J. B. SULGROVE.

Take-Up and Tension-Spring for Wax-Thread Sewing-Machines.

No. 211,355. **Patented Jan. 14, 1879.**

Fig. 1.

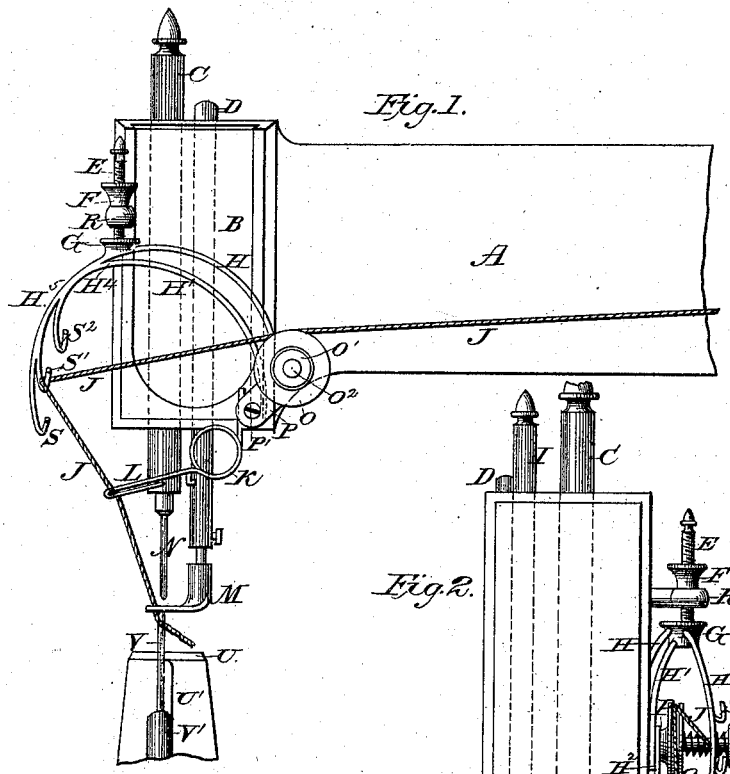


Fig. 2.

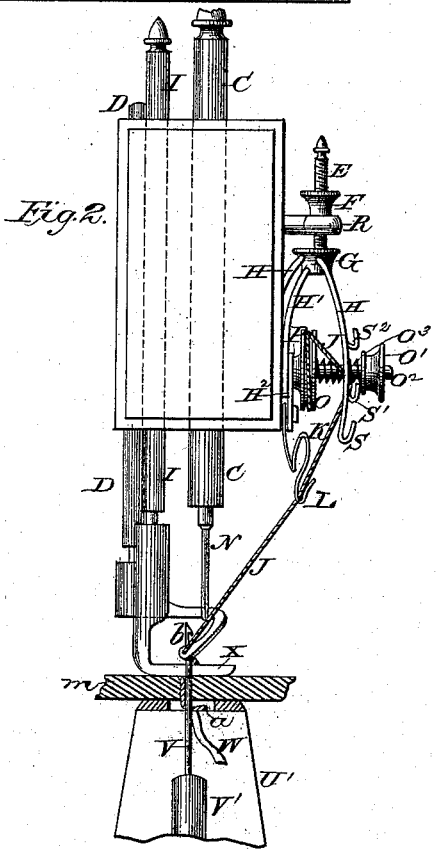
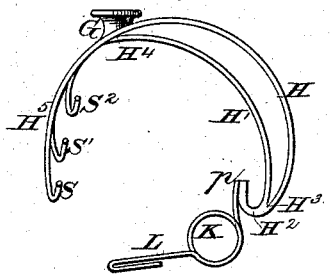


Fig. 3.



Witnesses:

D. F. Sees

Byron A. Tyler

Inventor:

Joseph B. Sulgrove

Pen & Pennie

his Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH B. SULGROVE, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO MARY L. SULGROVE, OF SAME PLACE.

IMPROVEMENT IN TAKE-UP AND TENSION SPRINGS FOR WAX-THREAD SEWING-MACHINES.

