(No Model.) 6 Sheets—Sheet 1.

J. A. DAVIS, Dec'd.

W. A. DAVIS, Executor.

WAX THREAD SEWING MACHINE.

No. 353,252. **Patented Nov. 23, 1886.**

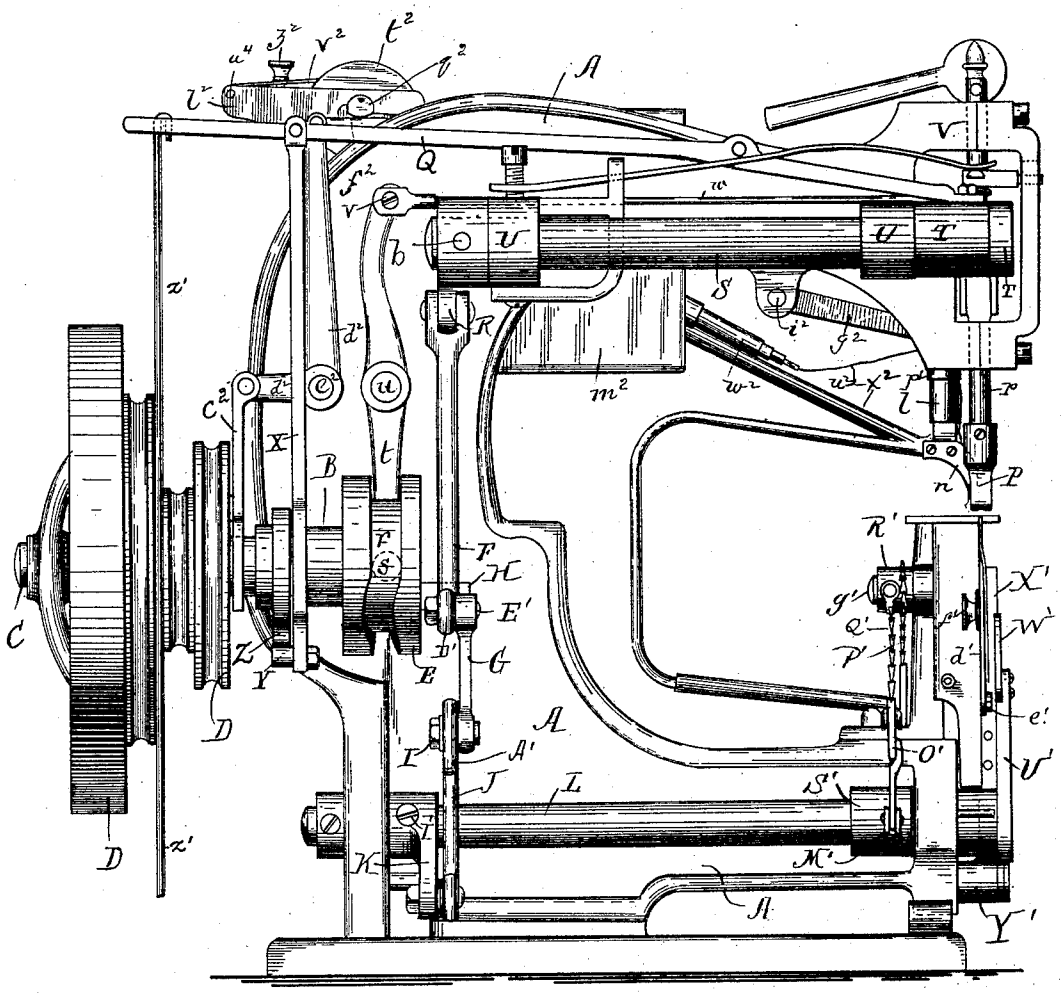

Fig. 1.

WITNESSES:

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Robert Wallace.

INVENTOR:

Jos. A. Davis
by Wm. McAllaccod
his atty

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No. 353,252. **Patented Nov. 23, 1886.**

