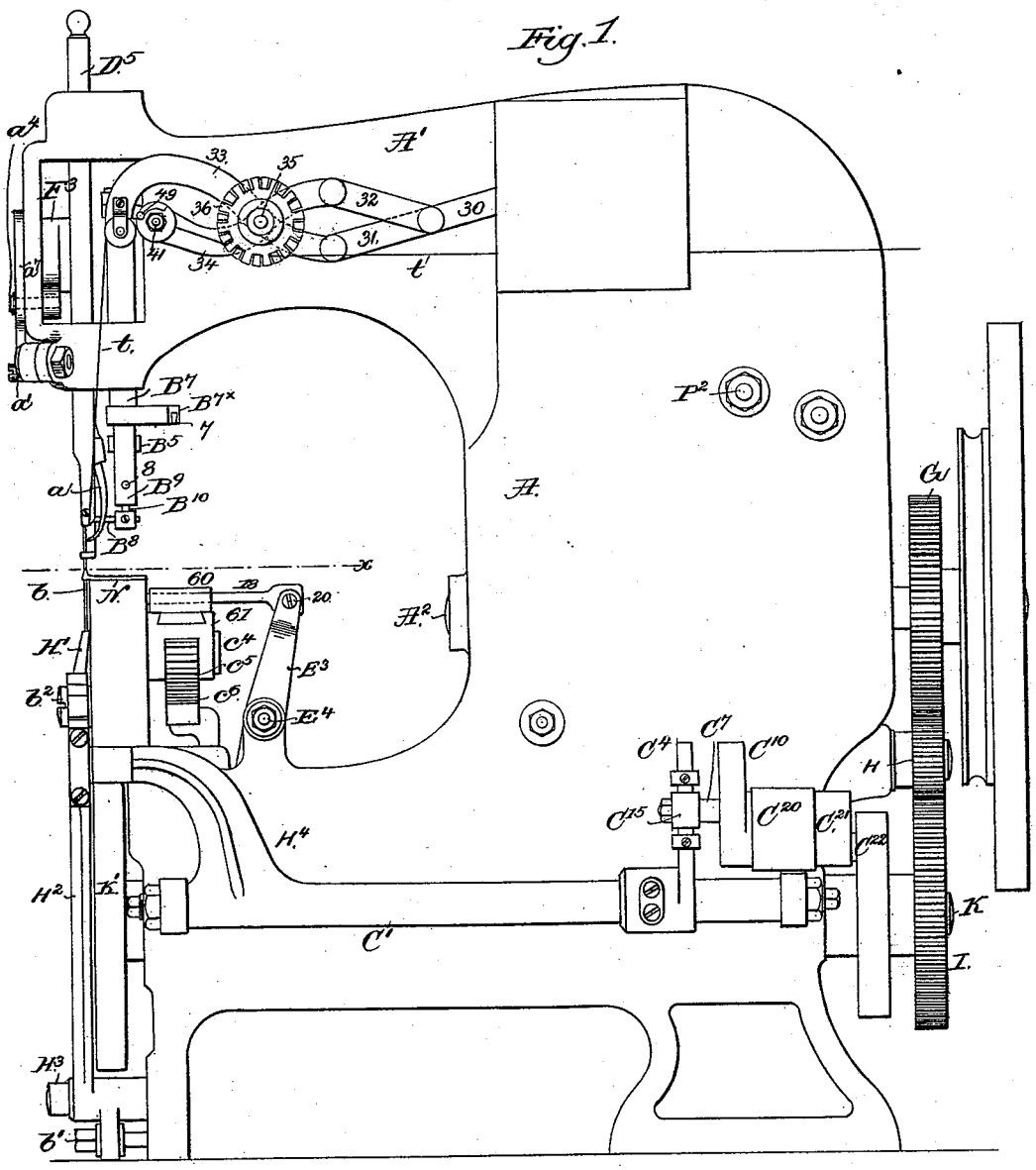
(No Model.) 4 Sheets—Sheet 1.

