

(No Model.)

5 Sheets—Sheet 1.

C. F. LITTLEJOHN.  
DOUBLE THREAD SEWING MACHINE.

No. 421,590.

Patented Feb. 18, 1890.

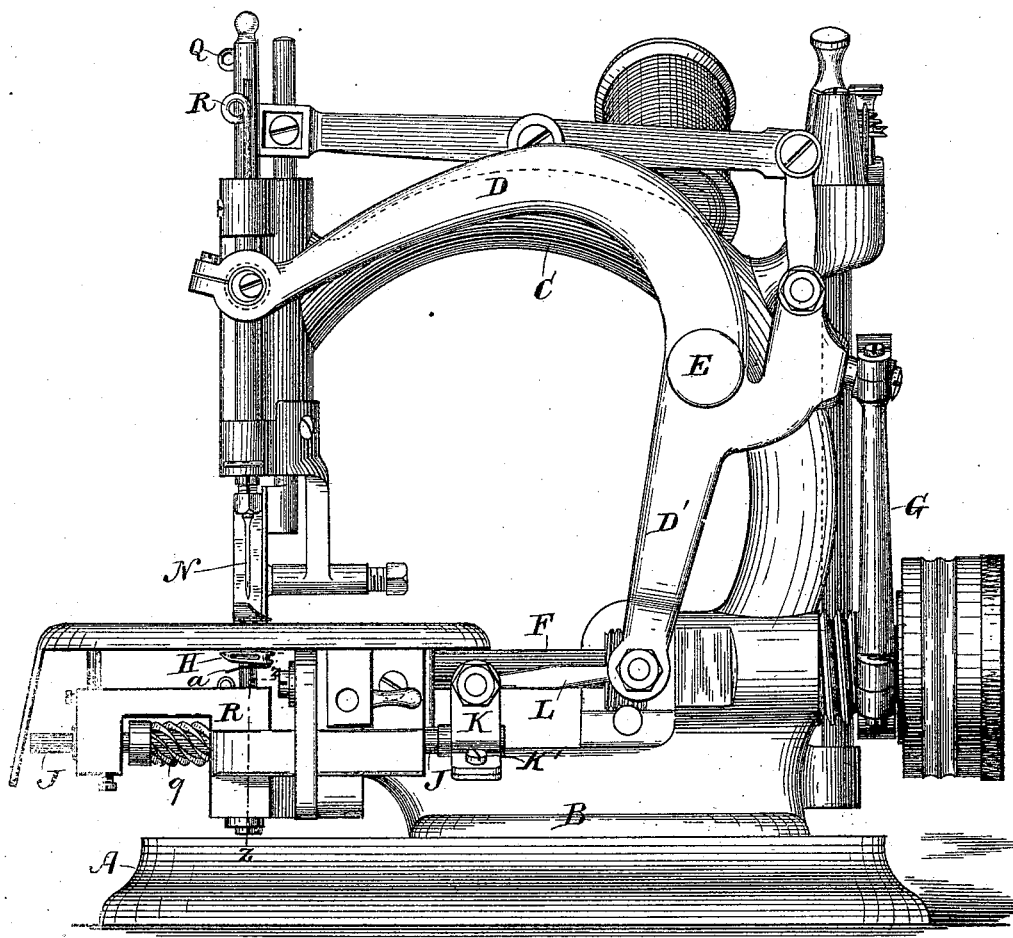


Fig. 1.

WITNESSES:

Chas. S. Gooding.  
H. Brown.

INVENTOR:

C. F. Littlejohn  
by Knight & Brown  
Attys.

(No Model.)

5 Sheets—Sheet 2.

C. F. LITTLEJOHN.  
DOUBLE THREAD SEWING MACHINE.

No. 421,590.

Patented Feb. 18, 1890.