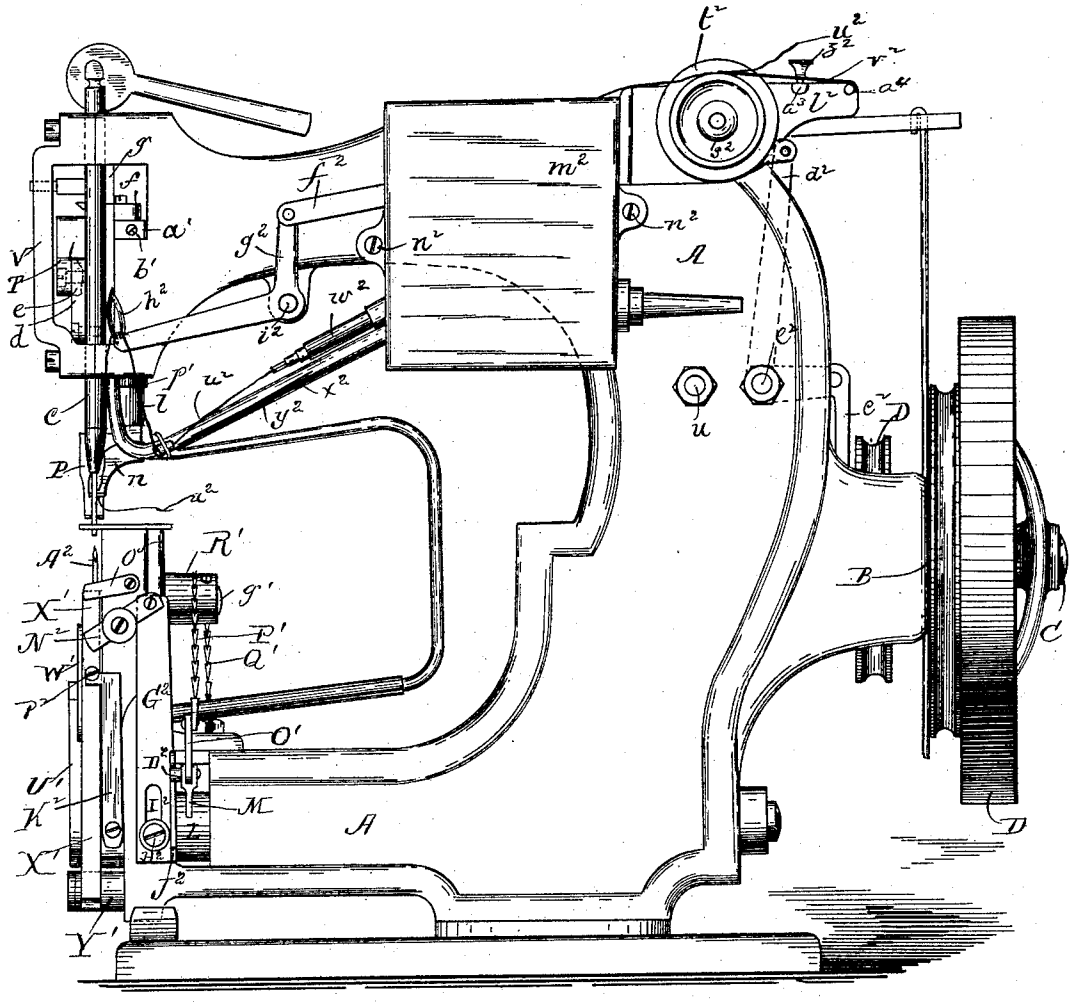

Fig. 2.

WITNESSES:
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WAX THREAD SEWING MACHINE.