G. A. STILES.

WAX THREAD SEWING MACHINE.

No. 423,456. Patented Mar. 18, 1890.

Fig. 1.



Witnesses.
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Inventor.
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(No Model.) 4 Sheets—Sheet 2.

G. A. STILES.

WAX THREAD SEWING MACHINE.

No. 423,456. Patented Mar. 18, 1890.

Fig. 2.

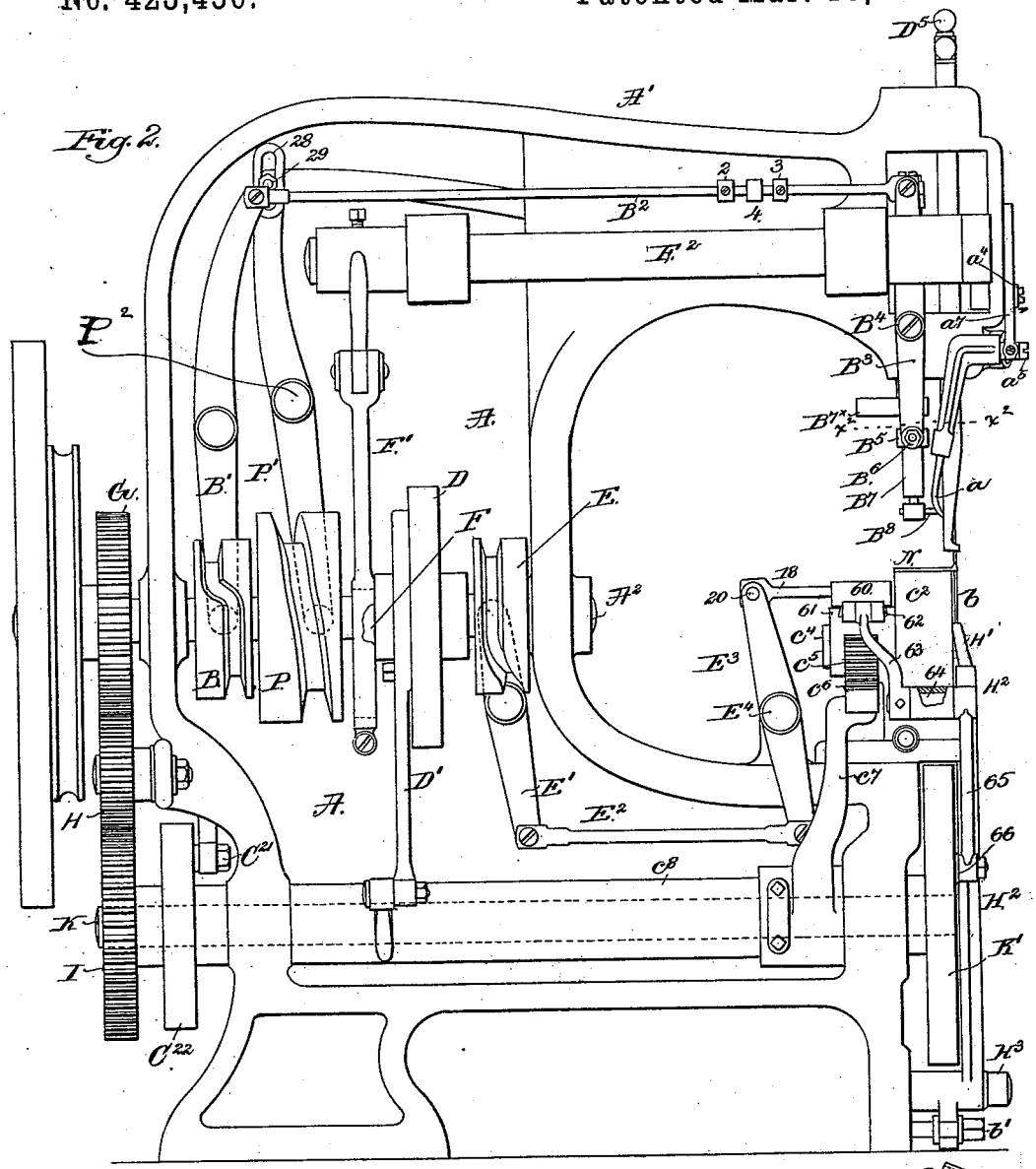

Fig. 3.