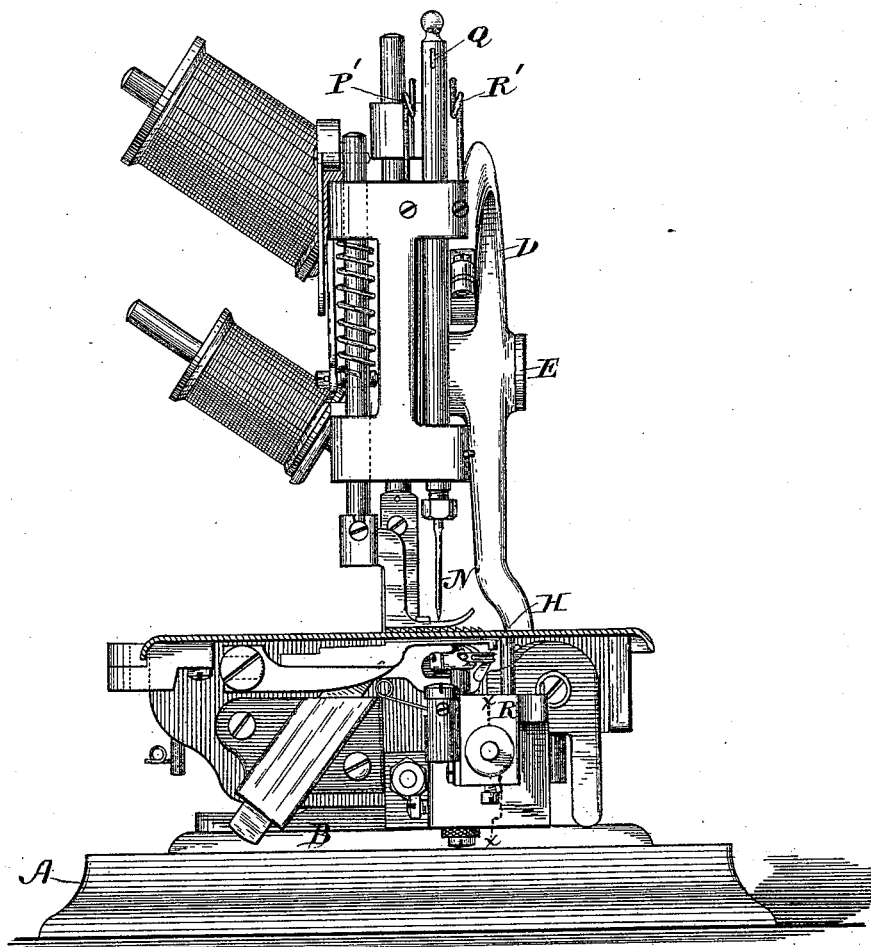


Fig. 2.

WITNESSES:  
C. S. Gooding.  
H. Brown

INVENTOR:  
C. F. Littlejohn  
by *Myrtle Brown*  
Atty

(No Model.)

5 Sheets—Sheet 3.

C. F. LITTLEJOHN.  
DOUBLE THREAD SEWING MACHINE.

No. 421,590.

Patented Feb. 18, 1890.

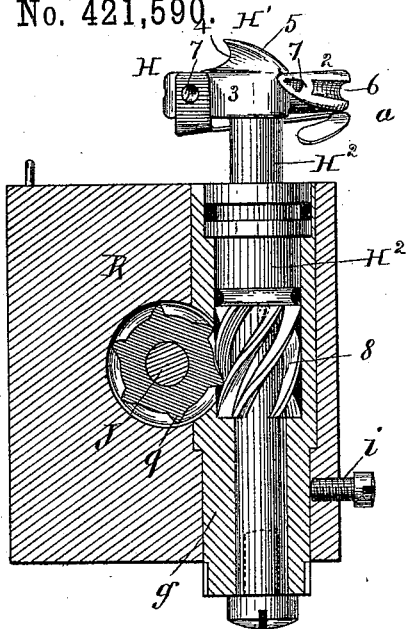


Fig. 5.

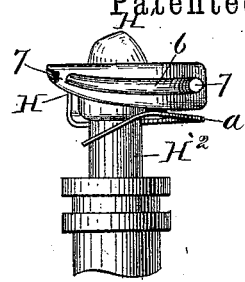


Fig. 6.

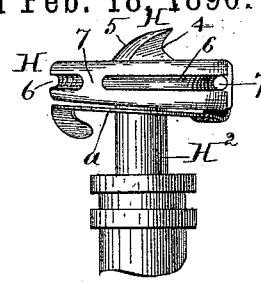


Fig. 7.

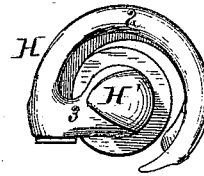


Fig. 8.

