3 Sheets—Sheet 1.

J. HARRISON, Jr.

Sewing Machine.

No. 10,763. Patented April 11, 1854.

Fig. 1.

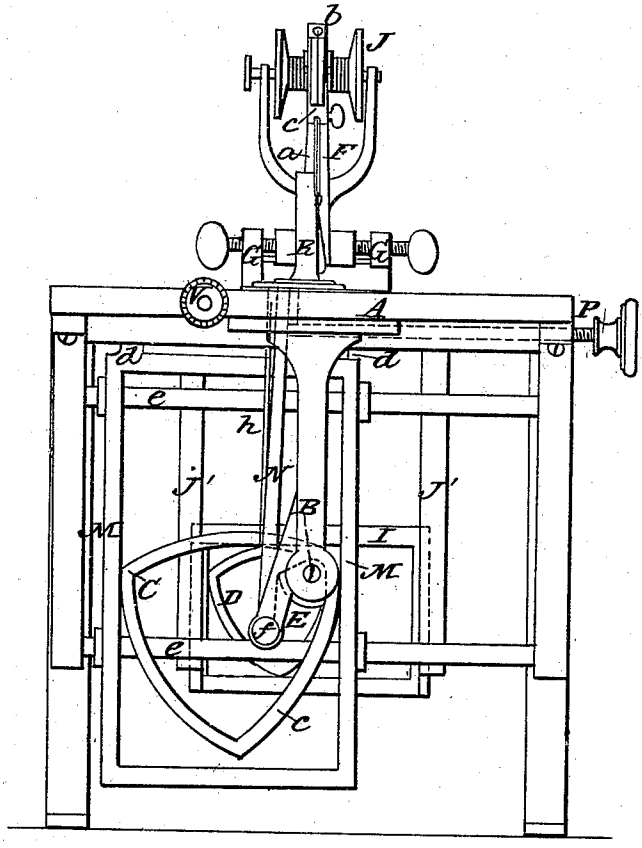

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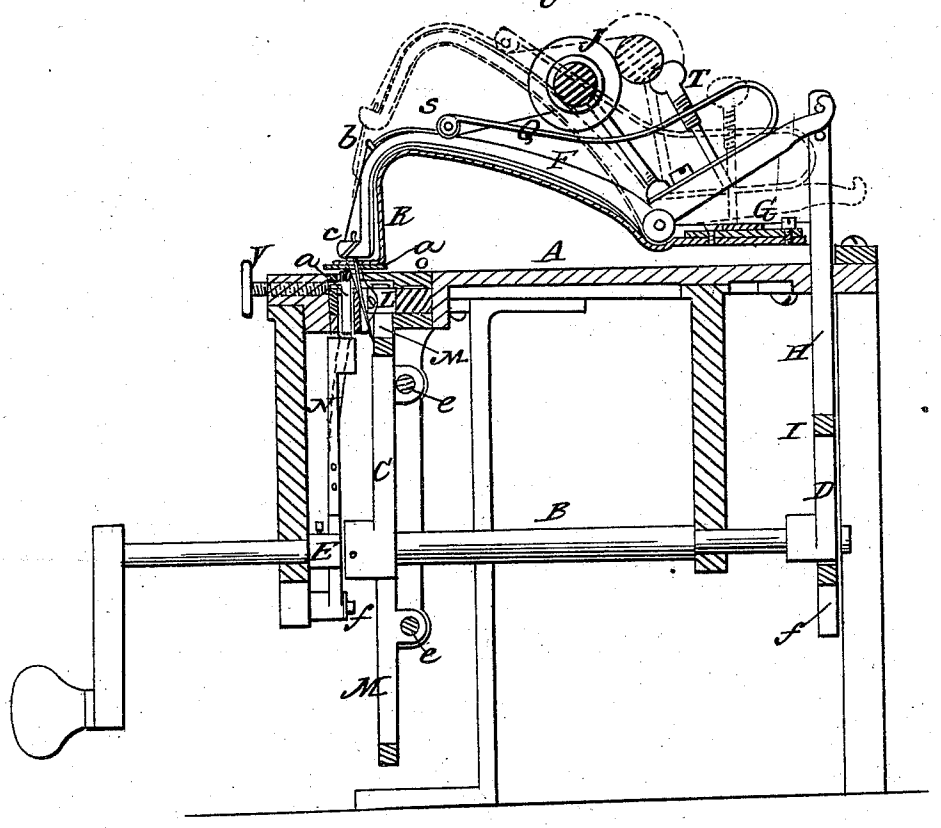
Fig. 2.



