No. 817,475. PATENTED APR. 10, 1906.

E. F. DURAND.

SEWING MACHINE.

APPLICATION FILED MAR. 17, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

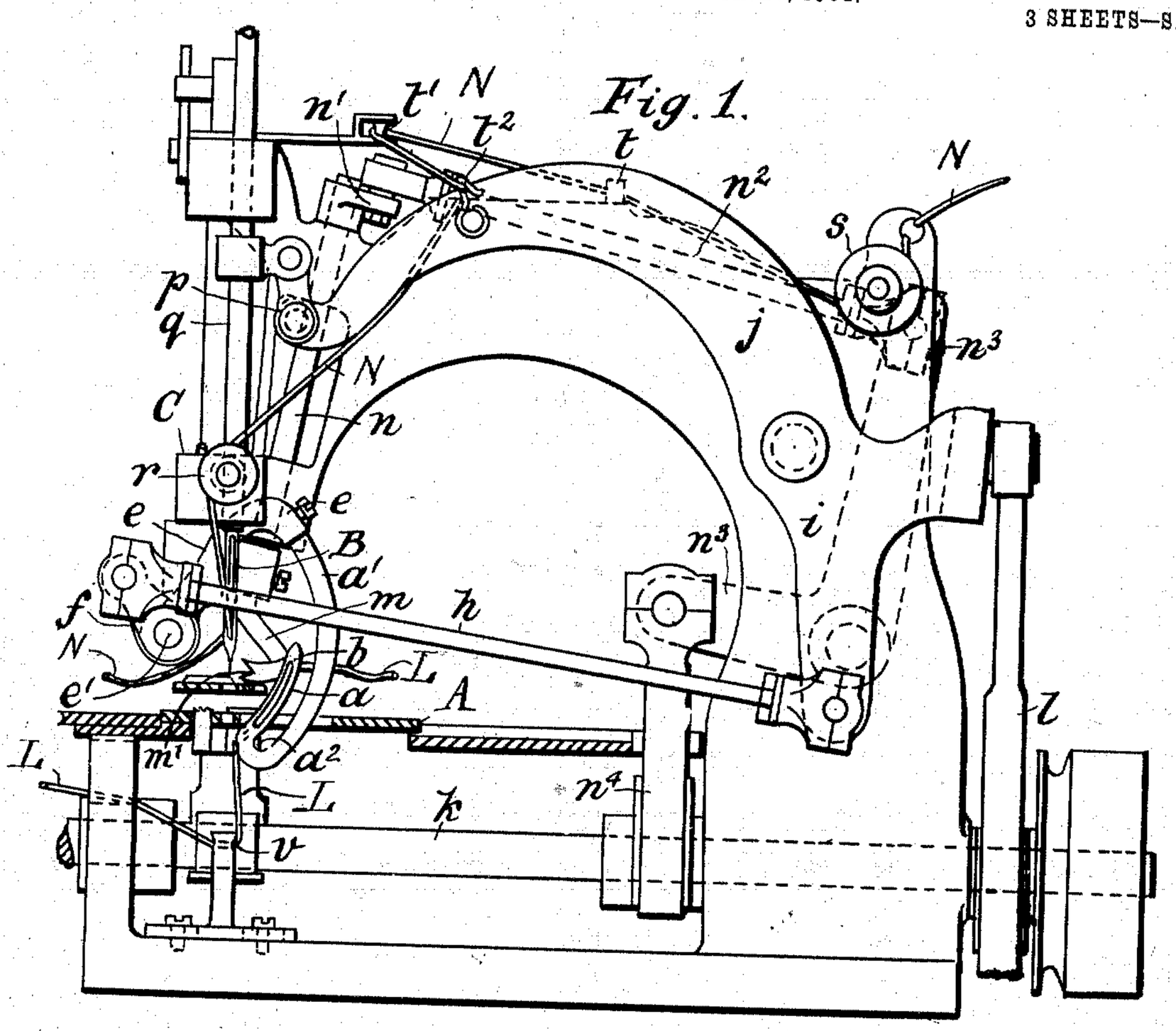
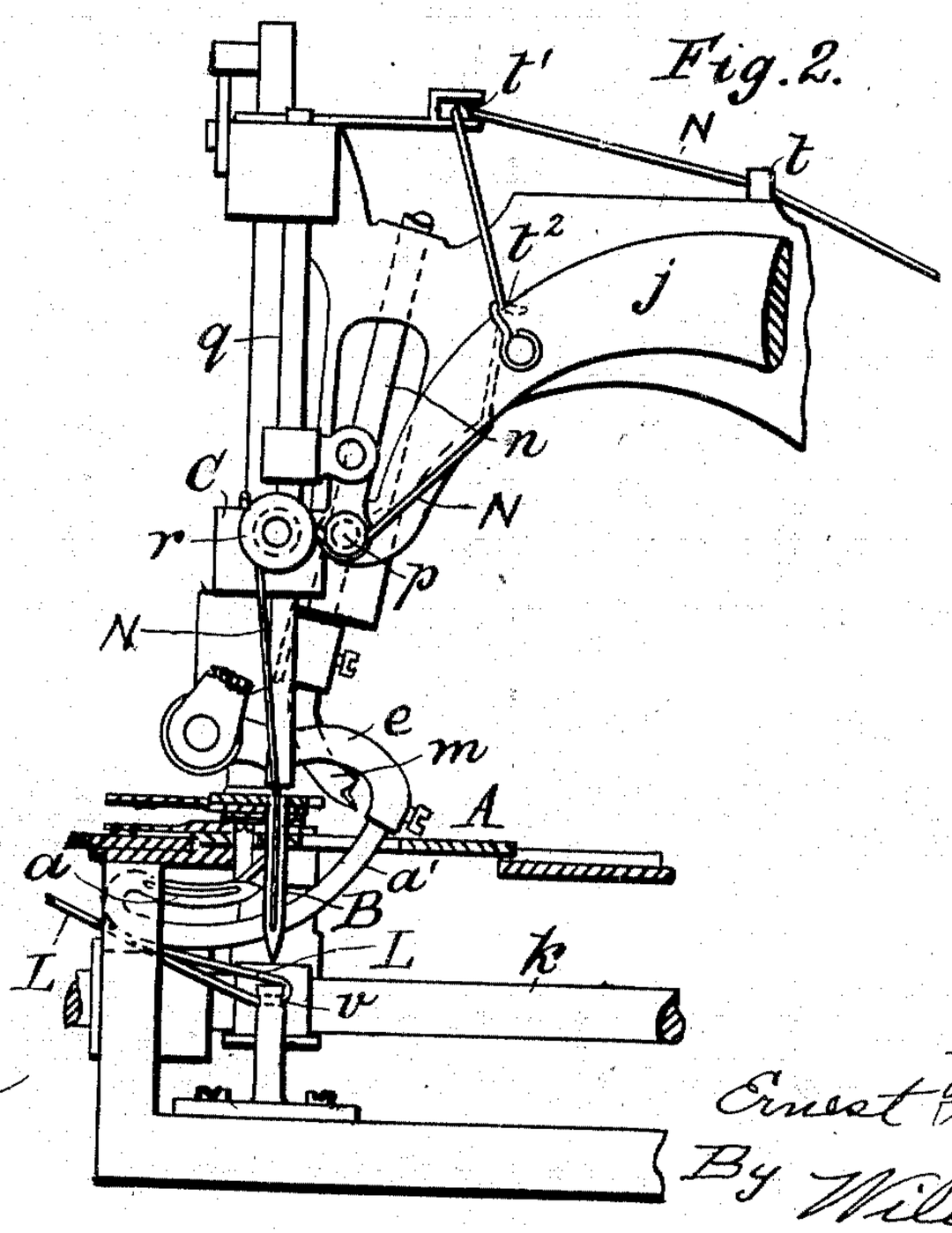