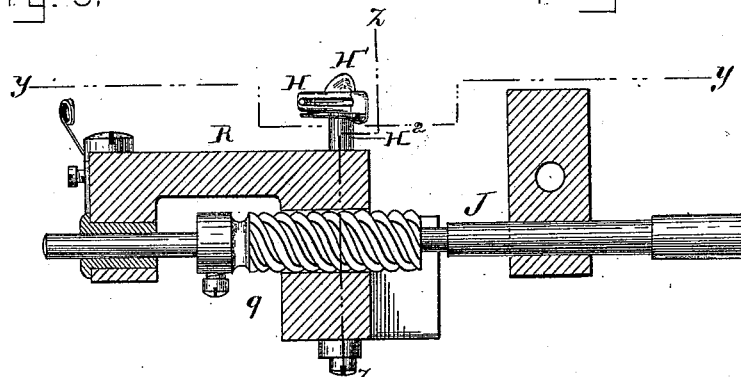


Fig. 3.

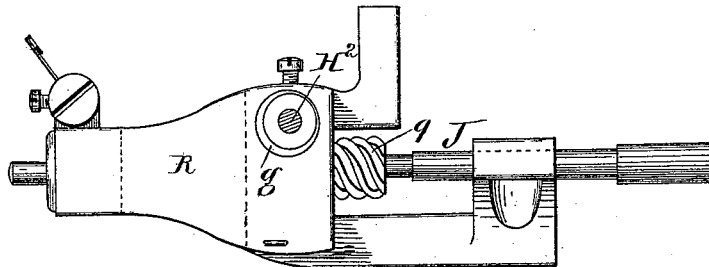


Fig. 4.

WITNESSES:

C. S. Gooding.  
H. Brown.

INVENTOR:

C. F. Littlejohn  
by Wright & Brown  
Atty.

(No Model.)

5 Sheets—Sheet 4.

C. F. LITTLEJOHN.  
DOUBLE THREAD SEWING MACHINE.

No. 421,590.

Patented Feb. 18, 1890.

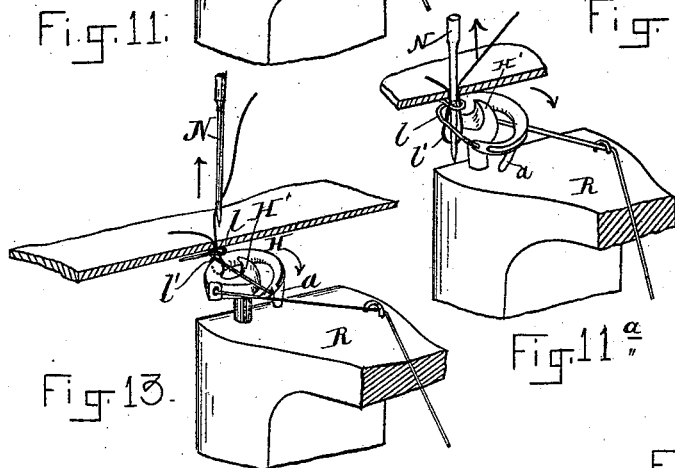
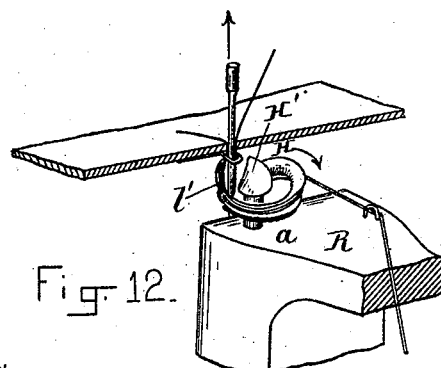
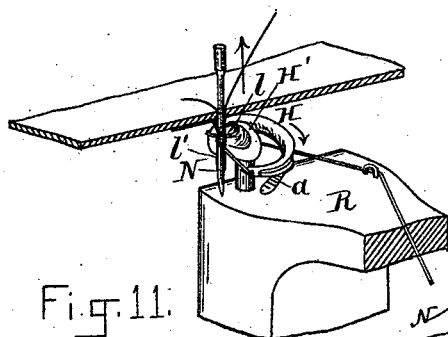
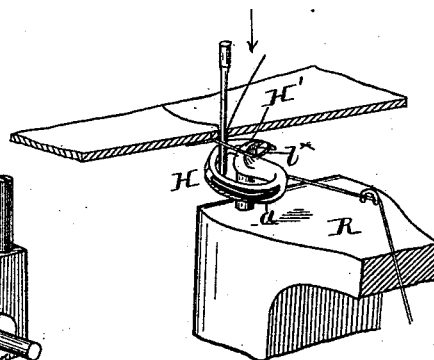
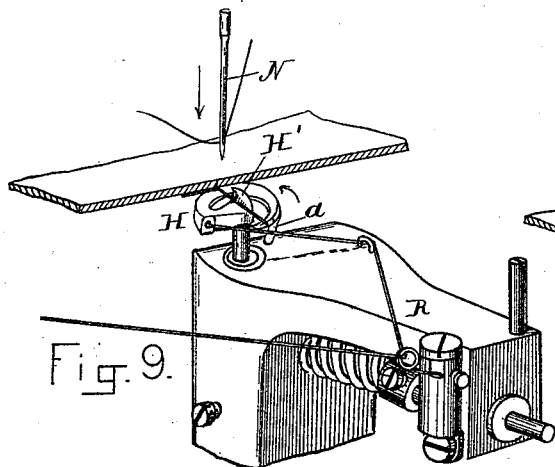


