2 Sheets--Sheet 1.

J. L. FOLLETT.

Sewing-Machine.

No. 162,372. Patented April 20, 1875.

Fig. 1.

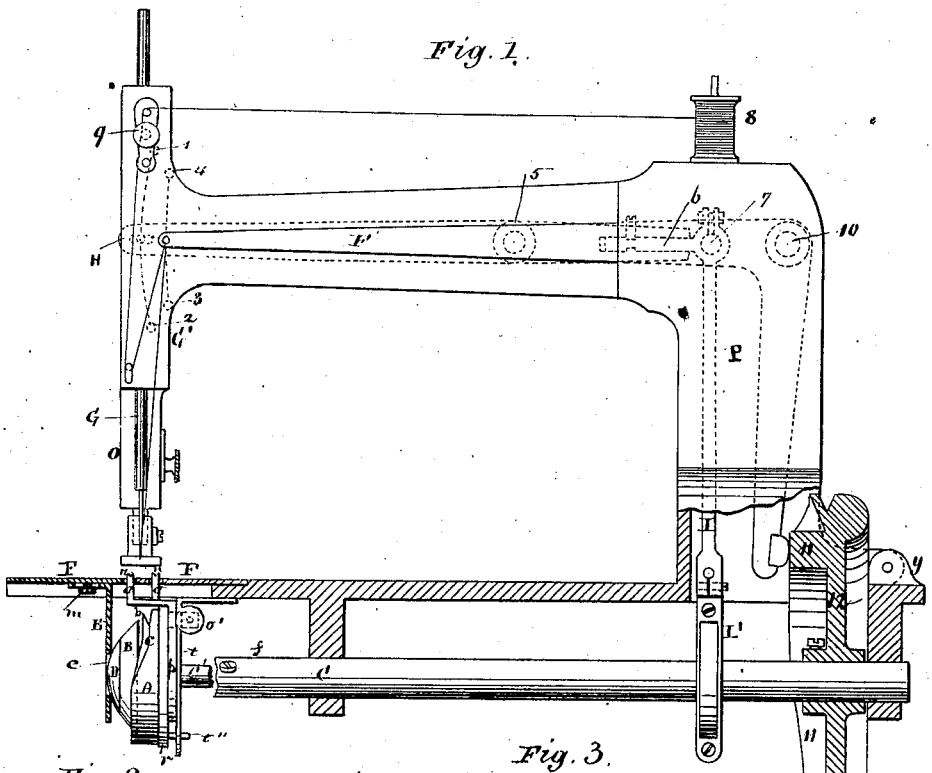


Fig. 2.

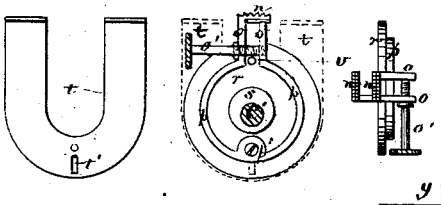


Fig. 3.

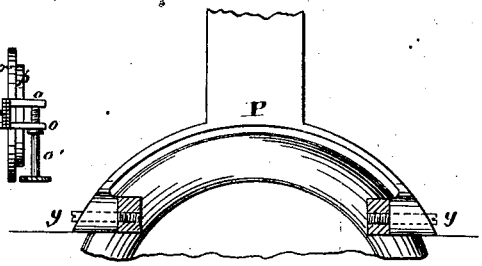


Fig. 4.

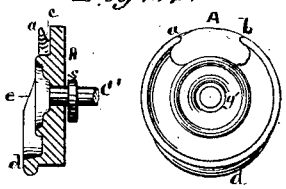
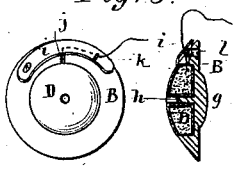


Fig. 5.



Witnesses.

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J. L. FOLLETT.

Sewing-Machine.

No. 162,372.

