

J. S. McCURDY.  
SEWING MACHINE

2 SHEETS—SHEET 1.

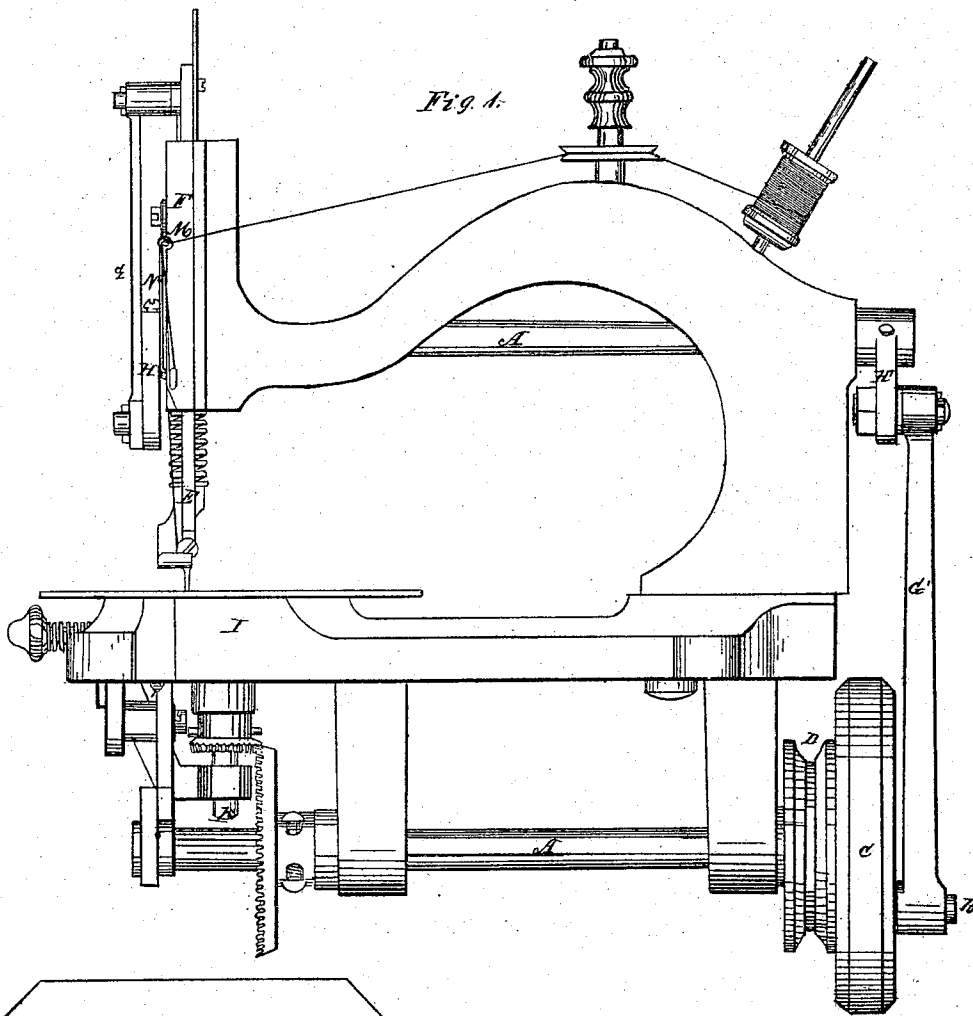


Fig. 1.