Fig. 11<sup>a</sup>

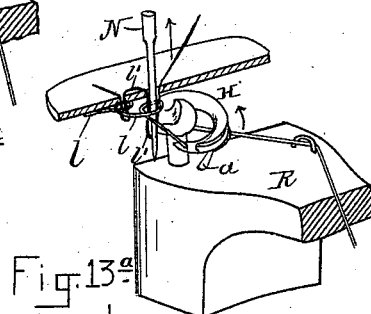


Fig. 13<sup>a</sup>

WITNESSES:  
C. S. Gooding  
H. Brown

INVENTOR:  
C. F. Littlejohn  
by night H. Brown  
Atty.

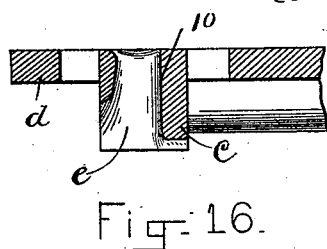
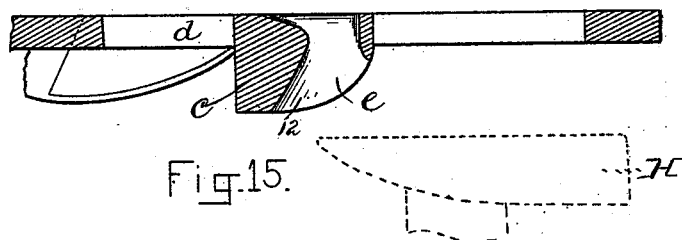
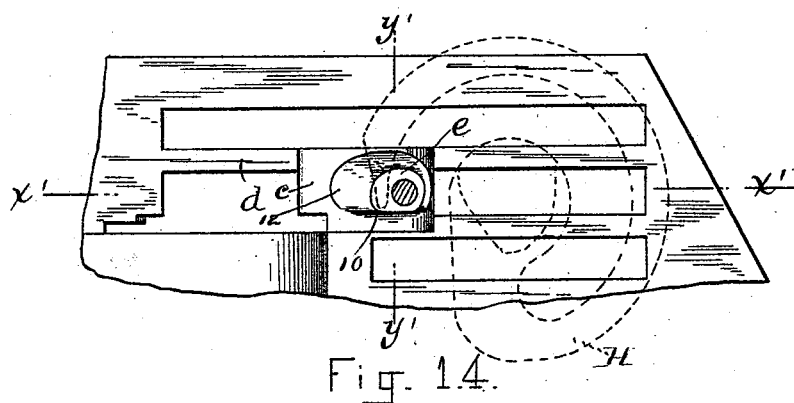
(No Model.)

5 Sheets—Sheet 5.

C. F. LITTLEJOHN.  
DOUBLE THREAD SEWING MACHINE.

No. 421,590.

Patented Feb. 18, 1890.



WITNESSES:  
C. S. Gooding  
H. Brown

INVENTOR:  
C. F. Littlejohn  
by Wright & Brown  
Atty.

# UNITED STATES PATENT OFFICE.

CHARLES F. LITTLEJOHN, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR OF  
ONE-HALF TO E. B. WELCH, OF CAMBRIDGE, MASSACHUSETTS.