Fig. 2.



Witnesses:
L. V. Sparks
W. A. Stein.

Inventor:
Ernest F. Durand.
By Wilkinson & Co.
Attorneys.

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3 SHEETS—SHEET 2.

Fig. 3.

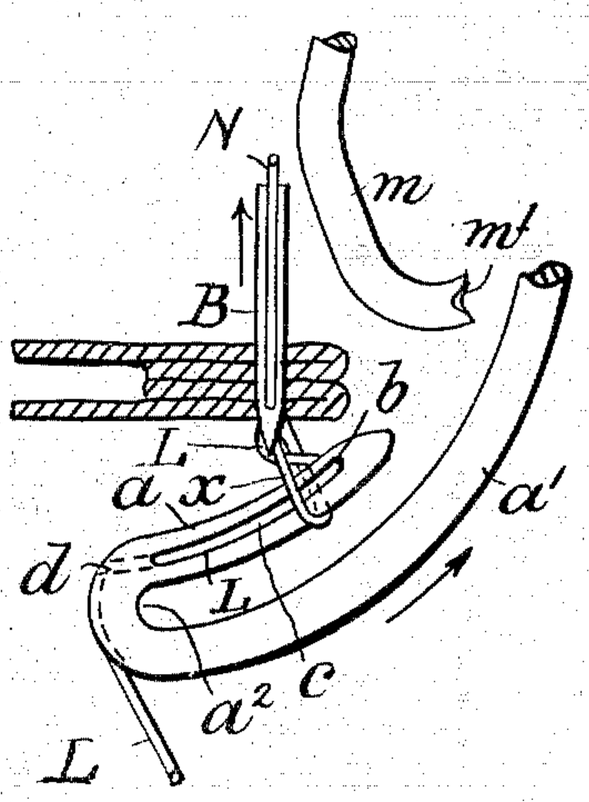


Fig. 4.