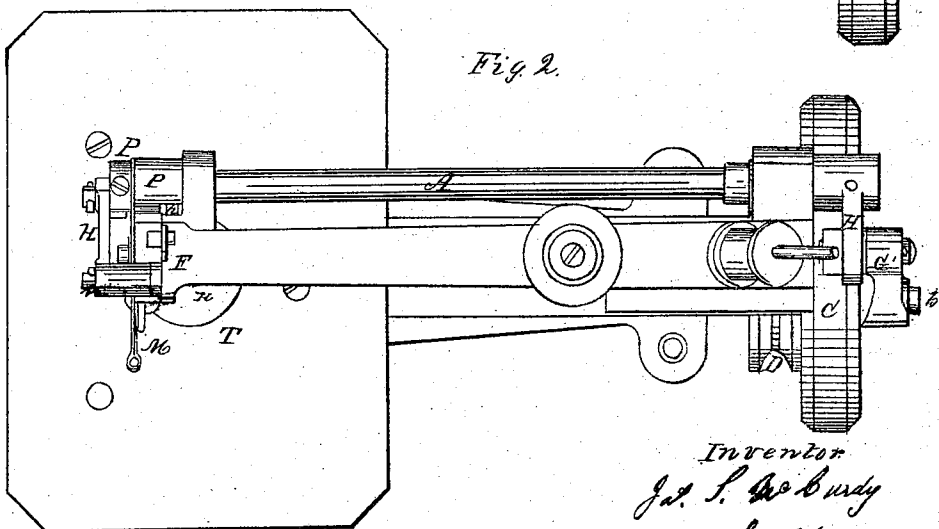


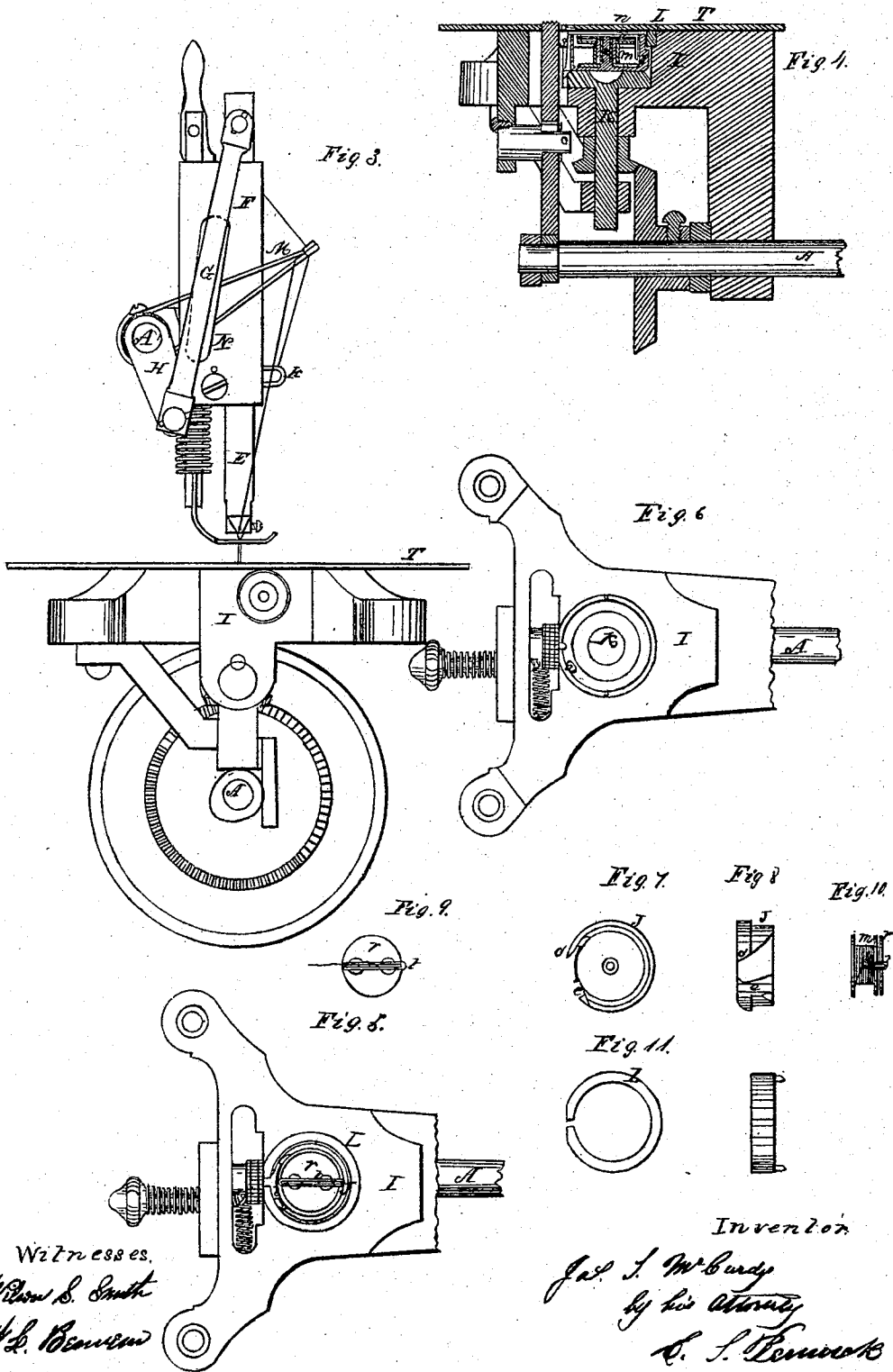
Fig. 2.