## DOUBLE-THREAD SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 421,590, dated February 18, 1890.

Application filed November 19, 1885. Renewed December 2, 1887. Serial No. 256,794. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES F. LITTLEJOHN, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Double-Thread Sewing-Machines, of which the following is a specification.

The object of this invention is to furnish an improved double-thread sewing-machine of a simple and durable character.

My improvements relate, first, to a horizontally-oscillating curved hook provided with a peripheral groove and eyes to hold and carry the under thread through a loop of the upper thread on the needle, and with a central cam, which is formed to spread and hold a loop or bight of the lower thread in position to receive the descending needle, and to release or throw off said loop after the needle has entered it.

My improvements also relate to certain combinations of devices and minor improvements, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a front elevation of a sewing-machine provided with my improvements. Fig. 2 represents an end elevation of the same, the work-plate being shown in section. Fig. 3 represents a section on line *x x*, Fig. 2. Fig. 4 represents a section on line *y y*, Fig. 3, looking downwardly. Fig. 5 represents a section on line *z z*, Figs. 1 and 3, and side elevation of the thread-hook. Figs. 6 and 7 represent side elevations of the thread-hook in different positions. Fig. 8 represents a top view of the thread-hook. Figs. 9 to 13<sup>a</sup>, inclusive, represent perspective views of the thread hook and needle, showing different stages in the formation of the stitch. Fig. 14 represents a bottom view of a part of the work-plate, showing the thread-hook in dotted lines. Fig. 15 represents a section on line *x' x'*, Fig. 14. Fig. 16 represents a section on line *y' y'*, Fig. 14.

The same letters of reference indicate the same parts in all the figures.

In the drawings, A represents the table, to which the base B of the machine is secured.

From this base the goose-neck or arm C rises in the usual manner.

D represents the needle-lever, pivoted at E and actuated by an eccentric on the main shaft F and by a pitman G, connected at its upper end with the short arm of said lever.

H represents the thread-hook, which is attached to a substantially vertical stem or arbor H<sup>2</sup>, and is composed of a curved portion 2, Fig. 8, about concentric with the axial center of said arbor, and a radial arm 3, connecting the portion 2 with said arbor, the upper side of the hook being substantially horizontal, so that it moves in a plane about at right angles with the line of movement of the needle N. The periphery of the hook has a groove 6, for the reception of the under thread, and two or more (preferably three) eyes 7, forming continuations of said groove to retain the thread in the groove, one of said eyes being at the heel, another near the point, and the third at about the middle of the periphery of the hook. The orifice of the thread-eye at the point of the hook may be on the same curve as the remaining portion of the groove 6, for a purpose hereinafter described. The stem or arbor H<sup>2</sup> of the hook is journaled in a bearing-block R, attached to the frame or base of the machine, and is grooved to form gear-teeth 8, meshing with similar teeth 9 on a horizontal rod J, which is reciprocated longitudinally (but is not capable of rotating) in the block R, and by its reciprocating movements oscillates the arbor H<sup>2</sup> and the hook thereon.

The rod J is reciprocated in this instance by means of an arm or extension D' on the needle-lever, and a connecting-rod L, pivoted to said arm and to an ear K, affixed to the rod J by means of a screw K', said screw serving to clamp the ear K upon the rod J. By loosening the set-screw K' the rod J may be turned to present any portion of its toothed surface to the shank of the thread-hook; hence as the rod becomes worn it may be adjusted to bring unworn portions into operative position. At the center of the hook or upon the end of the stem or arbor is the cam or hub H', which has a concave side 4 and a convex side 5, said concave side during a por-

