M. E. WALLACE.

Button-Hole Sewing-Machine.

No. 196,729. Patented Oct. 30, 1877.

Fig. 1

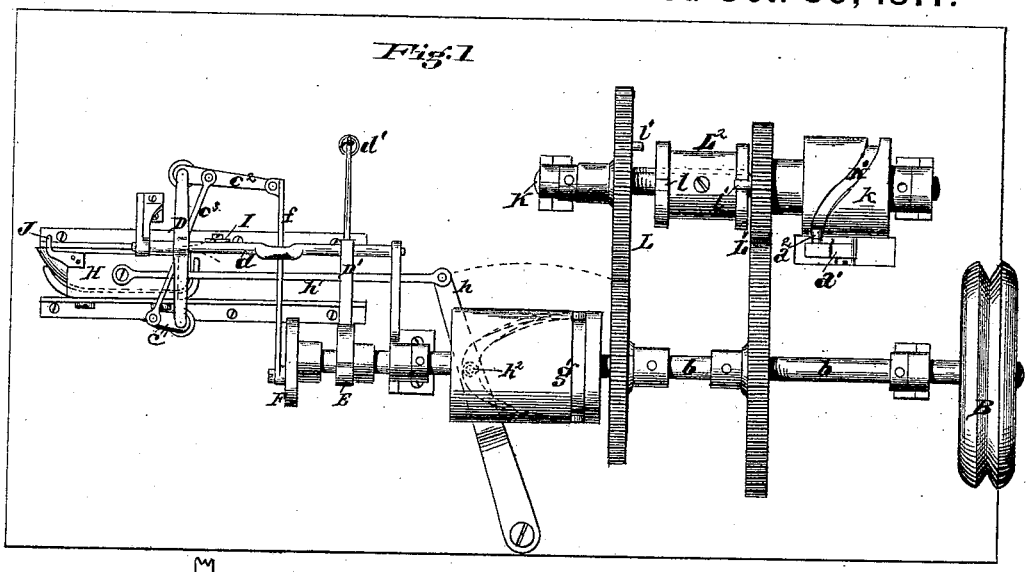

Fig. 2

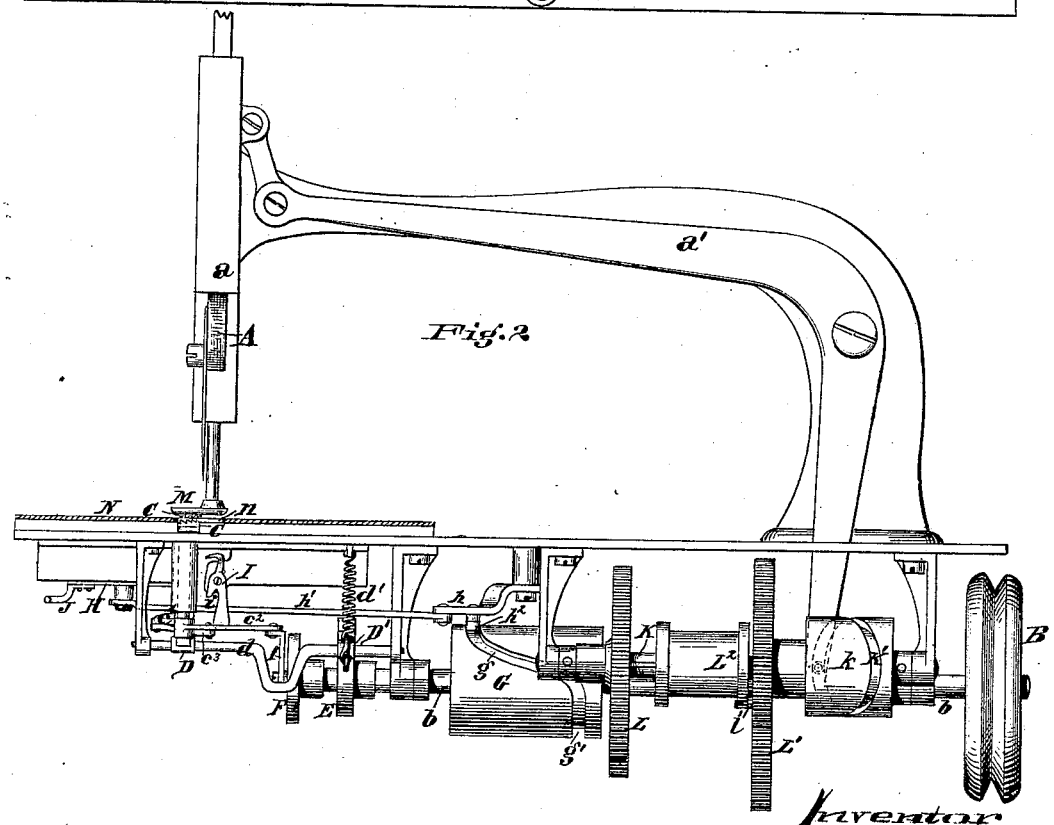

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Fig. 3

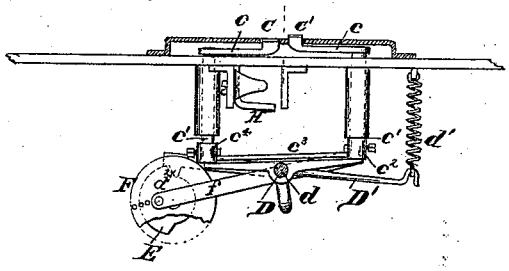


Fig. 6

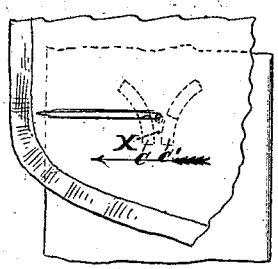


Fig. 4

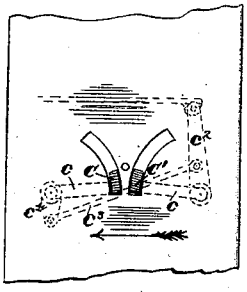
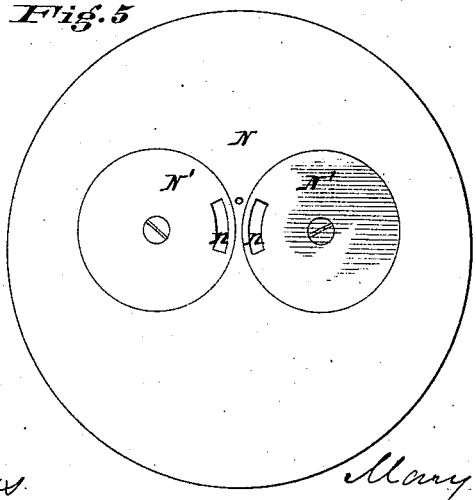


Fig. 5



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UNITED STATES PATENT OFFICE.

MARY E. WALLACE, OF NEWPORT, KENTUCKY.

IMPROVEMENT IN BUTTON-HOLE SEWING-MACHINES.

Specification forming part of Letters Patent No. **196,729**, dated October 30, 1877; application filed August 8, 1877.

To all whom it may concern:

Be it known that I, MARY E. WALLACE, of Newport, Campbell county, State of Kentucky, have invented an Improvement in Button-Hole Sewing-Machines, of which the following is a specification:

My invention has for its object such a construction of the feeding mechanism of a sewing-machine as that thereby the goods to be operated upon may be fed in a forward direction, as in ordinary sewing for straight-line stitching, and at the same time be fed laterally, the combined feed to operate in stitching button-holes or embroidery, &c.; and my invention consists in providing a sewing-machine with a pair of feed-dogs located and operated to act upon the goods alternately by a rising and dropping motion, and to operate oppositely in feeding laterally, while each acting in turn to feed forward, the whole to operate as hereinafter more fully described.

My invention still further consists, in combination with aforesaid double-acting feed-dogs of the sewing-machine, which act in conjunction with the needle and shuttle thereof, to form a stitch, of peculiarly arranged and operated hook, more fully described hereinafter.

My invention still further consists in so arranging the driving mechanism of the shuttle and feed-dogs with relation to the driving mechanism of the needle-bar as that they may be made to move together—that is, stroke for stroke; or the needle-bar may be caused to make two complete strokes or passes to one of the shuttle, the former method being employed in ordinary sewing and the latter in the sewing of button-holes.

My invention still further consists of a combination of parts for furnishing the necessary traveling motion to the feed-dogs, composed of a driving crank-wheel and pitman-connection, to a crank-arm upon the bearing-spindle of one of the feed-dog arms and pitman-connection, thence to a crank-arm upon the bearing-spindle of the other feed-dog arm, to cause a mutually diverging or converging motion of the feed-dogs, more fully described hereinafter.

My invention still further consists in mechanism for giving the alternate rise and fall of the feed-dogs, as composed of driving-cam, a lever pivoted to a common shaft, with a tilting presser-bar, located to press alternately upon the lower ends of the feed-dog arms ascending to the action of the cam, the whole more fully described hereinafter.