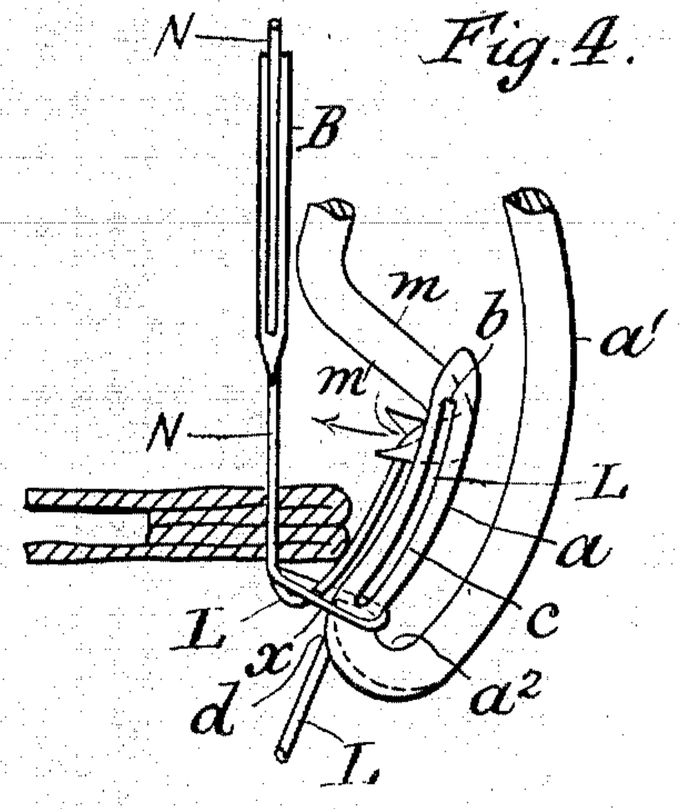


Fig. 5.

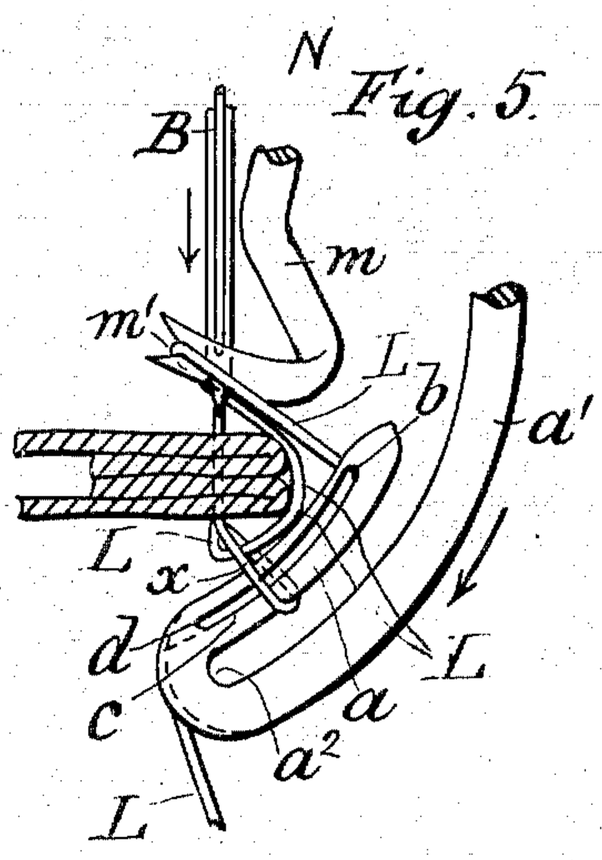


Fig. 6.