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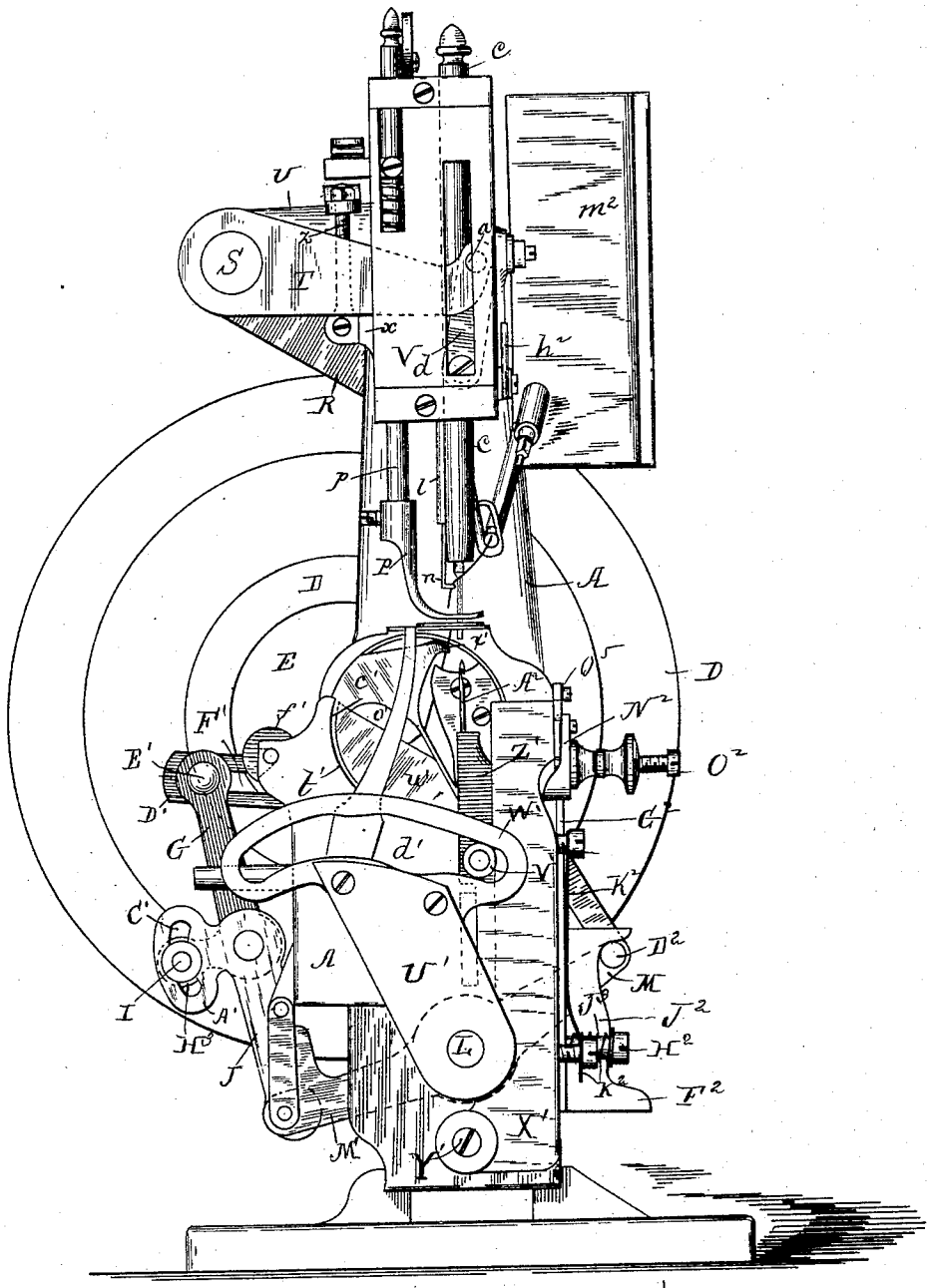

Fig. 3.

WITNESSES:
Chas. S. Gooding
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INVENTOR:
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(No Model.) 6 Sheets—Sheet 4.

J. A. DAVIS, Dec'd.

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WAX THREAD SEWING MACHINE.

No. 353,252. Patented Nov. 23, 1886.