Specification forming part of Letters Patent No. **211,355**, dated January 14, 1879; application filed September 9, 1878.

To all whom it may concern:

Be it known that I, JOSEPH B. SULGROVE, of Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Combined Self-Adjustable Tension and Take-Up Spring for Waxed-Thread Sewing-Machines, of which the following is a description, reference being had to the accompanying drawings.

My invention relates to a combined take-up and tension spring for sewing-machines using a single waxed thread.

Previous to my invention waxed-thread sewing-machines using a single thread have required at least five adjustments of various parts in order to adapt the machine to all grades of sewing, such as shoe and harness work, especially the latter, where various thicknesses of material have to be united together. The adjustments required are as follows, to wit: first, the take-up mechanism; second, the adjustment of the tension of the thread; third, the adjustment of the length of stitch; fourth, the adjustment of the needle and cast-off; and, fifth, the adjustment of the needle with respect to the awl and the stroke of the pressure-foot vertically. The adjustment of the stroke of the needle and cast-off, and also of the needle relative to the position of the awl, are, in waxed-thread machines, in excess of any adjustment heretofore necessary in the ordinary dry-thread machines, and these extra adjustments have been of such vital importance in a waxed-thread machine that they have necessitated a change of adjustment of those parts whenever the thickness of material that is to be sewed varies. Thus, if the material to be sewed is one-fourth of an inch thick, the needle-bar has usually been adjusted with a stroke of fifteen-sixteenths of an inch, and the hook or barb of the needle adjusted to rise one-half inch above the throat-plate, and also to descend below the surface of the throat-plate seven-sixteenths of an inch, the stroke of the needle requiring a new adjustment in length for each additional thickness of material sewed, and a corresponding reduction in length of stroke for material of less thickness; otherwise the thread would form loops too large or too small for the required stitch, while the surplus thread drawn from the tension-wheel is permitted to seesaw in the eye or hook of the needle until it is damaged by chafing and frequently broken. When the stitch in such machines is increased in length, then the needle-bar has to be again adjusted with a corresponding increase in its stroke, which must be added below the throat-plate in order to draw an additional amount of thread necessary to form the loop required for the lengthened stitch.

It is obvious that in making the necessary adjustments of parts as above described in the ordinary waxed-thread machines, considerable time is lost, and that with the most explicit instructions it will require a skilled artisan to keep the machine in good working order; and it is impossible for manufacturers of such machines to send a machine with its needle-bar, awl, and take-up adjusted ready for all kinds of work, or, in fact, for any kind of work, unless the work required is specially mentioned in the order for the machine.

The object of my invention is to do away with the various vertical adjustments of the needle-bar, cast-off, and awl, as above described, in a waxed-thread sewing-machine, and to provide such machines with an automatic, self-regulating, combined take-up and tension spring, whereby the needle-bar, cast-off, and awl, when once adjusted to the longest stroke that the thickest part of the work requires, needs no further adjustment vertically for thick or thin work. The only adjustment required of the needle is its movement horizontally for lengthening or shortening the stitch when the machine has a needle-feed, (while in those machines that are provided with an awl-feed no such adjustment of the needle is required,) and the stitches, whether coarse or fine, whether through thick or thin material, whether of light, medium, or heavy thread, are always drawn tight, with no loose loops or slack thread left in the work, and no seesawing of thread in the hook of the needle, because all surplus thread that slides one way in the hook of the needle is formed into a loop and left in the material, thus rendering the now difficult to be adjusted and operated waxed-thread machine as simple in its opera-

tion as any of the ordinary dry-thread machines.

My invention consists of the new construction and arrangement of parts, and in the new combination of new and old elements that are deemed essential for operating my newly-combined self-adjustable take-up and tension spring, as will be hereinafter fully described and set forth.

In the accompanying drawing, in which like letters of reference in the different figures indicate like parts, Figure 1 represents a side elevation of the head and post of a waxed-thread sewing-machine, showing a side view of my combined take-up and tension spring adjusted ready for use. Fig. 2 is an end view of the same, and Fig. 3 is a view of the combined take-up and tension spring detached from the head of the machine.