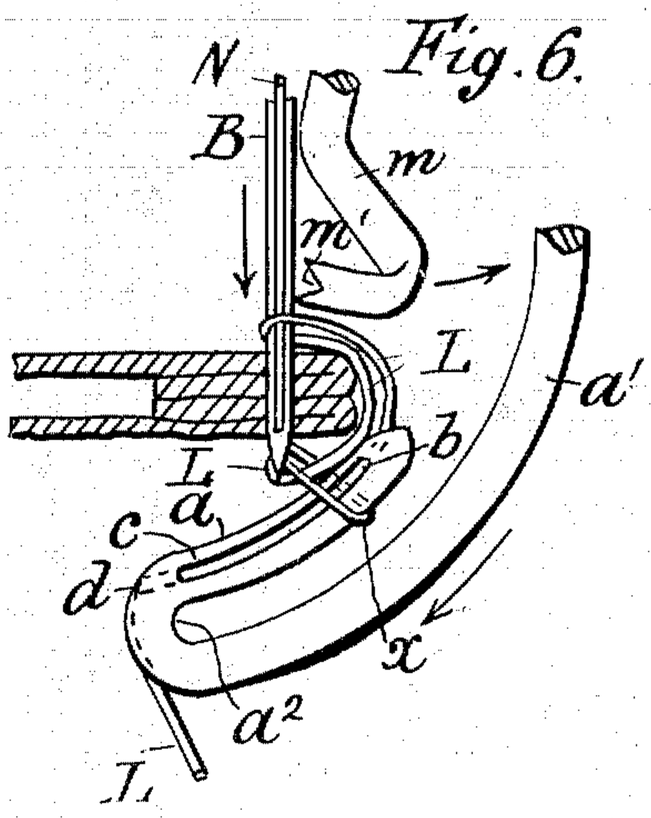


Fig. 7.

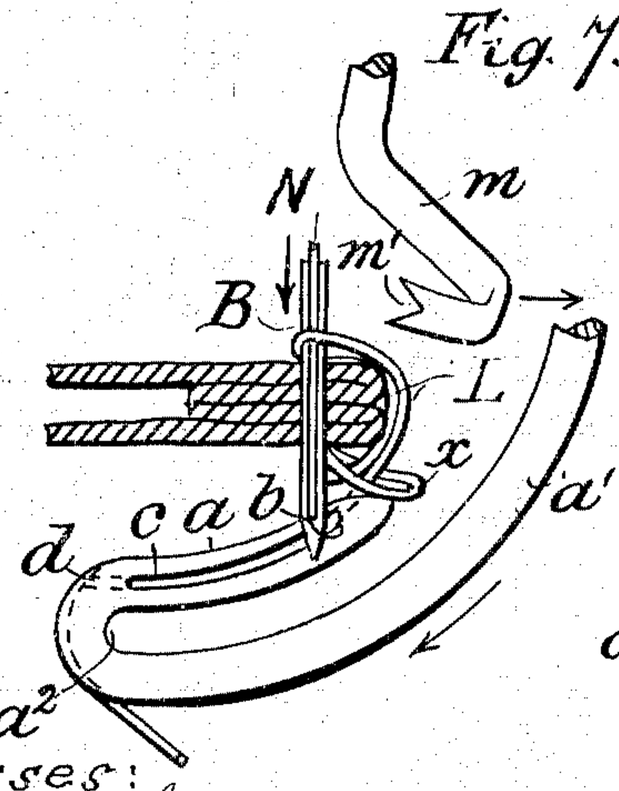
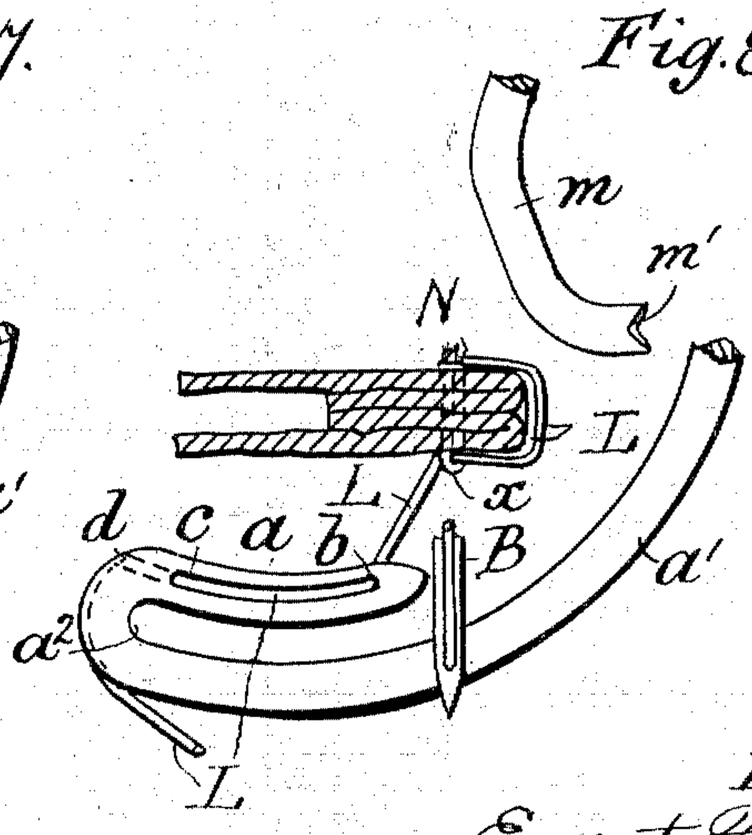


Fig. 8.