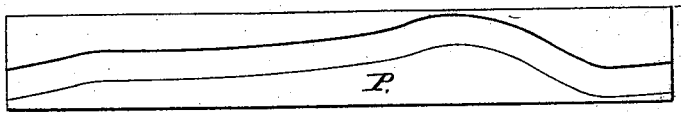

Fig. 4.

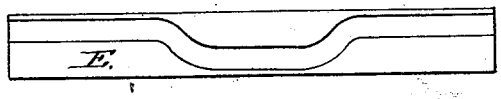

Fig. 5.

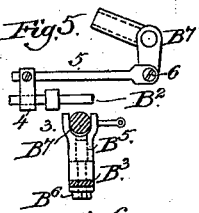

Fig. 6.

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(No Model.) 4 Sheets—Sheet 3.

G. A. STILES.

WAX THREAD SEWING MACHINE.

No. 423,456. Patented Mar. 18, 1890.

Fig. 7.

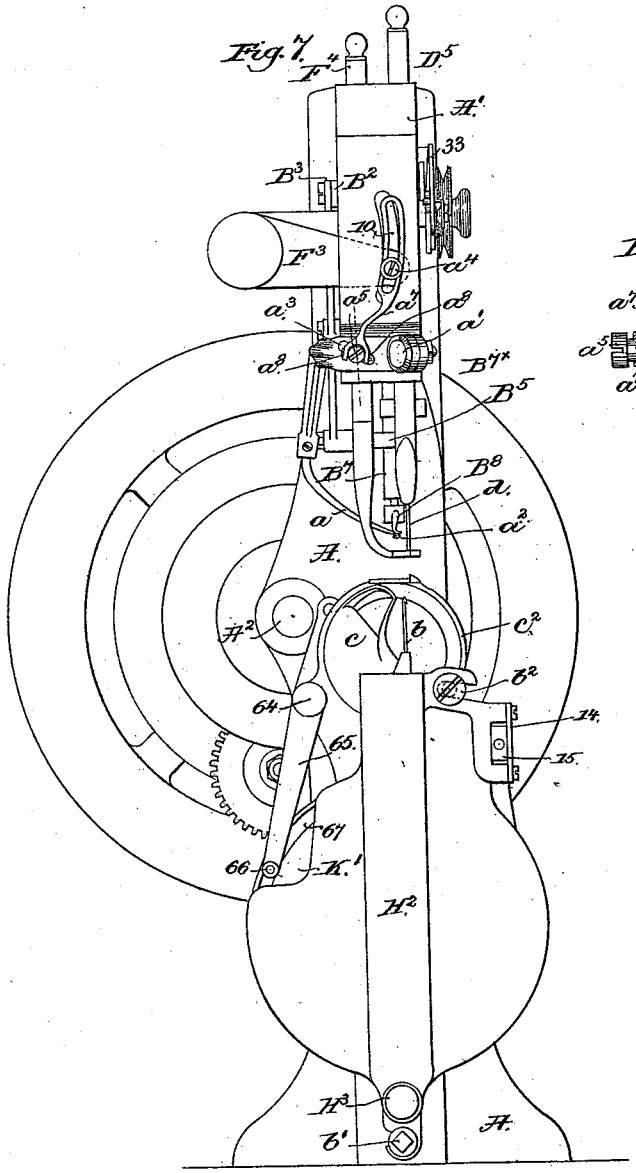
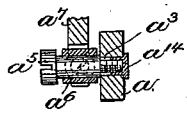


Fig. 8.



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(No Model.) 4 Sheets—Sheet 4.