The combined take-up and tension spring is represented as attached to the head of a "New England Wax-Thread Sewing-Machine;" but it is equally adapted to the "National Wax-Thread Sewing-Machine," or any other single-thread machine designed to be used in the manufacture of all kinds of leather articles.

A represents the arm of the machine, and B the head. At the lower rear part of one side of the head is attached an arm, P, by means of a screw, P′. The tension-wheel O is mounted on the screw-stud O^2, that is secured to the arm P, and is provided with a coil-spring, O^3, and adjusting-nut O^1, in the usual manner. C is the awl-bar; D, the thread-carrier bar; M, the thread-carrier; I, the presser-foot bar; X, the presser-foot; N, the awl; U′, the post; U, the throat-plate; W, the cast-off; V, the needle, and V′ the needle-bar, all of which are of the ordinary form now in use.

The take-up and tension spring H H^1 is of peculiar construction, to wit: The outer spring, H, is bent into a curve, with a curved hook, H^2, at one end, for the purpose of forming a means of fastening the device to the stud P′, as shown in Figs. 1 and 3. The other end of the curved spring H is provided with a thread-hook, S; and two other hooks, S^1 S^2, are attached to the spring, a short distance above, as shown. At or near the top of the spring H, nearest to the thread-hooked end, is a stop, G, with a rubber or leather cap, that acts against the adjusting-screw E. The outer curved spring, H, if used alone, would have to be made so stiff that some of its various actions would be impaired, and it would not have the quick, yielding, and flexible qualities required to adapt it to the various uses and purposes which it is designed to accomplish. Hence the outer curved spring, H, is made of light, active spring material, and is provided with another curved active spring, H^1, that is attached thereto, forming a compound crescent-shaped spring that is extremely quick and sensitive in its action, and yet yielding enough to accomplish the various ends required. One end of the curved spring H^1 is secured to the outer spring, H, at H^3, and the other end of the inner spring is secured to the outer curved spring at or near the stop G, thus forming a curved flexible brace to the outer spring, extending from the fastening H^2 to the stop G, while the part H^5 of the outer spring, with the thread-hooks S S^1 S^2 extending beyond the inner spring, is allowed an independent spring motion toward and from the hook end H^2, as will be hereinafter described.

The light coil take-up spring K has one end securely fastened to the hook end H^2 of the compound tension-spring H H^1, and the other end projects toward the lower thread-hook S, and is provided with a loop, L, as shown, the operation of which will be hereinafter fully described.

Immediately over the stop G of the spring H H^1 is a stud, R, secured to the head B, as shown in Fig. 2. The outer end of said stud is provided with a vertical hole, having a screw-thread cut therein for the adjusting-screw E to operate in, and said screw is held at any required adjustment by the jam-nut F, as shown.

The operation of the machine with the combined take-up and tension springs, together with the new results produced, are as follows, to wit: First, the needle and cast-off, together with the awl and presser-foot, being once adjusted for the thickest part of work to be sewed, the machine is then adjusted for any thickness of material, and requires no further adjustment except for length of stitch, which is accomplished by giving the needle more or less horizontal movement, (but no lengthening or shortening of the stroke of the needle-bar is required.) The thread is drawn from its ball and passed through the wax-cup and around the tension-wheel O, in the usual manner, after which it is carried over one of the thread-hooks, S, of the take-up and tension spring H H^1; then down through the wire loop L of the small coil take-up spring K; then down through the thread-guide, which partially rotates around the needle. The driving-wheel of the machine (not shown) is then revolved until the needle is at the lower end of the stroke. Then the material that is to be sewed is placed on the throat-plate U of the post, and the presser-foot lowered upon it. The driving-wheel is then revolved slowly until the first stitch is secured, and then the machine is ready for operation.