Witnesses:
L. V. Sparke
W. A. Stein.

Inventor.
Ernest F. Durand
By Wills & Fowler.
Attorney.

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E. F. DURAND.

SEWING MACHINE.

APPLICATION FILED MAR. 17, 1904.

3 SHEETS—SHEET 3.

Fig. 9.

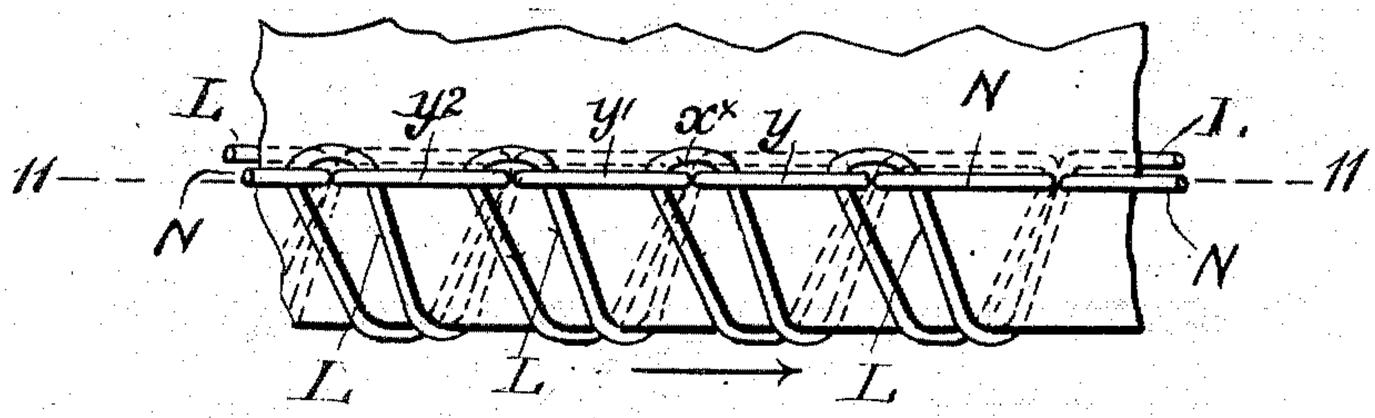


Fig. 10.

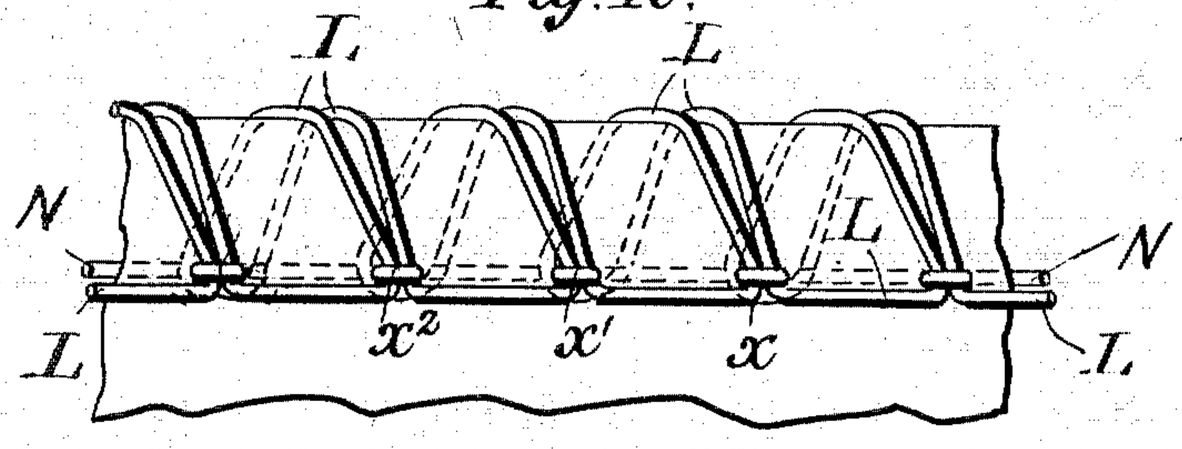
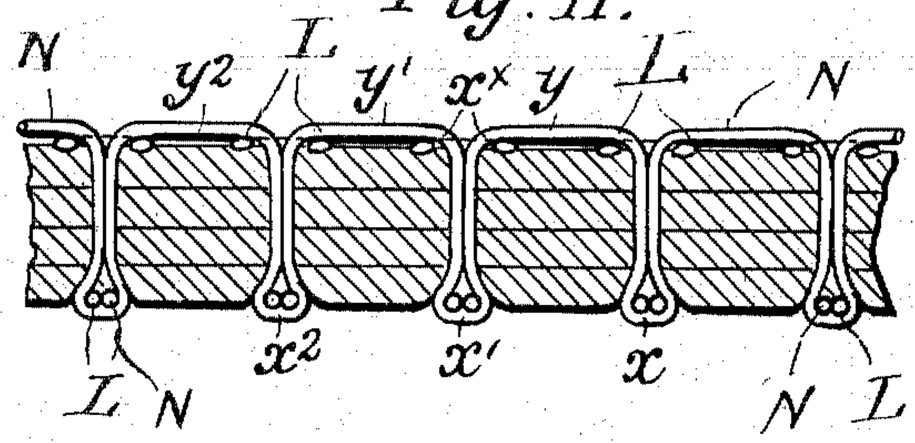