G. A. STILES.

WAX THREAD SEWING MACHINE.

No. 423,456. Patented Mar. 18, 1890.

Fig. 9.

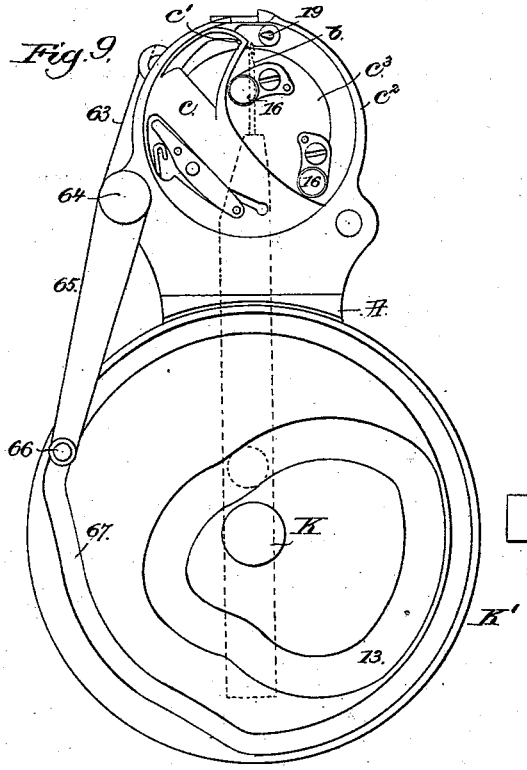


Fig. 10.

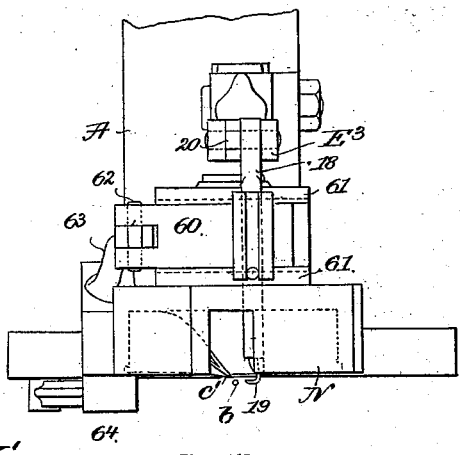


Fig. 11.

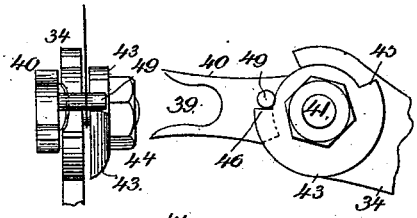


Fig. 12.

Fig. 13.

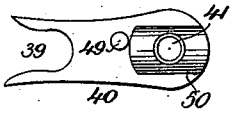


Fig. 14.

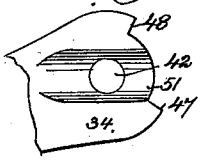


Fig. 15.

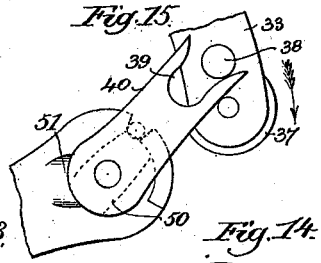


Fig. 16.

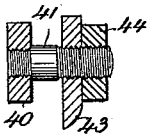


Fig. 17.

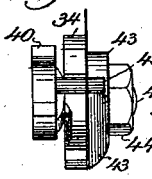


Fig. 18.

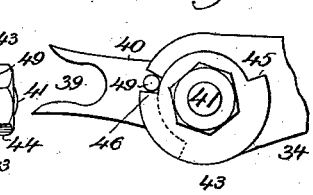
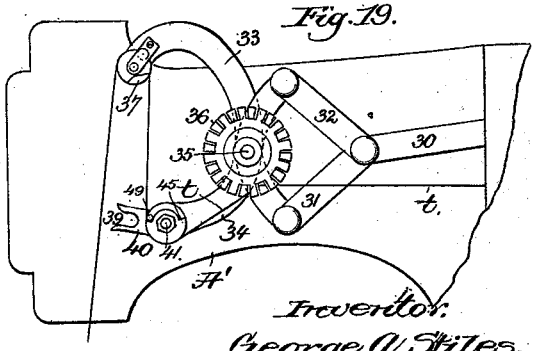


Fig. 19.