As the awl-bar descends, the awl N punches a hole, and the needle, following the awl up, enters the hole and passes up until the hook or barb is some distance—say seven-eighths of an inch—above the throat-plate. At the same time the thread-carrier M is partially revolved, carrying the thread around the needle below the hook or eye. The take-up spring L holds the thread taut, and throws it into the eye or hook as the needle descends and moves horizontally to effect the feed. The eye or hook of the needle, as it enters the material in its downward motion, draws the thread from above on the

spring H H^1, which springs slightly and tightens the former loop around the cast-off below. The double thread or loop carried down by the hook passes through the hole, and at the same time the double spring H H^1 is drawn slightly down from the adjusting-screw E, the spring H H^1 having a tension given to it by the adjusting-screw E sufficient to draw the thread and to allow the spring H H^1 to yield and let the double thread pass through the leather without breaking it. As the needle with the loop continues going down below the material the thread slides slightly one way in the eye of the needle (not seesawing) as it draws the thread from above. The spring H H^1 at the same time is recovering its position, so that when the needle reaches its lowest point the stop G has moved up against the adjusting-screw E, with the thread just stretched taut, with but slight tension on it, and that tension is caused by the straightening out of the part H^5 of the spring H and the slight tension given by the small spring K L. As the needle and cast-off come up, the loop just formed is loose enough for the cast-off to come between the thread and needle, while the previous loop slips off of the cast-off around the loop just formed; otherwise the loop would get into the eye again and the cast-off could not get between the thread and needle, and, consequently, when the next stitch is made, the needle would cut the thread.

As the needle reaches its lowest point it finishes the drawing of the cast-off loop up tightly under the material sewed, and part of the thread in tightening the loop is drawn up through the next to the last hole made by the awl over the work, and down through the last hole by the downward movement of the needle below the material, while the tension of the stitch is controlled by the take-up tension-spring H H^1. Thus the tension on the wheel O may be very tight, and the spring H H^1 only allows just enough thread to pass through the material to form a loop and be drawn into the material, where it is left, the tension-screw E preventing the spring H H^1 from springing up too high and drawing more thread than is required to make each stitch.

In working heavy thread it should be hooked over the thread-hook S^2 at the stiffest part of the spring, which causes an increase in tension proportional to the increase in power required to make the loop and stitch tight and the spring H H^1 yield. Medium-size thread is used in the hook S^1, and light thread in hook S. The tension-power of the spring H H^1 and length of thread drawn for each stitch are regulated by the amount of adjustment of the screw E—that is, should the screw E just touch the stop G, with no pressure thereon, the downward movement of the needle would draw the spring H H^1 down too far, and at the same time draw the thread from the tension-wheel O, and the spring H H^1, in moving up or down, would not draw the stitch tight enough in the work, as it would only act as a slight take-up; but when the screw E is run down so that the spring H H^1 is under considerable pressure, then the downward stroke of the needle draws the previous stitch tightly, and the spring H H^1 yields and draws the stop G slightly away from the screw E until the double thread is through the material. Then the spring H H^1 begins to move up against the screw E; but the part H^5 is still under sufficient strain to tighten the loop around the cast-off until the needle starts up again, when the operation is again repeated.

It will be seen from the foregoing that with my new combined take-up and tension-spring all manner of work, thick or thin, can be performed on any single waxed-thread sewing-machine with but one adjustment of the needle, cast-off, and awl, and that when the tension is once adjusted to any length of stitch, the stitch may be lengthened or shortened without readjustment of said tension, unless the tension should be so strong as, in making very short stitching where there is but little stock left between the holes perforated by the awl, to cut the stock and embed the stitch too deep. In such case the tension-wheel O may be readjusted.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a waxed-thread sewing-machine, the take-up tension-spring H, having thread-hooks S S^1 S^2, stop G, and take-up spring K, combined with the head B and adjusting-screw E, whereby the tension and take-up action of the spring H is increased or diminished, substantially as shown and described.

2. In a waxed-thread sewing-machine, the take-up tension-spring H H^1, combined with the head B, tension-wheel O, adjusting-screw E, and take-up spring K L, substantially as shown and described.

3. The compound take-up tension-spring composed of the outer spring, H, and inner spring, H^1, the thread-hooks S S^1 S^2, stop G, and the hook H^2, for fastening, substantially as shown and described.

4. The take-up tension-spring H H^1, having the take-up spring K, provided with a loop or hook, L, rigidly secured thereto, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH B. SULGROVE.

Witnesses:
E. C. FRINK,
M. H. OTT.