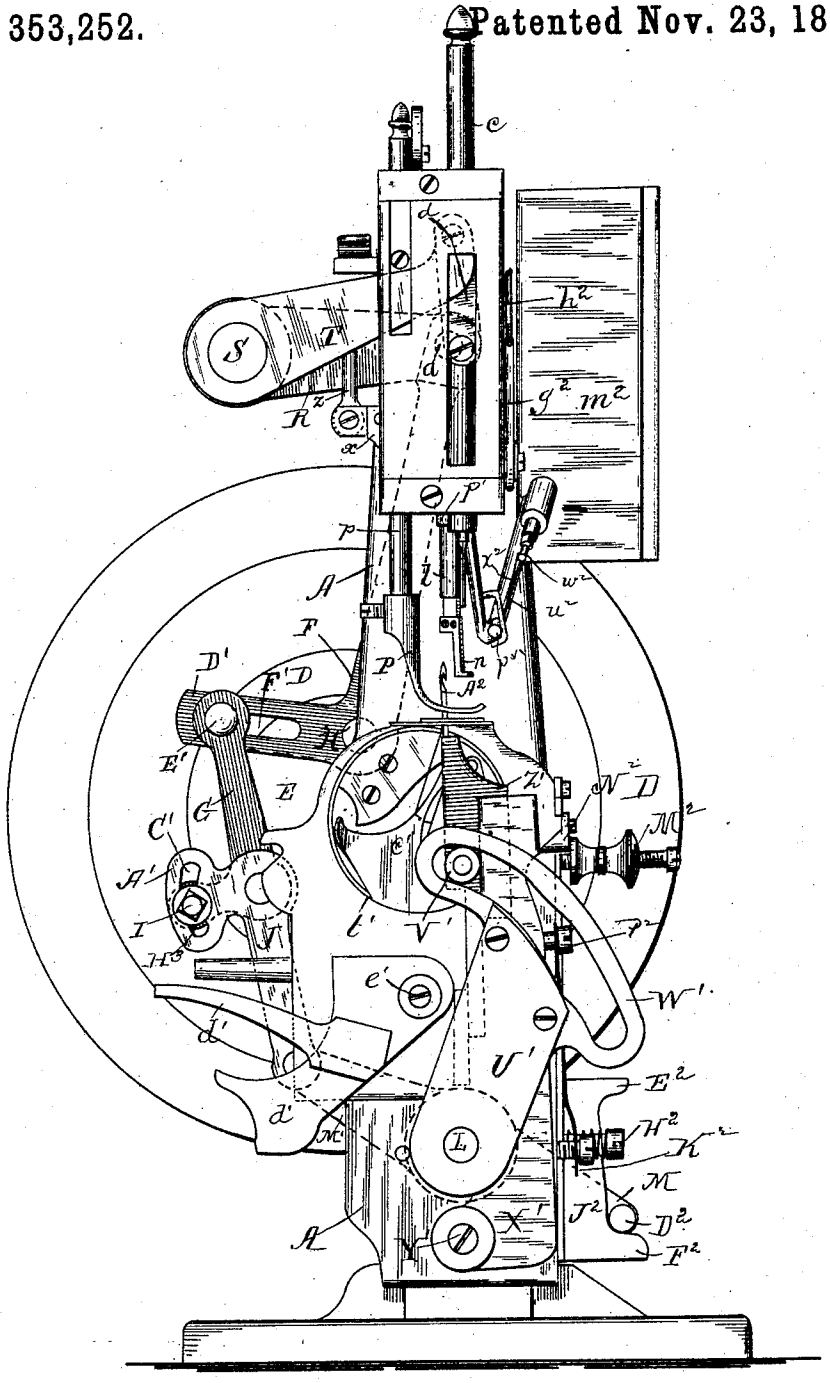

Fig. 4.

WITNESSES:
Chas. S. Gooding.
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WAX THREAD SEWING MACHINE.

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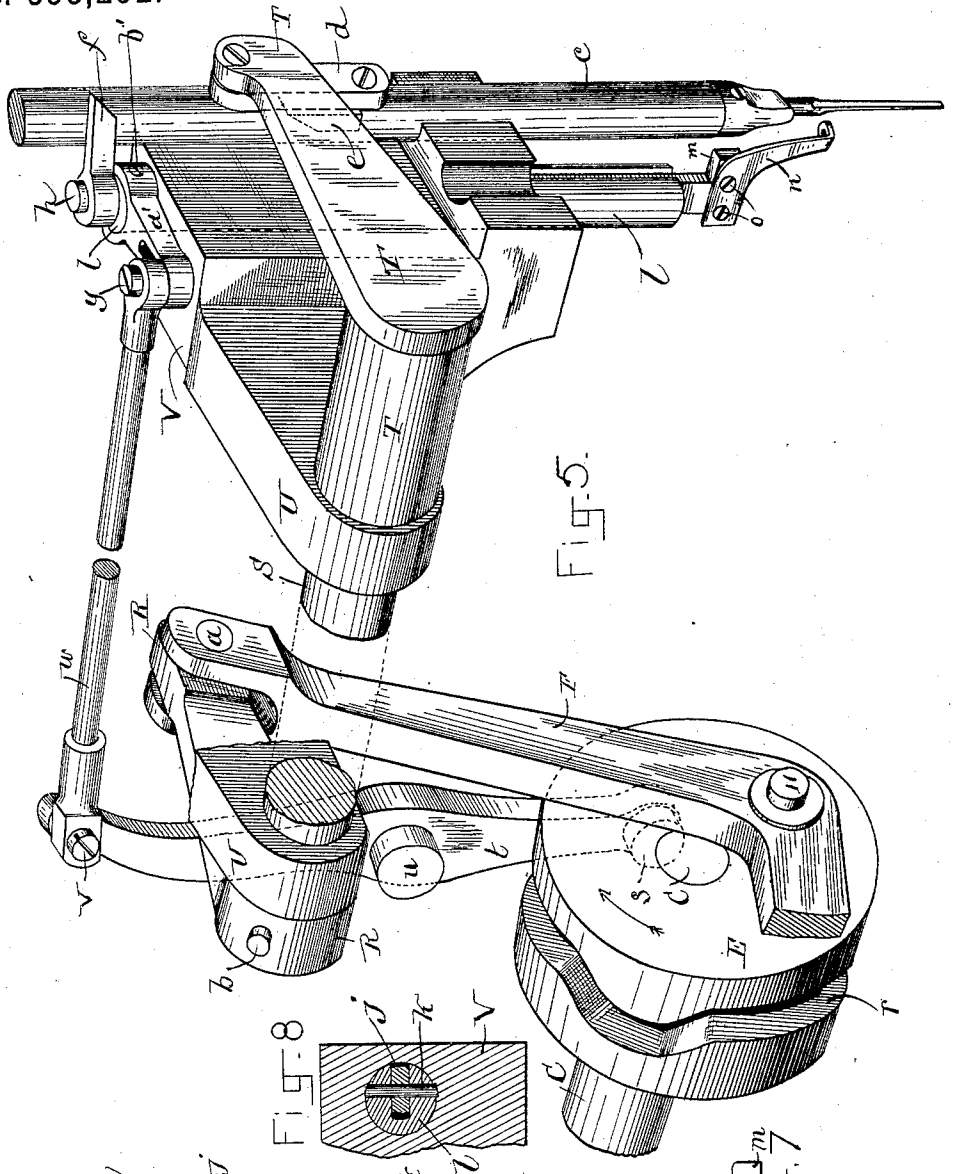

Fig. 5.