Referring to the accompanying drawings, Figure 1 is an inverted plan of the sewing-machine. Fig. 2 is a side elevation of the same. Fig. 3 is a partial sectional elevation, looking in the direction of operation of the shuttle. Fig. 4 is a plan of the feed-bars and connections. Fig. 5 is a plan of a modified form of work-plate, in which the feed-dogs move. Fig. 6 is a diagram illustrating the position of the button-hole in starting to operate from the position of the machine as seen in Figs. 1 and 2.

A is the needle-bar, fitted to move in suitable bearing *a*, and by means of pivoted lever a^1, which receives motion from driving-cam located beneath the bed of the machine. B is the pulley, which receives power from the driving-pulley of the machine, and it is located upon a shaft, *b*, which acts as the main shaft of the machine. C C′ are the feed-dogs, which, in this instance, are formed upon the end of arms *c c*, that swing upon center-pins c^1 c^1, journaled in bearings under the bed-plate, and when in operation their path of motion is of necessity circular, and also mutually diverging, by reason of this curvature of path from a point between and immediately in line with the two centers of oscillation of the feed-dogs. These feed-dogs are arranged to rotate so as to feed back and forth across the path taken in the operation of forming a line of stitching, for the purposes of forming each individual stitch; and in order to attain this backward and forward feeding of the goods, I arrange the teeth upon the two feed-dogs to relatively point in opposite directions, and provide means for raising and alternately lowering the feed-dogs, as follows: The two pins c^1 c^1 are made somewhat longer than their bearings, and rest immediately upon the two ends of the centrally-hung lever D. This lever D is thus centrally secured upon the shaft *d*, which is suitably journaled in bearings below the bed-plate, and which is provided also with a cam-lever, D′, the one end of which is secured to a spring, d^1, located on the under side of

the bed-plate, and the other end provided with a projection, d^2, to ride upon the cam-wheel E on the main shaft b, and follows closely its contour through the action of the spring aforesaid.

The cam-wheel E is so formed that one-half of its periphery is extended evenly to a desirable distance farther from the center than the other half, and thus one end of the lever D is elevated and the other depressed during half the revolution of the cam, minus the space consumed by the sloping surfaces that connect the two parts of the periphery of the cam, and vice versa; and this elevation and depression of the two feed-dogs alternately is so timed with respect to the feeding movement of said dogs as that the one whose teeth point in the direction to be traveled shall be elevated and the other depressed.

The feeding motion of the dogs is attained from a crank-wheel, F, upon shaft b, acting through pitman f upon the crank-arm c^2 of one of the dogs, which is connected by pitman c^3 to crank-arm c^4 of the other feed-dog in a manner, as seen in Fig. 1, to cause a concerted diverging or converging motion of the dogs.

Secured upon shaft b, as seen in the drawing, is a cam-drum, G, half of whose diameter is traversed from one end to the other by a groove, g, which, in operation, gives the necessary movement to the shuttle of the machine, while the other half of the diameter is traversed by a continuation, g', of said groove, which runs parallel to the end of the drum, and acts in the nature of a blank to prevent the movement of the shuttle as the drum revolves. The shuttle-carrier H receives motion from this drum through the pivoted lever h and pitman h^1, the lever h having a friction-roller, h^2, which travels in the groove $g\,g'$, as shown.

Secured in a vertical position, to swing back and forth in the direction of travel of the shuttle and upon the shuttle-slideway, is a pivoted hook, I, whose hook end extends around the downward path of the needle, so as to pass it upon the same side as the shuttle, and whose lower end is formed into a fork, i, one of the prongs of which may be preferably lengthened, so as to act as a weight to bring it to its normal position when released by the tripping device, and also act to prevent its too hasty return by allowing the tripping device to disengage before the return stroke.

The tripping device consists in the provision of a projection, J, upon the shuttle-carrier in such position as that it will trip the hook just as it finishes the stroke, and retain it in this position until it starts on the return stroke, and do this in concerted action with the descent of the needle, so as to secure the thread from the needle.

Geared to shaft b, as shown, is a countershaft, K, having a cam-drum, k, which operates the lever a^1, whose friction-wheel a^2 engages with the endless groove K′, that traverses the surface of the drum from end to end and entirely around. The gearing that connects the shafts b and K is of two kinds—equal and unequal. The equal gearing L causes one pass of the needle to one of the shuttle, and the unequal gearing of two to one. L^1 causes two passes of the needle to one of the shuttle.