3 Sheets—Sheet 3.

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Fig. 3.

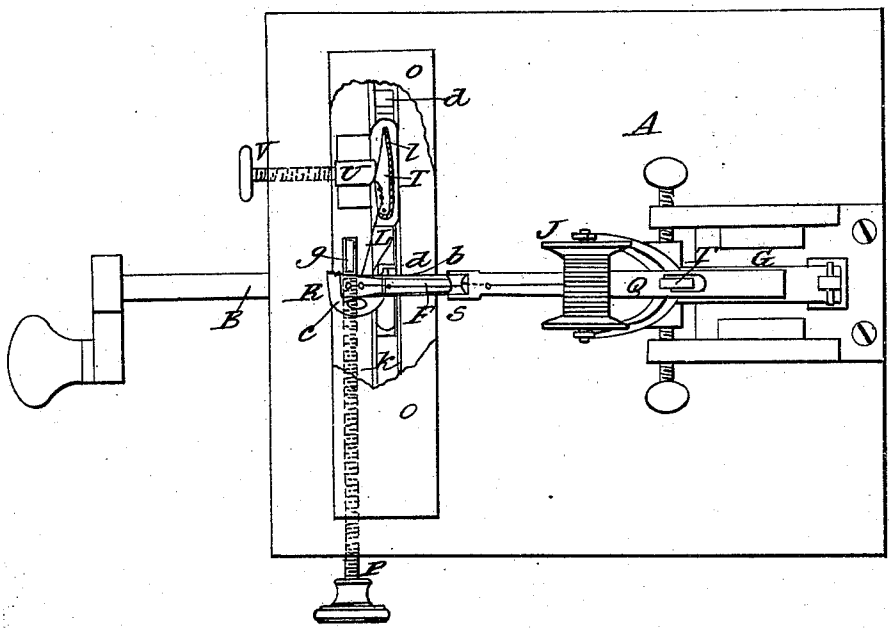


Fig. 4.

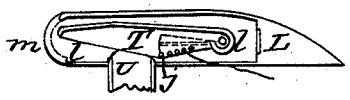


Fig. 6.

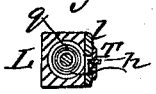


Fig. 5.

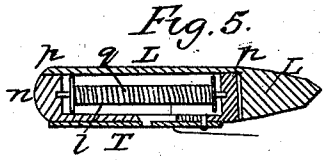
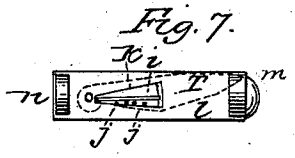


Fig. 7.



UNITED STATES PATENT OFFICE.

JAMES HARRISON, JR., OF MILWAUKEE, WISCONSIN.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **10,763**, dated April 11, 1854.

To all whom it may concern:

Be it known that I, JAMES HARRISON, Jr., of Milwaukee, in the county of Milwaukee and State of Wisconsin, 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, forming a part of this specification, in which—

Figure 1 is a front elevation of a machine constructed according to my improvements. Fig. 2 is a longitudinal vertical section of the same, taken nearly in the center. Fig. 3 is a plan of the same. Fig. 4 is a top view of the shuttle, showing it on a larger scale than the machine. Fig. 5 is a longitudinal section of the same in the line *x x* of Fig. 4. Fig. 6 is a transverse section of the same. Fig. 7 is an inside view of the top plate or cap of the shuttle.