Fig. 8

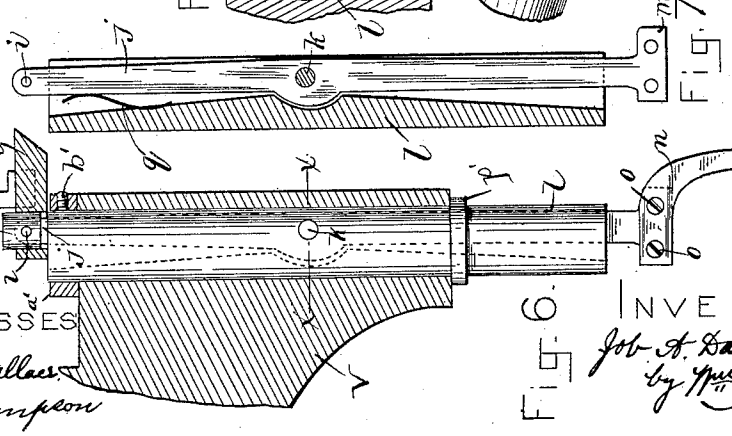

Fig. 7

Fig. 6.

WITNESSES

Robert Wallace.

M. A. Thompson

INVENTOR

Jos. A. Davis

by Wm. A. Macleod

his atty

(No Model.)

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J. A. DAVIS, Dec'd.

W. A. DAVIS, Executor.

WAX THREAD SEWING MACHINE.

No. 353,252. **Patented Nov. 23, 1886.**

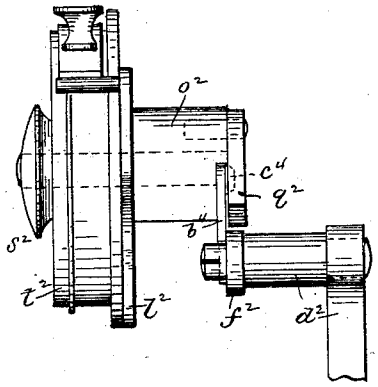

Fig. 9.

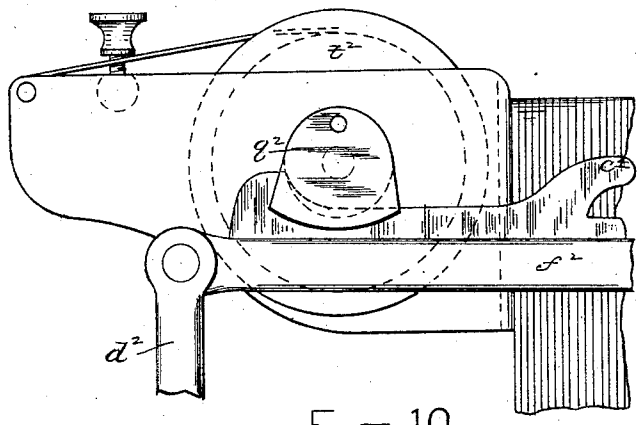

Fig. 10.

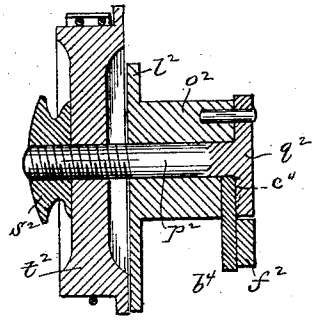

Fig. 11.

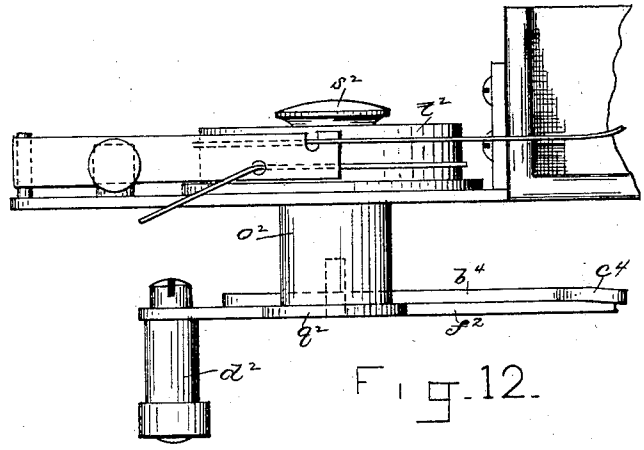

Fig. 12.