Witnesses.
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Howard J. Eaton

Inventor:
George A. Stiles.
by Lemby & Gregory Attys

UNITED STATES PATENT OFFICE.

GEORGE A. STILES, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE NATIONAL SEWING MACHINE COMPANY, OF NEW HAVEN, CONNECTICUT.

WAX-THREAD SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 423,456, dated March 18, 1890.

Application filed September 10, 1888. Serial No. 285,031. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. STILES, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Wax-Thread Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve that class of machines employing a hooked needle which pulls a loop of thread through the material and presents it in position to be entered by a shuttle carrying a second thread, the shuttle having an oscillating movement in a circular race, my invention being intended as an improvement on the machine represented in United States application Serial No. 217,768.

My invention in a sewing-machine consists in the combination, with a shuttle and a hooked needle, of a longitudinally-reciprocating and horizontally-sliding loop-spreading device having a hook, and with mechanism, substantially as will be described, by which to reciprocate the loop-spreader and move it horizontally backward and forward in the direction of the length of the stitch, substantially as will be described.

Other features of my invention will be described, and pointed out in the claims at the end of this specification.

Figure 1 is a right-hand side elevation of a sewing-machine embodying this invention, the presser-foot being shown as lifted, the slack-thread-controlling device and clamp being in position to give up the needle-thread. Fig. 2 is a left-hand side elevation of the machine shown in Fig. 1. Figs. 3 and 4 show, respectively, the cams P and E developed. Fig. 5 is a detail to be referred to of the sleeve and guide co-operating with the thread-carrier. Fig. 6 is a section in the line x^2, Fig. 2. Fig. 7 is a front elevation of the machine shown in Fig. 1, the position of the parts being, however, somewhat changed. Fig. 8 is a sectional detail showing the devices for connecting the thread-finger and its operating-lever. Fig. 9 is a partial front elevation, but enlarged, of the shuttle-race, shuttle therein, and the cam for actuating it and the needle-bar, the needle-bar being shown in dotted lines. Fig. 10 is a partial plan view below the dotted line x, Fig. 1; and Figs. 11 to 19, inclusive, are details in connection with the take-up and thread-clamping mechanism, showing the same in different positions.

The frame-work A and overhanging arm A′, which are and may be of usual shape to sustain the working bearings, have suitable bearings, in which is placed the main shaft A^2, having a series of cams B P D E and an eccentric F. The cam B has in it a suitable groove, in which is entered a roller or other stud curved at the lower end of a lever B′, which at its upper end has a link B^2, which at its front end is jointed (see Fig. 2) to the upper end of a lever B^3, pivoted at B^4 to the head of the machine, the said lever at its lower end having a hub which receives in it loosely the shank of a fork B^5, the said fork being restrained from longitudinal movement in the said hub by a nut B^6.

The link B^2 has on it two collars 2 3, (see Fig. 2,) and between the said collars the said link is surrounded loosely by an arm or block 4, extended from a short rod 5, (see Fig. 5,) the front end of the said rod being jointed by a screw 6 to an arm fast to the upper end of the rock-shaft B^7, provided at its lower end with a slotted guide $B^{7\times}$, in which is placed loosely a shoe 7, the slot in the said guide and the said shoe being of dovetailed or equivalent shape in cross-section to thus enable the shoe to be supported in the guide in which it is to be reciprocated. The shoe 7 has connected to and depending from it the sleeve B^9, into which is entered and secured by a screw 8 the shank of the holder B^{10}, in which is adjustably secured the thread-guide B^8.

