven independently thereof, so that the needle may be more perfectly steadied, substantially as herein specified.

5. So arranging the friction-spring Q that it comes in contact with the rim of the spool Y after the needle has left the cloth, and releases the said spool by the return movement or descent of the needle-bar, for the purpose herein specified.

In testimony whereof I have hereunto set my name in the presence of two subscribing witnesses.

JOSEPH C. DAY.

Witnesses:
THOMAS D. STETSON,
A. SNYDER.