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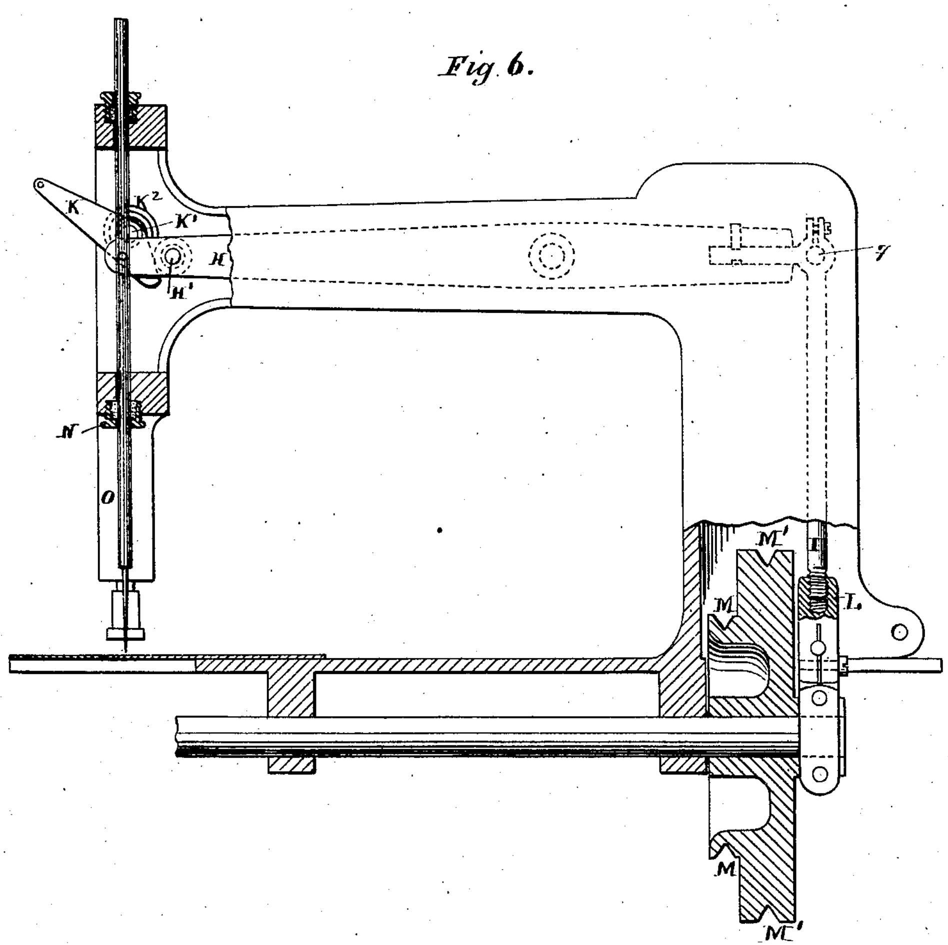
Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH L. FOLLETT, OF NEW YORK, N. Y.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **162,372**, dated April 20, 1875; application filed February 12, 1875.

To all whom it may concern:

Be it known that I, JOSEPH L. FOLLETT, of the city, county, and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification:

These improvements have primarily for their object the production of a revolving-hook sewing-machine capable of sewing in either direction at pleasure. Some of said improvements, however, are applicable to sewing-machines generally.

The nature of my improvements can best be understood by describing in detail and in succession the structure of the various parts of the machine, referring at the same time to the accompanying drawings.

The revolving hook is shown in side elevation in Figure 1, and in transverse central section and front elevation in Fig. 4. The hook A is a double hook with two points, *a b*. Each point is the counterpart of the other, and each half of the double hook is a counterpart of the other. Leading from each hook is a peripheral groove, *c*, which decreases in depth, and at last vanishes as it reaches the central cast-off *d*, which is common to both hooks. This groove conducts one of the threads of the loop to said cast-off. The other thread of the loop passes over the lateral surface *e* on the hook, and is thrown off to pass between the bobbin-case and the hook. The portion of the hook where the cast-off is located projects laterally far enough to extend beyond that face of the bobbin-case contiguous to the hook, as seen in Fig. 1, where B represents said bobbin-case. The consequence is, that that thread which is conducted to the cast-off by the groove *c* is thrown off from the hook over or on the outside of the bobbin-case, so that the bobbin-case will, in effect, pass through the loop carried around by the hook *a* or *b*. The hook takes the thread from the needle on the side opposite to the bobbin. The double hook is fixed to and rotates with the driving-shaft C of the machine. It may have a spindle, C′, projecting from its rear face, to fit in a socket in the front end of the driving-shaft, where it will be held by a set-screw, *f*, Fig. 1. In this way provision is made for the adjustment of the hook with relation to the needle, if this at any time be found necessary. The bobbin-case is shown at B in side elevation, Fig. 1, and in front elevation and transverse central section, Fig. 5. On the face next to the revolving hook it has a central rounded projection, *g*, forming a bearing to fit in a corresponding central recess, *g′*, in the face of the revolving hook. In the outer face of the bobbin-case is formed the central recess, in which is inserted the bobbin D. The projection *g* is not absolutely necessary, and can be dispensed with, if desired. The bobbin may be pierced axially to receive a central pin, *h*, projecting from the bottom of the case, on which pin it will revolve; but this pin is not a necessity. On the bobbin-case is a tension, consisting, in this instance, of a spring-strip, *i*, which bears against the face of the case with a yielding pressure. At one point in the side of the bobbin-case, surrounding the bobbin-recess, is a thread-slot, *j*, which extends under the tension *i;* in the tension-strip *i*, to one side of the thread-slot *j*, is also a slot *k*. The thread from the bobbin is drawn through thread-slot *j*, passes thence under spring-tension *i*, and then out through slot *k*. The thread between *j* and *k*, is thus held by spring-pressure, the degree of which pressure is regulated by suitable means, as, for instance, by an adjusting-screw, *l*, passing through the bobbin-case from rear to front, with its outer end resting against the rear face of the spring-tension strip.