The sleeve B^9 referred to is grasped by the fork B^5, so that the latter as it is moved by the lever B^8 is moved backward and forward in a horizontal plane, the shoe 7 at the same time being reciprocated in the guide $B^{7\times}$, which guide for a part of the movement of the link B^2 and lever B^3 in each direction is oscillated, as when the guides 2 or 3 strike the arm or block 4, thus causing the guide $B^{7\times}$ to impart to the sleeve and thread-guide B^8 vibratory motion, the extent of which depends upon the extent to which the shaft or sleeve B^7 is oscillated, and consequently the position of the shoe 7 in the slot of the guide $B^{7\times}$.

The described motion given to the thread-guide by the devices described enables the thread-guide to carry the needle-thread about the path of reciprocation of the needle, so as to present the thread to the hook of the needle *b*, to be taken thereby during the descent of the needle-bar H′, the thread-guide stopping on its return motion, while the take-up operates with the eye of the thread-guide in line with the pulling-point of the take-up and the point at which the thread of the stitch leaves the material, thence returning to its starting-point. Co-operating with the thread-guide B^8 is a slack-thread-controlling finger *a*, it having its fulcrum on a stud *a′*, set at an angle of about sixty degrees from the line of the center of the cam-shaft A^2, such location of the stud *a′* enabling the finger by its hooked lower end a^2 to engage and draw the loop of thread between the eye of the thread-guide B^8 and the work at an angle of about thirty degrees with relation to the direction of the feed of the material by the needle, the said finger *a* so engaging and drawing the thread to be presented to the needle while the needle *b* is fully up in the material and is feeding the latter over the work support or throat N, the hook of the needle *b* in its descent engaging the thread between the eye of the thread-guide B^8 and the said finger *a*, thus supplying the needle with sufficient thread to form a new loop without drawing the thread in the hook of the needle during the descent of the needle, the hook of the finger *a* engaging and retaining its hold upon the thread so drawn by it from the thread-guide until the needle *b* completes its descent, thus preventing the loop from being twisted or turned aside, as it would be liable to do if the said loop were released by the hook a^2 of the said finger before the needle *b* completes its descent. By preventing the twisting of the loop in this way before it is entered by the shuttle *c*, to be described, it is possible to make the stitch look alike on the upper and lower sides of the work, which in leather work is a great desideratum.

The shank of the finger *a* is shown as having a curved slot a^3, concentric with a circle having as a center the stud a^4, extended from the awl-bar D^5 through the head of the machine, the circle being struck when the awl-bar is in its lowest position.

The slot a^3 in the shank of the finger *a* receives in it a block-nut a^{14}, (see Fig. 8,) which is entered by a screw-stud a^5, the shank of which at the outer side of the finger *a* is surrounded by a sleeve a^6, the said sleeve having pivoted to it by point-screws a^8 the forked lower end of a lever a^7, slotted at 10, as shown best in Fig. 7, to receive the said stud a^4. By loosening the screw a^5 in the block-nut a^{14} the latter may be adjusted in the slot a^3 to any desired position to thus enable the finger *a* in its movements to pull out a greater or a less length of thread, as stated, according to the thickness of the stock being stitched, and as the slot a^3 is in the arc of a circle, as described, it enables the hook a^2 of the finger *a* to always approach the thread-guide to the same point, notwithstanding variations in the outward throw or pull of the said finger.

The finger *a* is pulled outwardly by the action of the stud a^4 in the upper end of the slot 10. The shaft A^2 has fast on it a gear G, which through an intermediate gear H engages a gear I, fast on and rotating the needle-actuating shaft K, (shown mostly by dotted lines in Fig. 2,) the said shaft having at its front end a cam-plate K′, having a cam-groove 13, in which enters a roller or other stud (shown by dotted lines, Fig. 9) extended from the inner side of the needle-bar H′, carrying the hooked needle *b*, the said needle-bar being preferably of dovetailed shape in cross-section and sliding in a correspondingly-shaped groove in a rocker-post H^2, mounted to turn on a stud H^3, the vertical position of the said rocker-post in line with the awl *d* being insured by two adjusting-screws *b′* b^2, screwed into a rigid part of the frame A and fastened loosely through slots in ears of the said rocker-post.