tion of the oscillating movement of the hook co-operating with the point of the hook in spreading and holding open a loop of the under thread, so that the descending needle may pass through said loop, while the convex side is so formed that during another part of the oscillating movement of the hook it will come in contact with said loop and release or throw it off, so that it may be taken up by the subsequent movement of the hook. Prior to the descent of the needle the hook stands in the position shown in Fig. 9, the under thread extending from the seam on the work to the point of the hook in close proximity to the concave side of the hub or cam. While the needle is descending the hook rotates backward, as indicated by the curved arrow in Fig. 10, and thus causes the portion of the under thread between the seam and the point of the hook to bear against the concave side of the hub or cam and bends said portion partly around the cam in the form of a loop *l*, Figs. 10 and 11, which is prevented from slipping upwardly off from the cam by the concave side 4. The needle descends while the loop *l* is thus held and passes through said loop. After the needle has entered the loop *l*, and while it is completing its downward movement, the hook continues its backward rotation until the convex side of its hub is brought against the loop *l*. The form of the convex side is such that it cannot retain said loop, but releases or casts it off, the loop then embracing the needle and the upper thread thereon, and being tightened by the completion of the backward movement of the hook. After the loop *l* is released and tightened the hook rotates forward, its point advancing toward the depressed needle. Just before the point of the hook reaches the needle the latter begins to rise, and in so doing throws out from one of its sides a loop *l'* of the upper thread, said loop being entered by the point of the advancing hook, as shown in Fig. 12, and thus retained on the hook while the needle is rising and the hook is completing its forward movement, as shown in Fig. 13. The needle in rising leaves the released loop *l* of the lower thread around the loop *l'* of the upper thread, which is held upon the hook. The hook then rotates backwardly out of the upper thread loop, leaving the latter interlooped by the lower thread, which is drawn through said loop by the point of the retreating hook. The operation is thus continued, each descent of the needle being through a loop of the lower thread first held and then released by the hub of cam *H'*, and each upward movement of the needle being followed by the entrance of the thread-hook into the loop of the upper thread thus thrown out from the side of the needle, said hook retaining the upper thread-loop while the needle rises, and then moving backwardly to draw the lower thread through and thus permanently hold said loop, the result being that the lower thread is first carried

around each loop of the upper thread and then looped through it. This continued interlooping of the needle and looper-threads forms the well-known "Grover & Baker," or double chain-stitch, seam. As soon as the point of the hook withdraws from the upper thread-loop *l'* said loop is drawn or tightened by a take-up consisting of two eyes *P' R'*, affixed to the frame of the machine at opposite sides of the needle-bar and another eye *Q* on the needle-bar, the eye *Q* being placed at a point which in the course of the stroke of the needle-bar moves equally above and below the fixed eyes *P' R'*, so that the slack of the upper thread is taken up both by the upward and downward stroke of the needle-bar.

I have in some cases found it advantageous to form a downward incline on the under side of the thread-hook from the point to or partly to the heel, as best shown in Figs. 5, 6, and 7. This incline causes the hook in passing through the loop *l'* of the upper thread to pull said thread downwardly, and thus tighten or set the preceding stitch. I have also in some cases employed a spring-plate *a*, attached at one end to the heel of the hook and extending along the under side thereof nearly to the point, its opposite end being free. Said plate stands parallel with and so near to the under side of the hook that it bears upon the loop of the upper thread and prevents said loop from moving independently or being displaced during the backward movement of the hook. Said loop is loosened by the backward movement of the hook, owing to the incline above described, which draws down or elongates the loop during the forward movement of the hook, and therefore loosens it during the backward movement. If the loosened loop were free to move laterally on the hook, it would be liable to get in the path of the descending needle and receive the latter. The spring-plate prevents this by retarding the loop or preventing its free movement toward the needle until the point of the needle has descended below the lower end of the loop. The thread-eye 7 at the point of the hook is shown as extending along the periphery of the hook in line with the groove 6. The eye thus disposed causes the under thread to stand off from the side of the needle, as shown in Fig. 12<sup>a</sup>, when the loop *l'* is thrown out from the needle and the hook is moving forward to enter said loop. The under thread is thus prevented from pressing against the loop *l'*, so that the latter is free to stand out from the needle and receive the hook.

*c* represents a projection on the under side of the throat-plate *d* of the machine, said projection extending nearly down to the plane of the upper side of the thread-hook and containing the hole *e*, through which the needle passes. Said hole is formed with a straight and flat side or wall 10, which affords a support for the loop *l'* of the upper thread,

thrown off from the needle by the upward movement of the latter, as above described, and prevents said loop from yielding when the point of the advancing hook reaches it, thus insuring the prompt entrance of the hook into said loop. The needle-hole is also provided with a recess 12 at one side of the wall, said recess receiving the thread of the upper loop when said loop is being taken up.

g represents a socketed cylindrical holder, Fig. 5, journaled in the block R, so as to be capable of rotating therein, and provided with a socket eccentric to its periphery, in which socket the arbor H<sup>2</sup> of the thread-hook is journaled. It will be seen that by reason of the eccentricity of said arbor to the periphery of the holder a rotary movement of the holder in the block R will move the arbor laterally with relation to the spirally-gearod rod I, so that any lost motion between the spiral gears of the arbor and rod resulting from wear or other cause can be taken up by a rotary movement of the holder. A set-screw i secures the holder in a position to which it may be retained.

