2 Sheets—Sheet 1.

L. CHEVALLIER.

WAX THREAD SEWING-MACHINE.

No. 176,772. Patented May 2, 1876.

Fig: 1

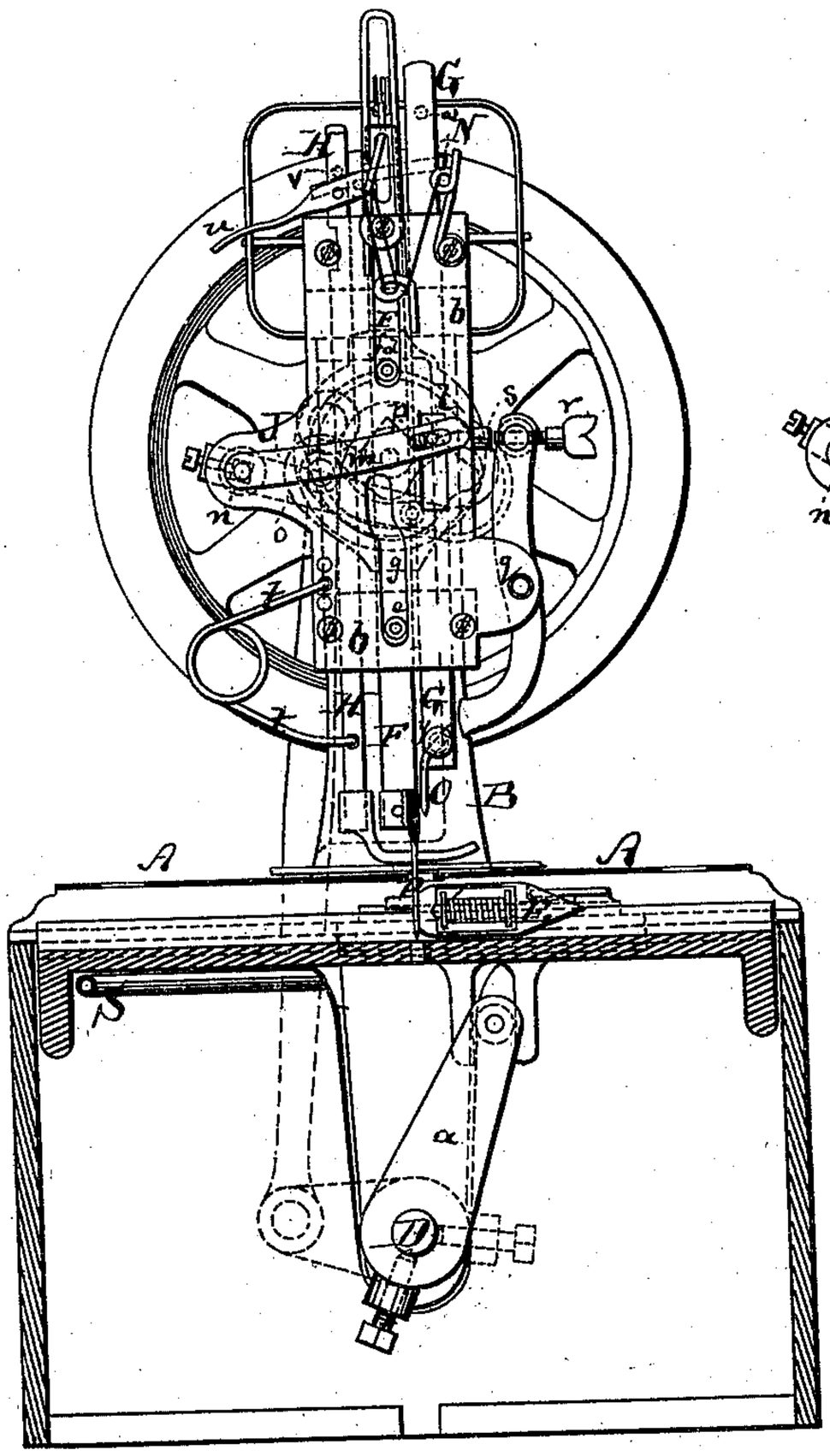


Fig: 2

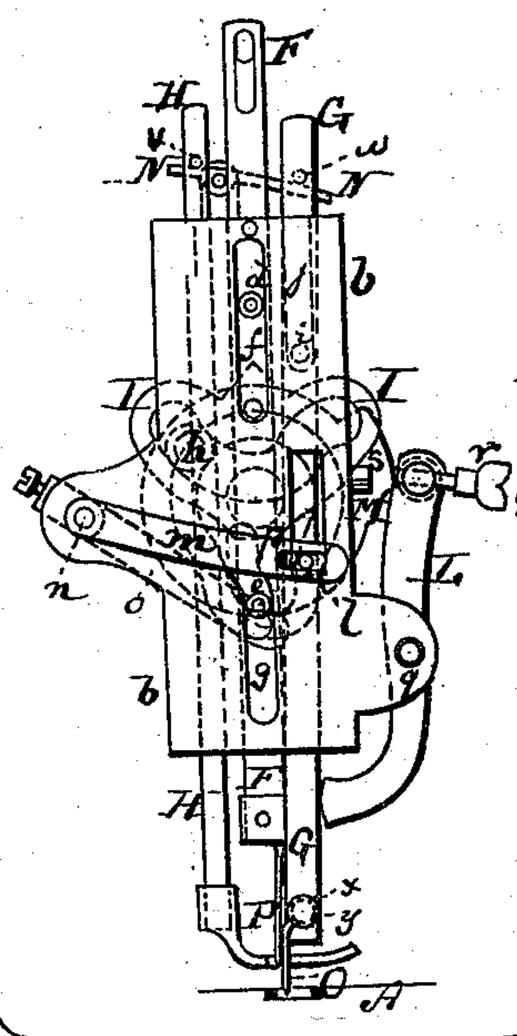


Fig: 3

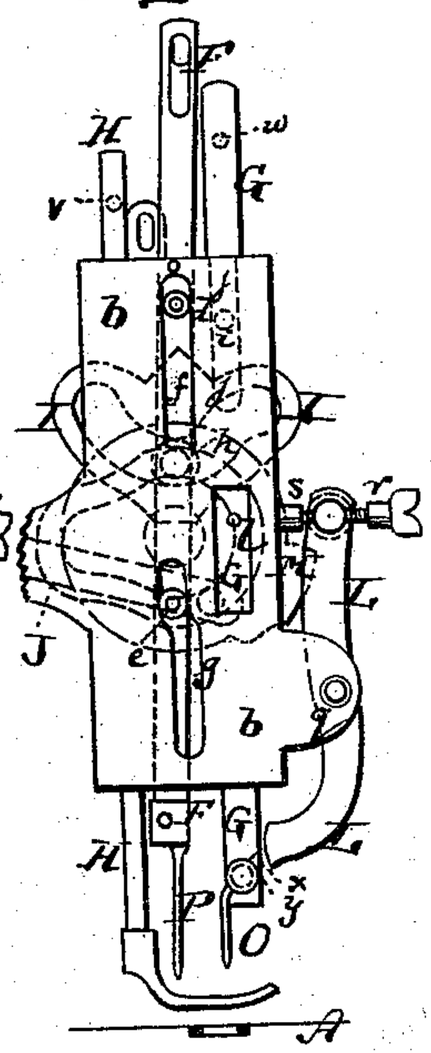


Fig: 4

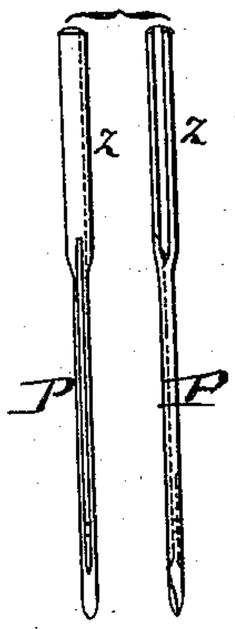


Fig: 5

Witnesses:

A. Moraga.

O. A. Weidner.

Inventor

L. Chevallier

by his attorney

A. v. Briesen

2 Sheets—Sheet 2.

L. CHEVALLIER.

WAX THREAD SEWING-MACHINE.

No. 176,772. Patented May 2, 1876.