The rocker-post has at its upper portion a slot 14, in which enters a slide-block 15, mounted loosely on the outer end of the rock-shaft C′, pivoted at its ends on conical pointed screws, the said rock-shaft having an arm, as C^4, adjustably secured to it by two set-screws, the said arm C^4 entering a block C^{15}, and a stud C^7, having a loose block placed in a groove of a rocking slot-arm C^{10}, attached to a rock-shaft supported in a hub C^{20}, said rock-shaft arm and block C^{15} to and including the said hub being common to the application referred to and acting in like manner to vibrate the rocker-post H^2, which is substantially the same so far as its moving the needle to feed the material as in the said application. The rock-shaft carrying the arm C^{10} has at its opposite end an arm C^{21}, provided with a pin which enters a groove in a cam C^{22}.

The shuttle *c*, having its point *c′* at one side or offset, is placed in a circular race c^2, and is oscillated therein by a driver-plate c^3, having dogs 16, which act against the shuttle to move it in usual manner. The driver-plate c^3 is fast to a short horizontal shaft c^4, having fast on it a pinion c^5, which is engaged and oscillated by a segmental rack c^6 at the upper end of an arm c^7, attached to a rocking sleeve c^8, having its fulcrum on the shaft K and deriving its motion from the cam D through the link D′, the said driver-plate shaft c^4, pinion c^5, and means for actuating it being all substantially as in the said application.

The eccentric F, by or through the eccentric-strap F′ and rock-shaft F^2 and its attached arm F^3, actuates the awl-bar D^5 in the usual manner.

The cam E receives in it a roller or other stud at the upper end of a lever E′, which, by a link E^2, is jointed to the lower end of a

lever E^3, having its fulcrum at E^4, the upper end of the said lever having jointed to it the loop-holder, it being composed, essentially, of a slotted bar 18 and a hook 19, (shown best in Fig. 10,) the said bar being slotted or provided with a hole at its inner end, which is entered loosely by a pin 20 at the upper end of the lever E^3. The hook 19 of the loop-holder is directed toward the needle *b*, and is capable of being moved not only longitudinally, but also horizontally, as on the pin 20, across the path of reciprocation of the needle when the latter is down, as in Fig. 9, to thus enable the hook to engage the loop of needle-thread between the needle and the under side of the work, so that the point *c'* of the advancing shuttle *c* will enter the loop of needle-thread, the loop of needle-thread at such time being held by both the loop-holder and the hook a^2 of the finger *a*. As the loop-holder starts backward, the point of the shuttle having caught the loop, the loop-holder aids in carrying the loop of needle-thread over the broad part of the shuttle, after which the loop-holder is again moved horizontally and forward longitudinally to cast off the loop to be acted upon by the take-up.