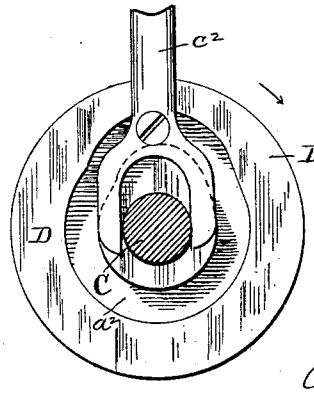

Fig. 13.

WITNESSES:

E. S. Smith

Chas. L. Taylor,

INVENTOR:

Jos. A. Davis

by Wm. A. Macleod,

his Atty.

UNITED STATES PATENT OFFICE.

JOB A. DAVIS, OF BOSTON, MASSACHUSETTS; WILLARD A. DAVIS (EXECUTOR OF SAID JOB A. DAVIS, DECEASED) ASSIGNOR OF ONE-HALF TO LEE E. MOORE, BOTH OF SAME PLACE.

WAX-THREAD SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 353,252, dated November 23, 1886.

Application filed December 22, 1885. Serial No. 186,467. (No model.)

To all whom it may concern:

Be it known that I, JOB A. DAVIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Wax-Thread Sewing-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in wax-thread sewing-machines, serving to simplify and cheapen such mechanism, and to facilitate the manufacture of boots and shoes by providing apparatus especially adapted to that class of work.

My present invention is designed to embody in a single organized machine the several improvements set forth in detail in my applications, Serial Nos. 186,468, 186,469, 186,470, 186,471, and 186,472, for patents on sewing-machines, filed simultaneously herewith; and to show how such detail features of improvement may be combined and made to co-operate with each other, reference may be made to said applications for a more specific description of the particular improvement presented in each separately, and to facilitate such reference each part represented in two or more of the cases, or of the figures in either case, is uniformly designated by the same letter.

In the drawings, Figure 1 is a left side elevation of my wax-thread sewing-machine, and Fig. 2 an elevation from the right side thereof. Fig. 3 is a front elevation showing the position of the parts when the needle is down at the bottom of its stroke; and Fig. 4, a like view with the needle up and the other parts in their corresponding positions, the shuttle-guard plate being shown thrown back. Fig. 5 is a perspective view of the mechanism for operating the thread-guide, parts being represented as broken away. Fig. 6 is a sectional elevation of a portion of the same. Fig. 7 is a vertical section of the shaft shown in elevation in Fig. 6, and Fig. 8 is a horizontal section on line *x x*, Fig. 6. Figs. 9, 10, 11, and 12 are enlarged detail views of the intermittent tension device, and Fig. 13 a detail view of the cam and rod for operating the take-up.

A represents the frame of the machine, on which are formed bearings B B to receive the shaft C, rotated by means of the pulleys D D.

E is a cylinder mounted on the shaft C, and having in its periphery a cam-groove, *r*, to receive a friction-roll, *s*, on the end of a lever, *t*, pivoted to the frame at *u*. (See Fig. 1.) This lever is connected by pin *v* with a rod, *w*, to which it imparts a reciprocating movement, the said rod being connected at its forward end by the screw *y* to a slotted arm, *a'*, attached by a screw, *b'*, to a vertical slotted shaft or cylinder, *l*, mounted in the head V of the machine, said shaft having at its lower part a flange, *p'*, abutting against the lower surface of the head V. As the cylinder E rotates, the shaft *l* will be rocked on its vertical axis, and the extent of this rocking movement of said shaft may be varied by adjusting the screw *y* in the slot of the arm *a'*.

Within the slot of the shaft *l* is pivoted at *k* a lever, *j*, having at its lower end a foot or block, *m*, to which is attached by screws *o* the thread-guide *n*, and to the top of said lever *j* is attached, by a recessed cap, *h*, and pin *i*, an arm, *f*, having a beveled outer end.

F D' is a bell-crank lever attached by a pin, H, to the cam-cylinder E, and connected by a pin, *a*, to an arm, R, attached by a pin or set-screw, *b*, to the shaft S, carrying at its forward end an arm, T, connected by a link, *d*, to the awl-bar *c*. Thus the pin H serves as a crank-pin, and the upper or vertical arm, F, of the lever F D' serves as a link to connect said pin H with the arm R of the shaft S, so that said shaft may be rocked as the said cam-cylinder rotates.