Similar letters of reference indicate corresponding parts in the several figures.

The machine to which these improvements relate is of that well-known form in which the stitches are produced by the interlacings of two threads, one of which is supplied by a needle and the other by a shuttle.

The first improvement relates to a contrivance for tightening that part of the stitch which is formed by the needle-thread. It consists in furnishing the needle-bar with a spring, a roller, and a screw, so combined and arranged as to hold the needle-thread secure at a point between the spool which carries it and the needle, and prevent its delivery from the spool except during such a portion of the latter part of the needle's upward motion as may be desirable. This contrivance enables any degree of tightness that may be desired to be produced.

The second improvement relates to a contrivance for tightening that part of the stitch which is formed by the shuttle. It consists in furnishing the shuttle with a drag-bar, which checks the delivery of the thread from its bobbin, except during such a portion of the back part of the shuttle's movement as may be desirable, when it is allowed to release the thread by the action of a liberating-piece projecting on one side of the shuttle-race. This liberating-piece is adjustable, and may therefore be made to lengthen or shorten the delivery of the thread, and thereby control the tightness of the stitch.

The third improvement relates to a certain method, hereinafter described, of constructing the shuttle, whereby great facility is afforded for the removal and reinsertion of the bobbin, and for the passing of the end of the thread through the eye.

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

A is a metal bed-plate, to which all the working parts are attached. It may be supported on any suitable stand or base, and forms the table for the work.

B is the main shaft, which is hung in bearings suspended below the bed-plate, and receives rotary motion either by a crank-handle, treadle, or other means. It carries the cams C for operating the shuttle-driver, B for operating the needle-arm, and E for operating the feed-bar.

F is the needle-arm, which is free to vibrate freely on an axis formed by two center screws in a stand, G, which is bolted to the top of the bed-plate. It is extended back from its point of attachment to form a lever of the first order, and its back extremity is attached to a vertical rod, H, which extends upward from the frame I, in which works the cam D. This frame I is confined between vertical guides J' J', attached below the bed-plate, and therefore receives motion only in a vertical line. The cam D is of that form known as a "triangular cam," one side being an arc described from the axis of its shaft, and the other two sides being arcs of similar radius and length. The two sides of the frame upon which the cam acts are parallel and at right angles to the line of its motion. This form of cam and frame causes one fourth of the revolution of the cam to give such motion to the needle-arm as to drive the needle *a* through the cloth, the second fourth to hold it stationary therein, the third to draw it back, and the last to hold it again stationary. The needle *a* is attached to the front end of the vibrating arm in the usual manner, and is curved to form an arc described from the axis or point from which the needle-bar vibrates. The thread with which the needle is supplied is contained on a spool, J, which turns freely on a spindle supported in a forked stand secured above the needle-bar,

and it is conducted to the needle by guides *b c* on the needle-bar.

L is the shuttle, which works in a raceway, K, sunk in the bed-plate and extending transversely nearly all across the same. It is driven by two pickers, *d d*, which protrude through a slot in the bottom of the raceway, and stand up one on its front and the other on its butt end. These pickers form part of the frame M, in which works the cam C. The frame M works on guide-bars *e e*, parallel with the bed-plate, and thus is only capable of receiving motion in the direction in which the shuttle is required to move. The cam C and frame M are of similar form to the cam D and frame I, which operate the needle-arm, and therefore give a similar motion to the shuttle; hence one fourth of the revolution of the cam drives the shuttle forward through the loop protruded through the cloth by the needle, the second fourth holds it stationary at the end of its flight, the third fourth returns it, and the last holds it stationary till the proper time for the next flight. The cams C and D are so arranged relatively to each other on the shaft that the shuttle does not commence its flight until the needle is protruded to its fullest extent through the cloth and becomes stationary. The needle does not return till the shuttle has terminated its flight. The shuttle does not commence its return till the needle is fully withdrawn and has become stationary, and the needle does not commence its descent until after the return of the shuttle.