Fig. 11.



Witnesses:
L. V. Sparks
W. A. Stein

Inventor
Ernest F. Durand
By Wilkie Bowker.
Attorney

UNITED STATES PATENT OFFICE.

ERNEST FREDERICK DURAND, OF LONDON, ENGLAND.

SEWING-MACHINE.

No. 817,475. Specification of Letters Patent. Patented April 10, 1906.

Application filed March 17, 1904. Serial No. 198,686.

To all whom it may concern:

Be it known that I, ERNEST FREDERICK DURAND, a subject of the King of Great Britain and Ireland, and a resident of London, England, have invented new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to an improved construction of double-chain-stitch sewing-machine for the production of overseam-work; and it has for its objects to enable an overstitch to be formed that shall be tighter and of better appearance than that hitherto produced and in which the needle-loop shall be drawn up almost to disappearing point on the under side of the fabric; to increase the strength of the seam, so that it shall not gape or show a "grinning" stitch when opened and stretched; to avoid damage to the thread while stitching is taking place, and to economize the needle-thread. This type of machine is particularly adapted for sewing sacks, although suitable for other purposes.

The sewing-machine of my invention is mainly characterized by a looper arranged to rock in a vertical plane and adapted to enter and carry its thread through the needle-loop formed underneath the work and then present its own thread sidewise above the work to a spreader, oscillating in a practically horizontal plane and taking and spreading such loop over the work until it is extended beyond the path of the needle, and so permit the latter, with its thread, to enter downwardly through the loop into the work. Simultaneously with the downward stroke of the needle the looper retires and casts off the prior needle-loop, whereupon the stitch is immediately tightened up, so as to almost disappear in the under side of the fabric.

A distinguishing feature of this machine is that all the operative parts of the same are disposed above the work-plate and in sight of the operator, so that they can be easily got at if needed.

I will now describe my invention with reference to the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section, of the improved machine. Fig. 2 is a similar view of part of same, showing the needle-thread pulled up and tightened. Figs. 3 to 8 are diagrammatic views, on an enlarged scale, showing the relative positions of the needle, the looper, and the spreader during the formation of a stitch. Fig. 9 is a plan of a piece of the work, showing the stitches on an enlarged scale. Fig. 10 is an under side view of the same, and Fig. 11 is a section thereof on the line 11 11 of Fig. 9.

In my improved sewing-machine I employ a curved looper of U shape comprising a short or operating limb a, a long limb or shank a', and a bend or throat a^2. The limb a has a pointed end or nose with an eye b and a rearwardly-extending guide-groove c for the looper-thread L, which is introduced through an eye or threading-hole d at the rear end of said groove. The shank a' of the looper is firmly secured to the free end of a lever e, which is fast on an axis e', above the work-plate A to the left of the needle B, and whose function is to rock the looper in a vertical plane on the right-hand side of the needle, its range and time of motion being such that when the needle is in its lowest position the nose of the looper is slightly to the left thereof, and when fully raised its nose is about level with the eye of the needle, and the bend or throat a^2 is below the work. The looper thus constructed and arranged is enabled to enter its nose with its thread L into each newly-formed needle-loop without disturbing the latter.