On the inner face of the arm T (see dotted lines in Fig. 5) is a wedge-shaped block or projection, *e*, the beveled face of which is arranged to engage with the beveled outer end of the arm *f* on the lever *j* when the arm T is near the upper end of its stroke, thus forcing the upper end of the said lever inward against the stress of the spring *q*, Fig. 7, arranged in the slot of the cylinder or shaft *l*. At the moment when the lever *j* is thus vibrated the shaft *l* is rocked slightly on its vertical axis by means of the above-described connections of the said shaft with the cam-groove *r* in the cylinder E,

and thus a compound movement is imparted to the thread-guide n, to cause the latter to move in an elliptical path to lay the thread carried thereby in the hook of the needle A^2, which at this movement rises to the position shown in Fig. 4, and which is operated from the rock-shaft L, as will be hereinafter described.

The cam-groove r in the cam-cylinder E is so shaped and timed that the thread-guide n will be operated at the proper moment to throw the thread into the hook of the needle just as the latter is about to descend, and I am enabled by the apparatus described to place the hole or eye in the thread-guide, through which the thread passes vertically above the hole in the work through which the needle has pulled the thread, and thus when the take-up tightens the loop through which the shuttle has passed the thread will be drawn in a line with the eye of the thread-guide, so that the friction on the thread will be as little as possible.

The arm D′ of the bell-crank lever F D′, through connecting-levers G and J and arm K, Figs. 1, 3, and 4, oscillates a shaft, L, to which are affixed arms M M′. Through the vibration of these arms, carrying links O′ and chains P′ Q′, the collar R′ on shaft g' is oscillated, and thereby an oscillating movement is imparted to the shuttle c', which is provided with an offset or laterally-projecting point, x', to take the loops of thread from the hooked needle A^2, as is fully explained in case No. 186,470 of my applications, said offset or laterally-projecting point being outside of or beyond the plane in which the body of the shuttle oscillates, so as to be adapted to co-operate with the hooked needle. It will be seen from this that the thread-guide n, awl-bar c, and shuttle c' are all actuated from the grooved cylinder E. The needle A^2 is likewise operated indirectly therefrom, as will be explained. The oscillating shaft L also carries at its front end a vertical plate, U′, which has near its upper end a cam-slot in a generally oblique direction, to receive a stud and friction-roll, V, on the needle-bar Z′. Figs. 3 and 4 show the plate U′ in its two extreme positions, and represent the needle A^2 at the bottom and top of its stroke. The details of this operation are set forth in case No. 186,470 of my aforesaid application. Another function is also performed by the oscillation of shaft L, and is described particularly in said case No. 186,470—viz., the feeding of the material forward by a lateral movement of the needle while protruding through the work. The needle-bar reciprocates in a recess in a guide-plate, X′, which is pivoted on a stud, Y′, so that a slight swinging movement is imparted by means of a pivoted lever, N^2, and sliding plate G^2 J^2, actuated by a spring, K^2, and a friction-roll, D^2, on the arm M, fixed to shaft L, as detailed in case No. 186,470. This swinging movement of the needle and plate X′ may also be accomplished by the simple means illustrated and described in my application No. 186,472 of this series.

The take-up and tension devices, set forth more in detail in my application No. 186,471, may be briefly described. The pulley D on shaft C has a cam-groove, a^2, in its face, to engage a stud projecting from a vertical bar, c^2, Fig. 1, which is pivoted to one arm of the bell-crank lever d^2, the other arm connecting by a rod, f^2, with a bell-crank take-up lever, g^2, Fig. 2, pivoted at i^2. Depression of the bar c^2 thus raises the thread-loop h^2 at the extremity of the take-up lever g^2. This upward movement of the take-up lever g^2 occurs when the loop of needle-thread has been carried around the shuttle, and to enable the stitch to be properly tightened into the work the tension-wheel l^2 is momentarily clamped to hold the thread taut between said wheel and the work while the thread is thus being drawn up by the take-up. This automatic clamping of the tension-wheel may be effected by means of a plate, b^4, (see Figs. 9, 10, 11, and 12,) on the rod f^2, and having an offset tip, e^4, which is forced between a plate, q^2, on the pin p^2, on which said wheel rotates, and the boss o^2, through which said pin passes, thus clamping said wheel between a plate or flange, l^2, on said boss and the nut s^2, which holds the tension-wheel on its pin p^2.

The presser-foot P is automatically lifted from the work at the instant when the work is to be moved forward by the needle by means of a gripping-block, x, connected by a rod, z, with a lever, Q, operated by a rod, X, having a pin or roller, Y, which is in engagement with a cam, Z, on the shaft C.