N is the feed-bar, which consists simply of a straight bar vibrating from a pivot, *f*, attached to a hanger on one side of the front bearing of the main shaft, and passing through a slot in the bed-plate in front of the shuttle-race, protruding above the surface of the bed-plate in the form of a tooth, *g*, which is so formed that it will seize the cloth when moved in the desired direction of the feed, but will release it and work under it when moving in the opposite direction. The feed-bar is driven by the cam E, rotating in contact with one side, and a spring, *h*, applied to the opposite side in such a way as to keep it in contact therewith. The cam E is so arranged relatively to the cams C and D as to move the feed-bar in the direction for moving the cloth while the needle is lifted from the cloth, but to move it back while the needle is in the cloth. The length of feed is controlled, and consequently the length of stitch regulated, by a screw, P, which works in a female screw in the under part of the bed-plate. The point of this screw serves as a stop to arrest the feed-bar when it is thrown back by the spring *h* after the prominent portion of the cam passes it, and by adjusting the screw, and thereby controlling the distance which the feed-bar will follow back the cam, its forward motion is controlled. The shuttle-race is covered by a loose plate, O, which fits a recess in the bed-plate, from which it is capable of being removed for the purpose of taking out or adjusting the shuttle. This plate, when in place, stands flush with the top of the bed-plate, and makes a perfectly even surface for the cloth to rest upon. The cloth is held down on the bed-plate while being sewed by a spring-holder, R, attached to the stand G.

The individual operations of the needle, the shuttle, and feed-bar above described are similar to the operations of corresponding parts in other machines where the needle and shuttle continue working all the time; but the order of succession of and intermissions in the motions of the needle and shuttle in this machine does not allow those parts to interfere with each other's operations, as the operation of one is suspended completely at the instant the operation of the other commences. This enables a more perfect seam to be produced, and reduces the liability to break threads.

The contrivance for drawing tight and regulating the tightness of that part of the stitch formed by the needle-thread, consisting of the spring Q, roller S, and screw T, is shown in Figs. 1, 2, and 3; but the arrangement of parts will be best understood by reference to Fig. 2. The journals of the roller S work in bearings in the end of the spring Q, which is attached to the top of the back part of the needle-arm in such a way that when left free it causes the roller to press upon the top of the needle-arm at a point between the spool J and the needle. The needle-arm, at the part where the roller rests, has such a transverse form given to it as to fit the periphery of the roller. The thread in passing from the spool to the needle passes one, two, or more times round the roller, and when the roller is forced in contact with the needle-arm it is prevented revolving and the delivery is stopped, and the thread held secure at the point of contact. The back part of the spring is provided with a female screw, which receives the male screw T. The lower part of the male screw is turned off smooth, and passes freely through a hole in the needle-arm, below which it protrudes far enough to come in contact with the top of the stand G before the termination of the upward movement of the needle and downward movement of the back part of the needle-arm. When the screw is forced down against the stand by the continued downward movement of the back part of the needle-arm, the spring Q is forced upward, and the roller S, being raised from contact with the arm, is left free to turn. By turning the screw so as to cause it to protrude more through the needle-arm, the thread is liberated earlier, and by turning it so as to protrude less the thread is liberated later in the stroke of the needle-arm. During the ascent of the needle-arm, after protruding a loop through the cloth, the slack of the loop is all drawn up, after which the continued ascent of the arm tightens or exerts a tension on the thread until the screw R comes in contact with the stand G, and by raising the roller from the needle-arm, as shown in red in Fig. 2, sets the thread free, and allows the continued ascent of the needle-arm to draw

it from the spool. The thread given out during each ascent of the needle-arm is that which forms the succeeding stitch, and it will be understood that the longer the tension is exerted on the thread the less will be the quantity given out and the tighter the stitch, and vice versa. The screw admits of the tightness of the stitches being regulated with greatest nicety.