Witnesses.  
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Inventor  
J. S. McCurdy  
by his Attorney  
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J. S. McCURDY.  
SEWING MACHINE.

2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

JAMES S. McCURDY, OF BROOKLYN, NEW YORK, ASSIGNOR TO WHEELER & WILSON MANUFACTURING COMPANY, OF NEW YORK CITY.

## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 36,256, dated August 19, 1862.

*To all whom it may concern:*

Be it known that I, JAMES S. McCURDY, of Brooklyk; in the county of Kings and State of New York, 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 my invention, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of a sewing-machine embodying my improvements. Fig. 2 represents a plan of the same. Fig. 3 represents an end elevation of the machine. Fig. 4 represents a vertical longitudinal section of a portion of the machine at the axis of the shuttle. Fig. 5 represents a plan of a portion of the machine with the table-plate removed. Fig. 6 represents the same with the thread-guard, shuttle, and bobbin removed. Fig. 7 represents a plan of the shuttle of the machine. Fig. 8 represents an edge view of the same. Fig. 9 represents a plan of the bobbin-cap. Fig. 10 represents an edge view of the bobbin and its cap. Fig. 11 represents a plan of the thread-guard.

The main object of my invention is to produce a sewing-machine which shall form the stitch by the interlocking of two threads, substantially in the same manner as the ordinary needle and reciprocating-shuttle machines, but shall hold the bobbin of shuttle or second thread practically stationary, and shall also have the advantage of operating the passage of the shuttle-thread through the loops of needle-thread with a rotary motion continually in one direction, so that there shall be no changes in the direction of the motion of the shuttle.

To this end the first part of my invention consists in the combination of a reciprocating eye-pointed needle for carrying one thread with a rotating hook-pointed shuttle (or its equivalent for extending the loop of needle-thread and passing it over the bobbin of second thread) by means of multiple gearing in such manner that the shuttle is caused to revolve two or more times faster than the crank-pin or its equivalent, for operating the needle, so that the loop of needle-thread carried round the body of the bobbin shall be extended to its greatest dimensions and freed before the needle rises to its highest point, and in time to permit the stitch to be drawn tight during the

ascent of the needle, notwithstanding the rotation of the shuttle with uniform speed, the revolution of the shuttle being thus a multiple of that of the needle crank-pin or its equivalent.

The second part of my invention consists in combining a spool-bobbin with a rotating shuttle or its equivalent by means of a central spindle, so that the bobbin is maintained in a central position within the rotating shuttle.

The third part of my invention consists in combining with a rotating shuttle a thread-tension for the shuttle-thread, which remains stationary within the rotating shuttle.

The fourth part of my invention consists in combining a thread-guard with the rotating shuttle to prevent the loop of needle-thread thrown out by the rise of the needle from being misplaced before the point of the shuttle enters it.