Fig: 6

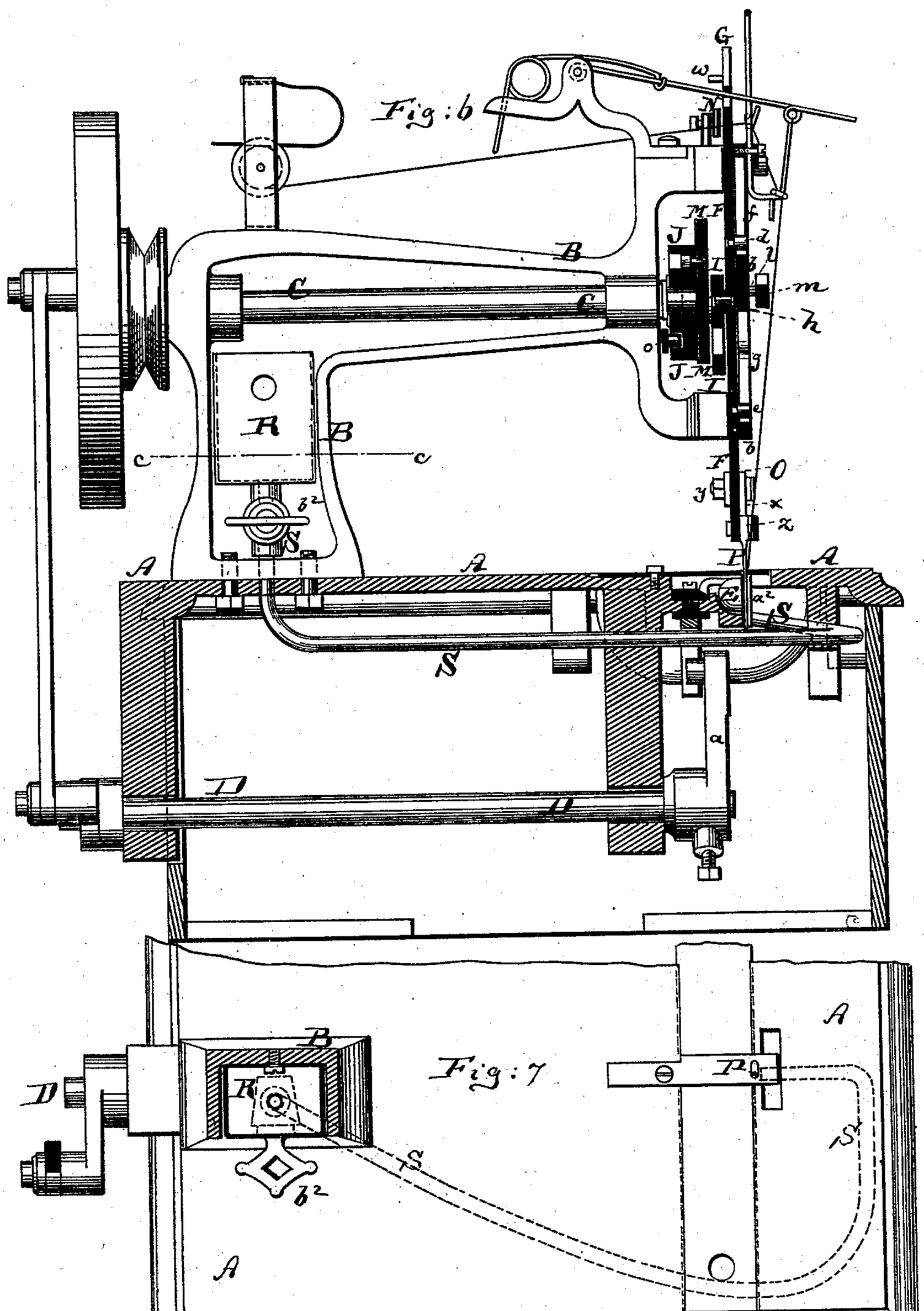
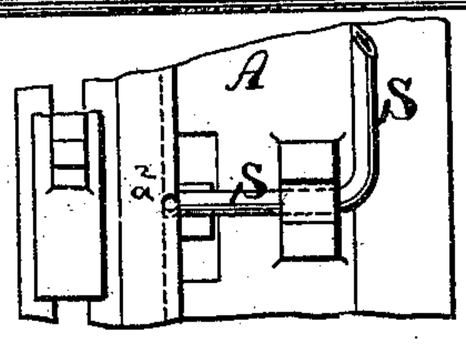


Fig: 8



Witnesses:
A. Moraga.
O. A. Weidner.