The looper-operating mechanism consists of a crank f on the axis e' and connected by a rod h to the arm i of the needle-lever j, which is driven from the main shaft K by an eccentric l.

The spreader comprises a stem and a bent arm m, which latter is flattened at its free end and is formed with a prong or fork m'. The stem of bent arm m is fixed in the end of an inclined rocking spindle n, which is mounted in suitable bearings on the frame and imparts to said spreader a circular reciprocating or sweeping motion in a nearly-horizontal plane, the motion being obtained by means of a crank n', mounted on the upper end of the spindle n and connected by a rod n^2 to a bell-crank lever n^3, which is driven from the shaft k by an eccentric n^4. The spindle n is mounted, preferably, at an angle of fifteen degrees from the vertical in order that space may be provided at its upper end for the application of a lever-arm to manipulate it and that at the same time the center of motion of its lower end may yet be in the proper relative position to the looper and needle. This, however, forms no part of my invention. The motion of the spreader is so timed and devised that when the eye b of the looper

has risen up to the path of said spreader the fork m' of the latter is a little below the eye and close to the back of the looper. From this position the spreader moves toward the needle and at the same time catches the looper-thread L, which it passes below and a little beyond the point of the raised and now downwardly-moving needle.

The stitch so far has been only loosely formed, and as it is imperative that it should be tightened up the following take-up means are employed for the purpose: The front end of the needle-lever j carries a stud p, and on the lower guide C of the needle-bar q is mounted a grooved pulley r. The needle-thread N is passed through an ordinary tension device s and guide-eyes t t' t^2, and is then led from the back of the needle-lever j under the stud p and over the pulley r to the eye of the needle, the position of the said stud and pulley being such that when the needle-lever descends the stud p impinges against the thread N close to the pulley r, and thereby pulls the lower portion of the thread tight at the moment when the needle-loop is released from the looper, as seen in Fig. 2. The "under" or looper-thread L before being threaded into the looper may also pass through a thread-eyelet v.

Referring to Figs. 3 to 8, and more especially to Fig. 4, it will be observed that the needle-loop while encircling the looper is not dragged or increased in length, and hence it does not become frayed or damaged.

The other parts of the machine not specially described are of ordinary construction, although their form is somewhat altered as to permit of the arrangement of all the working parts being located above the work-plate.

In my improved machine the operation is as follows: The work having been placed in position and the machine started, the needle descends with its thread N and penetrates the work to the required distance below. As the needle retires its thread forms a loop x below the work, and the nose of the looper, with its thread L, immediately enters the said needle-loop, as indicated in Fig. 3, the needle-loop encircling it and sliding down toward its throat a^2. The needle and the looper then move upward together, and by the time their upstroke is nearly completed the spreader m has advanced toward the looper, and its fork m' catches the looper-thread L near the eye b, as shown at Fig. 4, and pulls the portion thereof from between the said eye and the previously-formed stitch over the edge of the work and beneath the point of the needle, as at Fig. 5, thereby forming an overedge-loop of the looper-thread. The needle now descends and carries its thread N through the said loop, as shown in Fig. 6, while the spreader withdraws. Concurrently with this movement of the needle the looper is also traveling downward and when nearing the end of its travel casts off the needle-loop x, as is shown in Fig. 7. At this moment the stud p comes into contact with the needle-thread N, as shown in Fig. 2, and tightens the needle-loop, thus finishing and perfecting the stitch, as indicated in Figs. 8 and 11. The stitch being thus produced, reference to Figs. 9, 10, and 11 of the drawings will show that the needle-thread N lies in one vertical plane and forms a series of loops x x' x^2 on the under side of the work and a series of straight stitches y y' y^2 on the upper side thereof and that the looper-thread L passes through the loop x on the under side over the edge of the work and around the root $x^\times$ of the needle-loop x' on the upper side of the work, then back again to the under side through the same loop x, from which it passes longitudinally to the next loop x', thus completing a full stitch, and so on, the needle-thread loops being all in alinement—*i. e.*, parallel with the edge of the work.

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

1. An overseam sewing-machine provided with a reciprocating needle and means for operating it, an oscillating thread-carrying looper adapted to move in the arc of a circle whose center of motion is situate at a point above the cloth-plate, the thread-carrying portion of said looper having a range of movement in the path of said arc across the edge of the work and extending from a point below the cloth-plate to a point above it and adapted to both enter and cast off the needle-thread loop below said cloth-plate, said thread-carrying portion of said looper acting to move through said needle-thread loop in entering and casting it off so as to always maintain it below said cloth-plate at the same time carrying its looper-thread loop above said cloth-plate, an oscillating spreader adapted to engage the looper-thread loop and to spread the same upon the work for the said needle to enter it, means for taking up said needle-thread after being cast off the looper, and means for actuating said looper and spreader.