The fifth part of my invention consists in combining with a reciprocating eye-pointed needle and a rotating shuttle, moving substantially as described, a positive take-up operated by a rock-shaft of the needle mechanism to take up the slack needle-thread and hold it when the stitch is being drawn tight, so that the employment of a cam to operate the take-up in this class of sewing-machines is dispensed with.

The object of the sixth part of my invention is to obviate the use of a cam-motion for operating the needle in a rotating-shuttle machine, and consists in combining together the members for operating the needle with the main rotating shaft of the machine by means of a crank or eccentric, in connection with the combination of the spindle for driving the rotating shuttle with the same main shaft by means of multiple gearing.

The object of the seventh part of my invention is to simplify the construction of a rotating-shuttle machine and lessen the friction thereof, and consists in locating the shuttle over the head of a spindle and driving it by a driver secured to said spindle, so that spindle and shuttle rotate in unison.

All the parts of my invention are embodied in the sewing-machine represented in the accompanying drawings. In this machine the needle is caused to reciprocate by means of a revolving crank-pin, and the shaft A, that car-

ries this crank-pin *b*, revolves in two hangers, B B, which depend from the bed-plate of the machine. The crank-pin *b* projects from the face of a fly-wheel, C, and the shaft A has a pulley, D, secured to it to receive the belt by which the power is transmitted from the treadle-motion or its equivalent. The needle is mounted in the usual manner in a needle-bar, E, which slides in guides in the head F of the needle-arm. In order that it may receive the proper reciprocating movement the needle-bar E is connected by a connecting-rod, G, with an arm, H, which projects from a rock-shaft, A', and this rock-shaft is fitted with a second arm, H', upon which the revolving crank-pin *b* operates through the intervention of a connecting-rod, G'. The needle is eye-pointed in the usual manner, and carries the needle-thread, which is thrown out laterally from the needle in its ascent in the ordinary manner of reciprocating-shuttle machines.

The rotating shuttle J is sunk in a socket in the bed-plate I, wherein it is supported by the head of the shuttle-spindle K. The head of the shuttle-spindle is fitted with a pin-driver, *a*, which engages loosely in a recess, *e*, in the rim of the shuttle, so that the shuttle is caused to rotate in the shuttle-socket by the revolution of the shuttle-spindle, and, as in this instance the shuttle-spindle is vertical, the shuttle in revolving moves in a horizontal plane, as is the usual arrangement in reciprocating-shuttle machines.

The shuttle-driver fits loosely in the recess in the shuttle, so that the needle-thread can pass freely round the shuttle between it and the wall of the recess. The shuttle is fitted with a hook-formed point, *c*, so that the loop of needle-thread, in which the point of the shuttle is entered, is drawn out by the rotation of the shuttle, and thereby extended, one of its members during this operation passing over the shuttle, and the other between it and the head of the shuttle-spindle. The shuttle-spindle is caused to revolve by the revolution of the main shaft A through the intervention of a pair of beveled wheels; and in order that the first and second parts of my invention may be embodied in this machine, the cog-wheels are so proportioned that the shuttle-spindle K revolves three times as fast as the main shaft A; hence the speed of the rotating shuttle is a multiple of the speed of the needle, and the multiple is in this instance three. It is not essential that the multiple should be three, as two or four will answer; but the shuttle speed must be an exact multiple of the needle speed, in order that the shuttle-point may always be in the proper position to enter each loop of the needle-thread presented by the needle. A speed of three to one is well suited to cause the shuttle to operate advantageously in accordance with the first part of my invention. In order to form the loop of needle-thread for the entrance of the point of the shuttle, the movements of the needle and shuttle-point are so relatively timed that the needle is raised

sufficiently to throw out a loop of needle-thread from its side by the time the shuttle-point in its rotation passes by the needle.