The operation of my machine may be briefly indicated as follows: Motion being imparted to the shaft C, the shafts S and L, connected therewith in the manner above described, are rocked to reciprocate the awl-bar c and the needle-bar Z′. The awl-bar and the awl carried thereby descend to puncture the work, and as the awl rises the needle follows it upward through the hole which has been made, and when the needle is above the work, as in Fig. 4, the thread-guide n moves in an elliptical path around the needle, laying a loop of thread in the hook of the needle. Before the needle descends through the work the plate X′ (in which the needle-bar Z′ reciprocates vertically) is swung to the left, Fig. 4, to feed the material forward the length of a stitch, (the pressure of the presser-foot being meanwhile removed,) and the needle then descends, drawing its loop of thread through the work. While the needle is below the work, the rocking plate X is moved to the right, Fig. 4, or in a direction opposite to its first movement, to bring the needle back to its first position or in the vertical plane of the awl. After the needle has descended to its lowest point, carrying with it the loop of thread, it rises slightly to slacken said loop, and at this instant the offset point x' of the shuttle catches the loop, and as the shuttle continues its rotation it is passed entirely through the said loop, thereby interlocking the needle-thread with the thread carried by the shuttle in a well-known manner. The

take-up then operates to tighten the stitch into the work, the needle-thread being clamped by the intermittent tension when the tightening of the stitch is being effected, as hereinbefore described, and thus the operation continues.

For a more detailed description of the construction and operation of many parts of my machine reference may be had to my other applications, hereinbefore referred to, filed simultaneously herewith; and I hereby disclaim in this application the features herein shown, but which are embraced by the claims of my other application referred to.

What I claim is—

1. In a wax-thread sewing-machine, a reciprocating awl above the work and a hooked needle below and reciprocating through the work-plate, to draw down a loop of the upper thread, in combination with an oscillating shuttle having an offset point extending beyond or outside of the plane in which the body of said shuttle oscillates, and thus adapted to engage said loop and carry it around the shuttle, substantially as set forth.

2. In a sewing-machine, the combination, with a shuttle provided with an offset or laterally-projecting point extending beyond the plane in which the body of the shuttle oscillates, a hooked needle co-operating with said shuttle, and means for operating said shuttle and needle, of a take-up and an intermittent tension device and their operating mechanisms, whereby when the shuttle has passed through a loop of needle-thread the slack of said loop will be taken up and the lower thread drawn into the work, substantially as set forth.

3. In a wax-thread sewing-machine, the combination, with the main shaft C and cylinder E, provided with a wrist-pin, H, of the bell-crank lever F D′ and its connections, the rock-shafts S and L, and the awl and needle bars and the shuttle-driver connected therewith, whereby the rotation of said cylinder serves to oscillate the said rock-shafts, and thereby to effect in proper time the reciprocation of the awl and the needle, the oscillation of the shuttle, and the lateral feed movement of the needle, substantially as set forth.

4. In a wax-thread sewing-machine, the combination of a main shaft, a rock-shaft above the work-plate, an awl-bar connected with said rock-shaft, a rock-shaft below the work-plate, a needle-bar, and a shuttle-driver connected with and thus receiving movement from the latter rock-shaft, and connections between said main shaft and the said rock-shafts, substantially as set forth.

5. In a sewing-machine, the combination, with shuttle, the needle-bar and needle, and their operating mechanisms, of a take-up mechanism and an automatic or intermittent tension operated by a moving part of the said take-up mechanism, substantially as set forth.

6. In a wax-thread sewing-machine, the combination, with a main shaft and two rock-shafts connected therewith, of a needle-bar, and a shuttle operated by one of said rock-shafts, and an awl-bar operated by the other, substantially as set forth.

7. In a wax-thread sewing-machine, the combination, with the needle-bar and its hooked needle, of a thread-guide, a vibrating lever, by which said thread-guide is carried, and a slotted oscillating shaft, within which said lever is pivoted, substantially as set forth.

8. In a wax-thread sewing-machine, the combination, with the vertical shaft or cylinder *l*, the lever *j*, pivoted thereto, and the thread-guide carried by said lever, of mechanism, substantially as described, for vibrating said lever and for oscillating said shaft, as set forth.

9. In a wax-thread sewing-machine, the combination, with the shaft C and cam E, of the lever *t*, the rod *w*, the shaft *l*, having arm *a′*, the lever *j*, pivoted to said shaft and carrying the thread-guide *n*, the arm *f*, attached to said lever and provided with a beveled end, and the vibrating arm T, having a wedge-shaped block or projection, *e*, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 13th day of November, A. D. 1885.

JOB A. DAVIS.

Witnesses:
MILAN F. STEVENS,
WILLARD A. DAVIS.