2. An overseam sewing-machine provided with a reciprocating needle and means for operating it, an oscillating thread-carrying looper mounted on a pivot situate above the cloth-plate and on that side of the needle which is remote from the edge of the work under treatment, said looper comprising a pair of limbs united by a throat-piece and having one of said limbs adapted to carry the thread and being so curved that it always lies and operates in the arc of a circle whose center is coincident with the axis of said pivot, said looper being adapted to both enter and cast off the needle-thread loop below the cloth-plate, and a spreader engaging and spreading said looper-thread for the needle to enter it, and means for operating said looper and spreader.

3. An overseam sewing-machine provided with a reciprocating needle and means for operating it, an oscillating thread-carrying looper mounted on a pivot situate above the cloth-plate and on that side of the needle which is remote from the edge of the work under treatment, said looper comprising a pair of limbs *a* and *a'*, throat-piece a^2 uniting said limbs and the limbs being so curved that they always lie and operate in the arcs of circles with whose curvature they correspond and whose center is coincident with one another and with the axis of said pivot, said looper being adapted to both enter and cast off the needle-thread loop below the cloth-plate, a spreader for engaging and spreading said looper-thread for the needle to enter it, and means for operating said looper and spreader.

4. An overseam sewing-machine provided with a reciprocating needle and means for operating it, an oscillating thread-carrying curved looper of a U shape and comprising a short limb provided with an eye near its point, a long limb and a throat uniting it with said short limb, the said looper having its center of motion above the cloth-plate; the curvatures of said looper-limbs being substantially coincident with arcs struck from said center of motion and the said looper-limbs reciprocating on said arcs and the said short limb thereby entering the needle-thread loop below the cloth-plate and substantially normal to the plane of the loop and at the beginning of the upstroke of said looper, and subsequently casting it off on its downstroke below said cloth-plate, to maintain it below the level of said cloth-plate and to prevent lengthening said needle-thread loop, an oscillating spreader adapted to engage the looper-thread loop and spread the same upon the work for the said needle to enter it, means for taking up said needle-thread after being cast off the looper, and means for actuating said looper and spreader.

5. An overseam sewing-machine provided with a reciprocating needle and means for operating it, an oscillating thread-carrying looper engaging the needle-thread loop and passing its thread-carrying end through said loop below the work and then casting off said loop below the work so as to maintain said loop always below the work, an oscillating spreader engaging the looper-thread loop above the needle-thread loop after the looper has passed through the latter and serving to spread such looper-thread loop above the work for the needle to enter said loop, means for taking up said needle-thread after it is cast off the looper, and means for operating said looper and spreader, whereby said needle-thread loop on the under side of the work is drawn into the same plane with the needle-thread upon the upper side and the needle-stitches are maintained in the said same plane.

6. An overseam sewing-machine provided with a reciprocating needle and means for operating it, a depending oscillating thread-carrying looper adapted to move in the arc of a circle whose center of motion is situate at a point above the cloth-plate, the thread-carrying end of said looper having a range of movement in the path of said arc extending from a point below said cloth-plate to the side of the needle opposite to that on which the edge of the work is caused to travel to a point above the cloth-plate and adapted to both enter and cast off the needle-thread loop below said cloth-plate and to maintain said needle-thread loop below said cloth-plate, the point of said looper being directed upwardly on the end of its upstroke and directed substantially horizontally on the end of its downstroke, an oscillating spreader adapted to engage the looper-thread loop when passed through and raised above said needle-thread loop and spread the looper-thread loop upon the work for the said needle to enter it, means for taking up said needle-thread after being cast off the looper, and means for actuating said looper and spreader.

7. An overseam sewing-machine provided with a reciprocating needle and means for operating it, an oscillating thread-carrying looper moving in the arc of a circle whose center of motion is situate at a point above the cloth-plate and adapted to both enter and cast off the needle-thread loop below said cloth-plate and to maintain said needle-thread loop below said cloth-plate at the same time carrying its looper-thread loop above said cloth-plate, a spreader adapted to engage said looper-thread when raised to spread it over the work and comprising a bent arm *m*, a forked end *m'* on said arm, and an inclined spindle *n* to which said bent arm is secured, and means for operating said looper and spreader.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ERNEST FREDERICK DURAND.

Witnesses:

GEORGE E. MINTERN,

H. D. JAMESON.