When the machine is in operation under the arrangement just described the bobbin-case remains stationary, the bobbin revolves as the thread is drawn from the same, and the bobbin-thread is always of the same length, or nearly so, this distance being about that which intervenes between the tension-slot *k* and the point where the stitch is made in the cloth or material that is being sewed.

The bobbin-case is held in place by an adjustable holder, E, an annular plate with a stem and foot, by which it is secured to the under side of the cloth-plate, the foot having formed in it a slot, through which passes a set-screw, *m*, into the cloth-plate F. The por-

tion of the cloth-plate to which the bobbin-holder is attached can be made to slide in and out, so that by withdrawing the plate the holder will be removed from the bobbin-case, and the latter will be permitted to drop. The holder E serves also to hold the bobbin in the bobbin-case. The bulging part of the bobbin fits in the central opening in the bracket, as seen in Fig. 1.

By the described arrangement of the bobbin and bobbin-case under the table, I am enabled to bring the cloth-plate of the machine down flush with the surface of the table.

With mechanism organized as above described there is required a reversible feed that will be operative in either direction. This I secure in the following way, referring to Figs. 1 and 2: The feed proper consists of feed-surfaces *n n*, formed on the extremities of arms *o*, which project from a spring-strip, *p*, bent into circular, or nearly circular, form, having its ends, which terminate in said feet-carrying arms *o*, held together by an adjusting-screw, *o'*, by which said arms are brought nearer together or farther apart, as occasion requires. The spring-strip *p* is pivoted at *p'* to the rear face of a disk, *r*, which is mounted loosely on an eccentric, *s*, on driving-shaft C or spindle C'. Disk *r* is prevented from rotating with the eccentric by a pin, *t''*, on its rear face, which projects into a vertical slot, *t'*, in the U-shaped bracket-plate *t*, fixed to the under side of the cloth-plate. By this means the disk *r* will have imparted to it by the eccentric an up-and-down and to-and-fro movement. The feed-surfaces, being attached to the disk by a pivot-pin, will partake of this up-and-down movement. They obtain their to-and-fro movement from the same source by a pin or stud, *v*, on the disk, that projects and plays between the arms *o*, and the extent of this movement of the feed, which determines the length of stitch, will be in accord with the distance between these arms, which is regulated by the adjusting-screw *o'*. The teeth of the feed-surfaces are turned some in one direction, others in the other direction, so they will take hold of the cloth whichever way they move. The feed is thus reversible, and will operate equally well in either direction.

I prefer to use a feed constructed and organized as above described; but it will be understood that this construction may be varied to a considerable extent, so long as the feed remains reversible and operative in either direction.

It has been my object in this machine to take up the slack, and to complete each lock-stitch separately after the needle leaves the cloth and before it enters it again, while preserving a regular and uniform movement of the needle-bar—that is to say, a movement which is equal and of uniform speed throughout the stroke. Heretofore, so far as I am informed, in lock-stitch machines where there is this uniform movement, the taking up of the slack and completion of each stitch separately as above specified, have not been effected during the time the needle is out of the cloth; or where, in said machines, the specified result has been attained, the movement of the needle-bar has not the uniformity and regularity which I propose to attain, but it has been effected by means of a cam which will slow or check the speed at stated times, in order to allow the take-up time to complete its action before the needle enters the cloth.