In order to prevent the misplacement of the loop of needle-thread, or, in other words, to cause it to stand off from the needle crosswise to the track of the shuttle-point, a thread-guard is provided. This thread-guard consists in this instance of a ring, L, slit at the side next to the needle, to form a kerf or slot to receive the loop of needle-thread protruded by the rise of the needle. This kerf extends farther from the needle than the track of the shuttle-point, as the interior radius of the ring is less than the radius of the shuttle-point, which travels round beneath the kerf, so that the loop of needle-thread is guided across the track of the shuttle-point, and a shoulder, *s*, is formed by the lower corner of one side of the kerf, across which the thread leading from the needle-eye is drawn. As this shoulder is nearly in the track of the needle, the needle-thread drawn across it does not tend to pull the needle laterally when the loop of thread is extended by the rotation of the shuttle. The shoulder also tends to hold the loop down from a straight line extended from the point of the shuttle to the place where the thread passes through the cloth, and facilitates the passage of the shuttle through the loop.

The shuttle contains within it the bobbin *m* of second thread. This bobbin has the form of a spool. Its tubular body fits upon the spindle of the bobbin-cap *r*, to which the bobbin-thread tension *t* is secured, and the spindle of the bobbin-cap is tubular, and is fitted on a spindle, *x*, that projects upward in the center of the shuttle. This spindle is the spindle by which the bobbin is maintained in a central position within the shuttle. The bobbin-cap *r* supports the bobbin-thread tension *t*, which consists in this instance of a doubled wire, around which the bobbin-thread is coiled a sufficient number of times to obtain the requisite tension. Before being coiled upon the wire the bobbin-thread is passed through a thread-guide, *d*, at one side of the bobbin, and in leaving the tension it is passed through the loop formed by the doubled wire, which thus forms a second thread-guide. As the thread leads from the thread-tension directly to the seam, the tension upon the thread causes it to hold the thread-tension stationary, notwithstanding the revolution of the shuttle-spindle on which the cap carrying the thread-tension is mounted. The bobbin turns to unwind thread as fast as the thread is sewed up, and, as it is centered within the shuttle by its shuttle-spindle, its edges do not come in contact with the interior of the shuttle and generate friction, which, tending to rotate the bobbin, would affect the tension of the bobbin-thread. In the machine represented the bobbin-spindle does not turn directly on the cap-spindle, but upon a sleeve running loosely on the latter. The shuttle is surmounted by a removable plate, *n*, which closes the orifice in the table-plate T, through

which the bobbin is inserted and withdrawn, and also prevents the rise of the bobbin by the drag of the thread.

In the operation of the machine the needle carrying a loop of needle-thread in its eye is protruded through the cloth in the usual manner, and is then retracted. As it retracts the cloth prevents the thread from withdrawing with the needle, and therefore causes the thread to bulge out laterally into the kerf of the thread-guard and form a loop to be entered by the shuttle-point. The passage of the shuttle through the loop requires a considerable extension of it, and when the loop is liberated it constitutes slack thread which must be taken up and held in order that the stitch may be drawn tight during the ascent of the needle. In order to take up this slack thread, and also to yield out thread to form the loop for the passage of the second thread, I have combined a positive thread take-up with the needle and shuttle in such manner that the take-up is operated by the rock-shaft of the needle mechanism. This take-up consists of an arm, M, which projects from a sleeve, P, mounted upon the needle rock-shaft A', and has an eye in its end, through which the thread is passed. The arm M is pressed against the face of the needle-arm head by a spring, N, which tends to hold it in its raised position, so that the arm does not descend with the needle. Its sleeve P has a slot in it, and a pin, h, is secured to the needle rock-shaft A' in such a position with reference to this slot that during the rise of the needle the pin carried by the rock-shaft strikes the end of the slot and turns up the needle to its highest position. The needle-thread proceeding from the thread-tension is passed through the eye of the arm, and thence downward through a fixed eye, k. It is then returned through the eye of the arm, and thence passed to the needle-eye; hence when the needle descends, the needle-eye slips down the thread to the cloth, and then, as the needle protrudes the thread through the cloth, the arm M, yielding to the downward drag on the thread, descends and gives off thread as required. During the first part of the retraction of the needle the arm remains stationary; but as the loop of needle-thread is extended for the passage of the bobbin of second thread, the lever, yielding, gives out thread for this purpose. After the loop of needle-thread is passed through by the bobbin the continued movement of the needle rock-shaft in raising the needle brings the pin in contact with the end of the slot of the sleeve P, and, turning up the lever, takes up the slack thread positively. The arm M thus constitutes a positive take-up for the needle-thread, and also lets off slack thread as required, and, as it is operated by the rock-shaft of the needle mechanism, the employment of a cam to operate the take-up in this class of machines is dispensed with.