The contrivance for drawing tight and regulating the tightness of that part of the stitch formed by the shuttle-thread, consisting of the drag-bar T′ and liberating-piece U, is shown in Figs. 3, 4, 5, and 7. The shuttle is formed with an opening, *i*, in its top side, (see Fig. 7,) and this opening is covered by the drag-bar, which consists of a small flat piece of metal lying close on the top of the shuttle and pivoted at one end thereto. The drag-bar contains one or more eyes, *j j*, through one of which the thread from the bobbin leaves the shuttle, and its under side furnished with a spring, *k*, which acts in such a way against one side of the hole *i* as to force the drag-bar to a position in which the eyes *j j* are not over the hole *i*, but over the closed part of the shuttle. The thread, before passing through the eye, has to pass through the hole *i*, and is held, when the eye is not opposite the hole between the drag-bar and the closed part of the shuttle, with sufficient tightness to prevent its delivery. The liberating-piece U is a small flat plate of metal, dovetailed in a recess at the front side of the shuttle-race, and having its position controlled by a screw, V, so that its back end may be made to project more or less into the shuttle-race at a suitable elevation to come in contact with the drag-bar. The distance moved by the shuttle backward past the needle must be sufficient to draw the thread to a certain degree of tightness before the drag-bar reaches the liberating-piece. Near the termination of the backward flight of the shuttle, before putting in the filling-thread, the drag-bar comes in contact with the liberating-piece, and is back far enough to bring the eye *j* opposite the opening *i*, and thus allow sufficient thread for the next stitch to be drawn out by the continued movement of the shuttle to the end of its flight. As the shuttle commences its forward flight the drag-bar works clear of the liberating-piece, and again prevents the delivery of thread. The shuttle has only just thread enough out between its eye and the cloth to make the stitch and allow it to be driven the distance required, and thus insures the stitch being drawn perfectly tight. The degree of tightness can be regulated very perfectly by the screw V. By screwing in this screw and forcing in the liberating-piece the draw-bar is released earlier, and more thread is allowed to be delivered, as the movement of the shuttle with the thread free is greater. By screwing out the screw an opposite effect is produced.

The shuttle L is constructed in two parts. One part, L, which I term the "shell," forms the bottom, two sides, and point. The other part, (shown detached in Fig. 7,) which I term the "cap," forms the top and the butt end, and contains both bearings for the journals of the bobbin. The top plate, L, has the butt-end *m*, which contains one of the bearings, and the piece *n*, which contains the other bearing, attached to it. The plate is flat, and the two pieces *m* and *n* are made of suitable form to slide into the shell from the open end *p*. The interior form of the shell is such that these pieces can only slide out endwise, its transverse interior section being nearly an entire circle. The bobbin *q* is put in its place before the cap is put in the shell, and to remove the bobbin the cap requires to be taken from the shell. This method of constructing the shuttle affords great facility for removing and inserting the bobbin, and is particularly convenient when the drag-bar is applied as hereinbefore described.

Having thus described my invention, I will proceed to state what I claim and desire to secure by Letters Patent:

1. The combination of the spring Q, the roller S, and the screw or adjustable pin T, operating, in the manner described, to prevent the delivery of the needle-thread for the successive stitches until each preceding stitch is drawn to the desired degree of tightness, and then to cause sufficient to be given out for the next stitch, thus regulating the tightness of that part of the stitch formed by the needle-thread.

2. The combination of the drag-bar T, attached to the shuttle and containing the eye *j*, through which the thread passes therefrom, the spring *k*, for throwing the said bar into a position to prevent the delivery of thread from the shuttle, and the adjustable liberating-piece U, operating, as described, for the purpose of preventing the delivery of thread from the shuttle until after each stitch is finished, and then allowing only the quantity desired to be given out, whereby the tightness of that part of the stitch formed by the shuttle-thread is perfectly regulated.

3. Constructing the shuttle in two parts, viz: the shell and cap, of which the latter is inserted into and withdrawn from the former endwise, as described.

JAMES HARRISON, JR.

Witnesses:

LEVI J. MERRICK,

C. W. PERKINS.