In fast-running machines it is very necessary to avoid such irregularities in movement, and it is to this end that I have adopted the arrangement that I shall now describe.

I give to the needle a stroke considerably longer than that in ordinary machines. The length of the stroke in my machine is two and seven-eighth inches, while in ordinary lock-stitch machines it is much less, say one and a half inch. The drawing represents the stroke as half that of a full-sized machine, 1 and 2 being the extreme up and down positions of the lever that operates the needle-bar. The take-up lever is shown at F', and the extent of movement of the end that holds the thread is equal to the distance between the points 3 and 4.

By giving this increased length of stroke to the needle I am enabled to obtain, during the time the needle is out of the cloth, the desired operation of the take-up, for the purpose of taking up all the slack, and the completion of each stitch separately, and this while preserving regularity of movement and uniformity of speed of the needle. The needle-bar G moves up and down in bearings in the head G', in the usual way. It is driven by the vibrating lever H, connected with it in the ordinary way, hung on a fulcrum-pin, 5, on the goose-neck of the machine, and deriving its movement from a connecting-rod, I, provided with a strap, I', which encircles a circular disk fixed eccentrically on driving-shaft C. It is this eccentric which imparts uniform and regular movement to the needle-bar. The connecting-rod I is coupled with the rear end of lever H by a universal joint, consisting of a pin, 6, which can turn in a socket in the end of the lever, in which it is held by a set-screw entering a peripheral groove in said pin, as indicated in dotted lines in Fig. 1. The outer end or head of pin 6 carries a stud or journal, 7, on which is hung the upper end of connecting-rod I.

The take-up shown in Fig. 1 consists of an elbow-lever, F', having in its front end a hole or equivalent for passage of the upper thread, which runs from the spool 8, through tension 9, to the take-up. Lever F' vibrates on a pivot, 10, and at its lower end it bears against a cam, 11, on the side of the driving and balance wheel 12. The lever is pressed against the cam by the action of a spring.

A modification of the take-up is shown in Fig. 6, which is a side elevation, partly in sec-

tion. In this modification the needle-bar lever H serves to actuate the take-up, which consists of an arm, K, hung on a pivot, K^1, on the head of the machine, and controlled by a spring, K^2, which holds it normally in a position nearly horizontal, or with its front end slightly elevated. The end of the arm in rear of the pivot is beveled on its upper side, as shown. This end of the arm is operated on by a pin, H′, laterally projecting from the needle-bar lever, the pin being a steel pin carrying a roller-sleeve covered with rawhide. When the needle-bar lever is in its uppermost position, the pin H′ is raised above and out of contact with the take-up. On the down-stroke the lever drops about five-eighths of an inch before the pin begins to act on the take-up, this interval being to allow the cast-off to clear the thread from the hook. The pin then commences to press on the take-up, which, by this action, has its front end gradually raised, so as to take up all slack before or by the time the needle reaches the cloth. By this time the pin will clear the take-up, which, being thus released, will drop so far as necessary to supply all the thread required for the remainder of the double stroke, which will be about seven-eighths of an inch. Thus the take-up, when not positively operated on by the working parts of the machine, will yield to the influence of the thread, and will answer to the demands made by the thread in the various movements. The lever H, on the upstroke, passes by and above the take-up, and in so doing the pin H′ will, by its action on the rear end of the take-up, throw the take-up down, which down movement occurs when slack is required for the loop, and it is of sufficient extent to allow all needed slack for this purpose.

I provide for adjusting the stroke by lengthening or shortening, at pleasure, the connecting-rod between the driving eccentric or crank and the needle-bar lever. This is effected by screwing the lower end of the connecting-rod I in a socket, L. By pulling out the pivot-pin 7, that connects rod I with the needle-bar lever, the rod can be screwed in or out of its socket, which will have the effect of correspondingly shortening or lengthening its working length.

The driving and balance wheel may be provided with two peripheral belt-grooves, as shown at M M′, Fig. 6, of different diameters—the larger when slow motion is required, the smaller when fast motion is required.

The packing-box I use is shown in section at N, Fig. 6. It is of thimble formation, with a milled head and screw-threaded exterior, which screws into a socket in the under side of the head around the needle-bar.