The sewing-machine thus far described is provided with a thread-tension and support for the needle-thread, and also with a feed mech-

anism and presser-foot; but as these constitute no part of my present invention it is not deemed necessary to describe them particularly. The horizontal position of the bobbin in my machine, although not essential to the success of the invention, is advantageous, as it enables it to be inserted and withdrawn more conveniently than if the bobbin and shuttle were set on edge. It also makes the pressure of the shuttle upon its support uniform.

I am aware that shuttles traveling round in a circular shuttle-race have been combined with a reciprocating needle, as in the Lerow & Blodget machine; but my first combination differs from that, among other things, in the respect that I use a different kind of shuttle, which rotates on an axis, while in the preceding combination the shuttle revolves in a circular race. Moreover, my invention enables me to use a flat bobbin holding a large amount of thread. It also obviates the necessity of drawing out a large amount of slack shuttle-thread, (equal about to the diameter of the circular shuttle-race,) as my bobbin, although turning to give off thread, always maintains the same position, or, in other words, is practically stationary. On the other hand, I am aware that a reciprocating needle has been combined with a rotating hook to extend the loop of needle-thread and pass it over a bobbin which is practically stationary, as in the well-known Wheeler & Wilson machines; but my first combination differs from them, among other things, in the respect that in mine the motion of the shuttle is sufficiently fast to free the loop of needle-thread in time to permit each stitch to be drawn tight during the formation of that stitch, while in them the hook is operated so slowly that the stitch is drawn tight by the extension of the loop during the first part of the formation of the next succeeding stitch.

I am also aware that a reciprocating needle has been combined with a rotating shuttle, moved alternately fast and slow, as in the Bond machine; but my machine differs from that in various particulars, and, among others, in the respect that in mine the shuttle is caused to rotate with a uniform speed. In the Bond machine, also, the spool and thread-tension revolve with the shuttle, so that the twist of the shuttle-thread is either tightened or slackened, according to the direction of revolution; hence the shuttle-thread is continually tending to kink, while in my machine, as the spool and thread-tension do not revolve with the shuttle, the twist of the shuttle-thread is not affected by the operation of the machine.

Having thus described a machine embodying all my improvements, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a reciprocating eye-pointed needle for carrying one thread with a rotating hook-pointed shuttle by means of multiple gearing operating in such manner that the shuttle rotates two or more times as

fast as the crank-pin or its equivalent for imparting the reciprocating movement to the needle, substantially as set forth.

2. The combination of a spool-bobbin with a rotating shuttle by means of a central spindle, substantially as set forth.

3. The combination of a rotating shuttle with a thread-tension for the shuttle-thread that remains stationary within the shuttle, substantially as set forth.

4. The combination of a rotating shuttle with a thread-guard for the needle-thread, substantially as set forth.

5. The combination of a reciprocating eye-pointed needle and rotating shuttle with a positive thread take-up operated by a rock-shaft of the needle mechanism, substantially as set forth.

6. The combination of the members for operating the needle with the rotating shaft of a sewing-machine through the intervention of a crank, in connection with the combination of the spindle for operating the rotating shuttle with the same rotating shaft through the intervention of gearing, substantially as set forth.

7. The combination of the rotating shuttle with the spindle, that operates it in such manner that the shuttle is located over the head of the spindle, and driven by a driver secured to said spindle, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

JAMES S. McCURDY.

Witnesses:

FREDK. HURD,  
F. W. PECK.