In order to adopt either style of gearing at pleasure for operation, I provide a sleeve, L^2, located upon the shaft K between the two gear-wheels L L^1, and having a feather-and-groove connection with the shaft, while having notches l to engage with the pins l' upon either of the wheels L L^1, the wheels themselves being loose upon the shaft and running with it, or not, according to the location of the sleeve.

M is a presser-foot, located above the head-plate, and against which the feed-dogs press the cloth in the act of feeding. The feed-dogs themselves project above the bed-plate, and are sheathed or covered by a secondary table, N, which is provided with openings n, through which the feed-dogs can operate upon the cloth. In Fig. 5 is shown a modified plan of this table N, in which the apertures n are located in secondary plates N′, that can be adjusted to suit the location of throw of the feed-dogs without necessitating the use of apertures of larger size than any one length of feed, as would necessarily be the case in the formation of the said apertures in a stationary table.

Operation: In ordinary sewing, when making the well-known shuttle-stitch, it is necessary to secure one pass of the needle to one of the shuttle—that is to say, every time the needle makes a downward stroke the shuttle must pass it, and through the loop of the thread carried by the needle in order to form the stitch; but when forming a button-hole stitch it becomes not only necessary to make the lock-stitch, but also requires a double line of stitching, (one in the body of the goods and one at the edge of the button-hole,) joined by double passes of the thread across the upper and lower surface of the goods, thus making what might be called a "double-line stitch," and requiring but one lock of the thread to secure it, which lock is formed upon the edge of the button-hole to receive the wear; and in the operation of my machine, to effect the above result, the cloth is fed into the machine in such position as that the length of the button-hole shall lie in the direction indicated by the arrow in Fig. 4, and the intention is that it shall feed in the same general direction indicated by direction of arrow while forming the line of stitching around the button-hole.

In starting in operation from the position of the working parts of the machine, as seen in Figs. 1 and 2, (the goods having been placed so that the left edge of the button-hole, looking in the direction of the arrow, Fig. 4, shall be immediately in the path of the needle,) the needle-bar descends and enters the goods, after they have been fed to the right by the feed-dog C, at a point, x, Diagram Fig. 6, and at

this juncture the hook I is tripped and engages with the thread of the needle, to hold it as the needle is withdrawn, when the needle ascends, the feed-dog C′ comes into play and carries the goods sidewise, so that the edge of the button-hole is again in line with the path of the needle, the shuttle is held in place by the blank in its operating-cam, and the hook consequently retains hold of the loop of the needle-thread until the needle-bar again descends, and of necessity passes through the loop of thread held by the hook, when the shuttle is driven forward, passing through the thread of the needle, the hook is disengaged, and the needle reascends, the stitch having been completed with two passes of thread running on both sides of the goods, from the points entered at the first pass of the needle to the points entered last, and where the lock of the stitch is secured by the passage of the shuttle through the thread carried by the needle.

In making a single stitch it is possible that the stitch could be made by the movement of the goods perfectly at right angles to the length of the button-hole; but in order to make a succession of stitches it is evident that there must be a progressive movement in the direction of the length of the said button-hole, and this progression is attained by the relatively curved or angular path of the two feed-dogs, as more fully seen in Fig. 4.

I claim—

1. In a sewing-machine, the combination, substantially as specified, of two feed-dogs, which feed alternately and in diverging directions to advance the material in a zigzag line.

2. In a sewing-machine, the combination, substantially as specified, of two feed-dogs, which feed alternately and in diverging directions with the needle, the loop-hook, and the shuttle.

3. In a sewing-machine, the combination, substantially as specified, of the needle-arm, driving shaft, the shaft for driving the shuttle mechanism, and the intermediate sets of gearing, either set of which may be used for transmitting motion from the one shaft to the other, as the needle is caused to make one pass or two passes to one of the shuttle.

4. The combination, in a sewing-machine, of the feed-dogs C C′, having arms *c c* and vertical spindles c^1 c^1, and secured together by pitman c^3 to crank-arms c^2 c^4, as shown, with driving-pitman *f*, and crank-wheel F, arranged to operate substantially as and for the purpose specified.

5. In a sewing-machine, the combination, substantially as specified, of the feed-dogs C C′, attached by arms *c c* to vertical spindles c^1 c^1, the presser-bar D, its shaft d^1, lever D′, and cam E.

In testimony of which invention I hereunto set my hand.

MARY E. WALLACE.

Witnesses:
JOHN E. JONES,
EDGAR J. GROSS.