In using the device, I wind a little wicking or any other suitable packing around the needle-bar, then push the box up against this packing to the under side of the head, and then screw the box into its socket. The farther it enters the socket, the more tightly the packing or wick is compressed around the needle-bar.

Any amount of oil may be put on the bar above the packing, and the bearing may become worn, but the oil can never pass the packing, or get to the needle or the work.

The packing can be further compressed at any time desired by simply screwing in farther the packing-box.

This device also furnishes an additional bearing for the needle-bar, and prevents all rattling. If one side of the bearing should become worn, a half or quarter turn of the box will present a new bearing-surface, and will take up all play or looseness.

As seen in Figs. 1 and 6, I extend the head of the machine on the presser-foot side down near to the bed or cloth plate of the machine, and in this downward extension O I form the bearing of the presser-foot. By thus bringing the bearings of the presser foot or bar near to the bed-plate I make the bar steady and firm, and obviate its tendency to spring. This extension of the head is also of advantage as furnishing a convenient point for the attachment and adjustment of additional machinery, or attachments used from time to time with the machine. It further serves to protect the work.

I cover the rear and sides of the standard of the goose-neck with a case, P, Fig. 1, which, at its base and rear, is forked or arched, as shown in Fig. 5, to accommodate the combined hand, balance, driving, and cam wheel, and is hinged at *y y* to the frame of the machine. With this case no screw or catch is needed to hold it in place. It can be thrown back to uncover the machinery whenever desired.

This arrangement of the case is that which for many reasons I prefer; but the same may be modified in various ways, all that I really require being that the standard, and the moving parts in proximity thereto, should be covered by a case hinged in such manner that it can be turned back to expose said parts when required.

Having now described my invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is as follows:

1. The reversible rotary double hook, constructed and operating as herein shown and described.

2. The reversible rotary double hook, in combination with the revolving bobbin, stationary bobbin-case supported against said hook, and bobbin-thread tension carried by said case, for joint operation, as shown and set forth.

3. The reversible rotary double hook, in combination with the revolving bobbin, the stationary bobbin-case, and the adjustable bobbin-holder, substantially as shown and set forth.

4. The reversible rotary double hook, revolving bobbin, stationary bobbin-case, and bobbin-thread tension, in combination with a needle, which, on its down-stroke, enters between the stationary bobbin-case and the rotating hook, for joint operation, as shown and set forth.

5. The reversible rotary double hook, revolving bobbin, stationary bobbin-case, bobbin-thread tension, and reciprocating needle, operating together as herein specified, in combination with a reversible feed, substantially as set forth.

6. A reversible draw-feed, attached directly to and deriving its movements from a disk mounted on and positively operated by a rotating eccentric, from which it derives an up-and-down and to-and-fro movement, substantially in the manner shown and set forth.

7. In combination with the feed-carrying disk or plate, and eccentric for operating the same, the feed proper pivoted to the said disk, so as to follow its up-and-down movement, and receiving between arms adjustable nearer to or farther from one another a pin or stud, which is attached to said disk, and imparts to the feed proper a to-and-fro movement, substantially as set forth.

8. The combination, in a lock-stitch machine, of a rotary hook and a straight needle, both of which have regular and uniform movement, as described, with a take-up, arranged and operating as described, to take up the slack of one stitch and complete the same before the next stitch is commenced, substantially as and for the purposes set forth.

9. The vibratory take-up and its spring, in combination with the needle-bar lever, arranged to operate said take-up at the times and in the manner substantially as shown and described.

10. In combination with the bobbin-case, the bracket-holder for the same, and the removable cloth-plate section carrying said holder, substantially as shown and set forth.

11. The removable cloth-plate section, in combination with the bobbin-case holder attached to and adjustable on said section, as and for the purposes set forth.

12. The cover or case incasing the sides and back of the standard and its appurtenances, and hinged to the machine, substantially as shown and set forth.

13. In combination with the vibratory needle-bar lever and its driving crank or eccentric, the intermediate connecting-rod, adjustable in length, for the purpose of adjusting the stroke, substantially as shown and set forth.

In testimony whereof I have hereunto signed my name this 6th day of February, A. D. 1875.

JOSEPH L. FOLLETT.

Witnesses:

W. E. NICKERSON,

C. K. CORLISS.