The cam P has a groove in which is entered a roller or other stud carried at the lower end of a lever P', pivoted at P^2, slotted at its upper end, as at 28, the said slot receiving in it in an adjustable manner a bolt, as 29, which is also extended through a connecting-rod, as 30, which in turn (see Fig. 19) is jointed by like links 31 32, respectively, to the arms 33 and 34 of the take-up, the said arms being pivoted on a stud 35, made fast in the framework of the machine, the said stud also constituting the support for the tension device 36, which is and may be a wheel of usual construction. The arm 33 of the take-up has at its end a roll 37, and near its end at its rear side a pin 38, the said pin, when the two arms 33 and 34 are made to approach each other, respectively, from opposite directions by moving the connecting-rod 30 backward or to the right in Fig. 1, entering a notch, as 39, in a short forked arm 40, fast to a stud 41, which is extended through a hole 42 in the arm 34, the said stud 41, after passing through arm 34, having screwed upon it a thread-clamp, (shown as plate 43,) which is held in place by the check-nut 44. The thread-clamp 43 is shown as provided with two shoulders 45 46, and the arm 34 has two shoulders 47 48. The forked arm 40 has a pin 49, and about the base of the stud 41 the said arm has a cam projection 50, whereas the inner side of the arm 34, next the forked arm, has a recess, as 51, (see Fig. 14,) into which may enter the said cam projection at a certain position of the parts—as, for instance, as in the position Fig. 1—at which time it is desired that the thread *t* be free in order that the shuttle while passing through the loop of thread just previously drawn down by the needle *b* may act upon the thread to draw from the usual wax-cup or thread-supply a small amount of thread which it is necessary to supply to enable the shuttle to get through the loop and at the same time aid in correctly setting the stitch, the roll 37 of the take-up being at such time in its lowest position. The roll 37 remains in its lowest position and the thread unclamped until the shuttle passes through the loop, and then the connecting-rod 30 is moved forward, as to the left in Fig. 1, which acts to separate the arms 33 and 34 or to move the roller 37 away from the clamp 43, the pin 38 at such time acting to turn the forked arm 40 in such direction as to remove the cam 50 from and so as to stand across the space 51, such movement of the cam 40 causing the thread-clamp 43 to be moved toward the face of the arm 34, so as to firmly clamp the thread between them and positively prevent any thread from being taken from the thread-tension or wax-cup, (not shown,) while the arm 33, having the roll 37, acts on the thread to take up the shuttle-loop and finish the stitch.

It will be noticed herein that the thread-clamp 43 is located between the tension and the take-up roll, and as a result thereof the amount of thread which is subject to hard strain when setting the stitch is less in quantity than were the thread-clamp stationary on the machine and did not move with the arms of the take-up.

The shorter the bight of thread acted upon by the take-up the less the spring or stretching of the thread.

The bar 18 of the loop-spreader is free to slide longitudinally in a carriage 60, fitted to slide horizontally in guideways 61, forming part of the shuttle-race c^2, the said carriage having a pin 62, which is embraced by the forked upper end of an arm 63 of a rock-shaft 64, a second arm, as 65, of the said rock-shaft having a roller-stud 66, which enters a cam-groove 67 in the cam K', the said cam being of such shape as to slide the carriage 60 to the left (see Fig. 10) to enable the hook 19 of the loop-spreader to enter the loop held by the needle, the loop-spreader then being drawn back and holding and spreading the loop, the carriage being thereafter moved to the right to enable the hook 19 to disengage the loop, when the spreader is again moved forward into the position Fig. 10.

The shoulders 45 46 and 47 48, co-operating with the pin 49, are to limit the extent of vibration of the arm 40.

I have herein shown and described a peculiar form of take-up mechanism and tension device; but the same is not herein broadly claimed, as it is made the subject-matter of another application, Serial No. 313,291, filed June 6, 1889, split off from this application after filing.

I claim—

1. In a sewing-machine, an oscillating shuttle and a hooked needle, combined with a horizontal sliding carriage, a loop-spreading

device having a hook 19 and adapted to reciprocate in the said sliding carriage at right angles to the length of the stitch, and with mechanism, substantially as described, to reciprocate the said loop-spreader in said carriage and also to move said carriage and loop-spreader bodily in the direction of the length of the stitch, substantially as described.

2. In a sewing-machine, the following instrumentalities, viz: an oscillating shuttle, a hooked needle, a horizontal sliding carriage, a loop-spreading device therein having a hook 19 and adapted to reciprocate in the said carriage at right angles to the length of the stitch, mechanism to reciprocate the said loop-spreader in said carriage, mechanism to move said carriage and loop-spreader bodily in the direction of the length of the stitch, and a finger a, having a hooked end a^2, the said needle and spreader and finger acting to hold the loop of thread substantially as described while the shuttle is entering the said loop, as and for the purposes set forth.

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

GEO. A. STILES.

Witnesses:
G. W. GREGORY,
HOWARD F. EATON.