These improvements add materially to the effectiveness and smoothness of the operation of the machine. I do not limit myself to the conjoint use of all the specified improvements in one machine. The hook may have its under side parallel with its upper side instead of inclined, if desired, and the loop-retarding spring may be omitted.

The thread-hook may be oscillated by any other suitable mechanism.

I claim—

1. In a double-thread sewing-machine, an oscillating thread-hook having a curved and peripherally-grooved arm and a projection within the curve of said arm, concave on one side for retaining the thread and spreading the same for the entrance of the needle, and convex on the opposite side for casting the thread off to engage with the upper thread, whereby during a movement of the hook the thread is first held and then released by said projection, and means for oscillating said hook, substantially as described.

2. The oscillating hook provided with the curved portion grooved on its outer face and perforated at its heel and point for the permanent engagement of the thread, and the cam or projection at the center extending above the head of the hook for spreading and releasing the lower thread, combined with means for oscillating said hook, as set forth.

3. In a sewing-machine, the vertically-reciprocating needle N, carrying the upper thread, in combination with the oscillating hook having the projection H' thereon, with the concave and convex sides, and the peripheral groove with the retaining loops or eyes, and the eye at the end of the hook, whereby the hook is adapted permanently to carry the lower thread, spread the same for the reception of the upper threaded needle, and then release said loop to enable the same to be

contracted around the upper thread, substantially as set forth.

4. The combination of the thread-hook having its shank or shaft grooved to form teeth, the rod J, grooved to form teeth intermeshing with those of the thread-hook, fixed bearings in which said rod is adapted to be reciprocated to oscillate the thread-hook, a reciprocating device, as K, whereby the rod is impelled, and means, substantially as described, for detachably securing the rod J to the device K, whereby said rod may be partly rotated to present different parts of its teeth to the thread-hook shank, as set forth.

5. The combination of the oscillating thread-hook having its shank or shaft grooved to form teeth, the reciprocating rod J, grooved to form teeth intermeshing with those of the thread-hook moved by the arm K, and the link L, uniting said arm and the lever D', all arranged and operating substantially as described.

6. The combination, with the oscillating thread-hook having its shank or shaft spirally grooved, forming spiral teeth, of the reciprocating, rod J, spirally grooved, forming teeth intermeshing with those on the thread-hook, whereby the bearing-point between the two may be changed, and bearings for preventing the rotation of said rod J, as set forth.

7. In a double-thread sewing-machine, a vertical shaft, a horizontally-arranged thread-looper thereon, a curved hook portion therefor, extending in a horizontal plane and having an incline, and a loop-retarding spring on the under side of the curved hook, as described, in combination with means for oscillating said looper, substantially as set forth.

8. In a double-thread sewing-machine, an oscillating thread-hook having a peripheral groove and an eye, the longitudinal axis of which is in line with said groove at or near its point to guide the lower thread and cause the same to stand away from the needle, combined with means for oscillating said hook, as set forth.

9. In a double-thread sewing-machine, a vertical shaft, a horizontally-arranged thread-looper mounted thereon, a curved hook portion therefor externally grooved, as described, and having a thread-eye at its point, the longitudinal axis of said eye being in line with said groove, so as to present a continuation of the latter, in combination with means for oscillating said looper, substantially as set forth.

10. In a double-thread sewing-machine, the combination of the needle, the thread-hook oscillating in a plane, substantially at right angles with the line of movement of the needle and perforated at its point and heel to permanently retain the thread, and the throat-plate having a downward projection containing the needle-hole, said hole having a wall which terminates near the upper side of the hook and supports the upper thread-loop while the hook is entering it, as set forth.



11. The combination, with a needle and the  
means for reciprocating it, of the toothed  
thread-hook arbor H<sup>2</sup>, the holder in which  
said arbor is journaled, said holder being ec-  
centric to the arbor, the fixed supporting-  
5 block in which the holder is capable of rotat-  
ing, and the toothed rod J, journaled in said  
block and engaged with the arbor H<sup>2</sup>, and de-  
vices for reciprocating said rod J, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of November, 1885.

CHARLES F. LITTLEJOHN.

Witnesses:

CHAS. SHULZ,

WALTER NICHOLS.