Inventor
L. Chevallier
by his attorney
A. v. Briesen

UNITED STATES PATENT OFFICE.

LOUIS CHEVALLIER, OF WILLIAMSBURG, NEW YORK.

IMPROVEMENT IN WAX-THREAD SEWING-MACHINES.

Specification forming part of Letters Patent No. **176,772**, dated May 2, 1876; application filed July 3, 1875.

To all whom it may concern:

Be it known that I, LOUIS CHEVALLIER, of Williamsburg, Kings county, New York, have invented an Improved Wax-Thread-Feed Sewing-Machine, of which the following is a specification:

Figure 1 is a front elevation, partly in section, of my improved upper-awl-feed sewing-machine. Figs. 2 and 3 are front elevations of the needle-guide and its appurtenances, showing the same in different positions. Fig. 4 represents two views, on an enlarged scale, of the needle. Fig. 5 is a side view, on an enlarged scale, of the awl. Fig. 6 is a sectional side elevation of the machine; Fig. 7, a horizontal section on the line *c c*, Fig. 6; and Fig. 8, a detail bottom view, showing the terminus of the thread waxing or lubricating pipe.

Similar letters of reference indicate corresponding parts in all the figures.

This invention relates to a new sewing-machine, which is to be more particularly used for stitching leather, and is a machine of that class in which an awl is employed above the fabric, together with a presser-foot and a needle, the awl serving to perforate the leather and feed it, the needle being subsequently introduced through the hole made by the awl, and making the stitch, while the presser-foot holds the leather firmly in place.

My invention consists, principally, in a new mechanism for imparting motion to the awl and needle, and also in a new combination of said awl and needle with a stationary guide, both awl and needle moving vertically up and down, and vibrating also horizontally on pivots attached to their bars or shanks, said pivots being parallel to the shaft which carries the eccentrics or cams that actuate the needle and awl. By this means of vibrating and reciprocating awl and needle I am enabled to feed the cloth or leather by means of the awl, after the same has been introduced through the leather, and I am further enabled to so actuate the needle that it will be out of the way of the awl while the latter feeds, and afterward be moved in line with the hole made by the awl, to enter the same. This mechanism differs, in the peculiarity of the motion referred to, from the mechanism heretofore employed in upper-awl sewing-machines, of vibrating the head that carries the needle and awl bars without allowing independent oscillating motion to such bars.

My invention also consists in applying to the awl-bar a projecting pin, which serves to raise the presser-foot as soon as the awl enters the leather, so that the awl may freely feed the leather.

My invention also consists in the use of a bent or V-shaped awl, the inclined shank of which renders it adjustable in its holder, so as to come nearer to or farther away from the needle, such adjustment being of great necessity in a machine of the kind invented by me; and in other details of invention, hereinafter more fully set out.

In the accompanying drawings, the letter A represents the work-plate of the machine; B, the arm projecting above the work-plate for the support of the horizontal shaft C, that carries the cams for operating the needle and awl, said shaft C being hung horizontally, in the manner usually found in sewing-machines, and as clearly shown in Fig. 6. D is a shaft, hung parallel to the shaft C, below the work-plate A, and connected, by a rod or otherwise, with said shaft C, so that the two will move simultaneously, the upper shaft revolving while the lower rocks. The shaft D serves, by means of a projecting arm, *a*, at its front end, to impart the necessary reciprocating motion to the shuttle-carrier and shuttle E. The front part of the arm B is forked, to make room for the cams of the shaft C, and carries at its extremity a vertical plate, *b*, which I call the needle-guide, said needle-guide being firmly affixed to, and to all intents and purposes part of, the arm B. This needle-guide serves to receive in its grooved back the needle-bar F, the awl-bar G, and the shank H of the presser-foot. The needle-bar F carries two friction rollers or pins, *d e*, which project forward through slots in the needle-guide, the upper friction-roller *d* through a straight slot, *f*, of the needle-guide, while the lower friction-roller *e* passes through the slot *g* of the needle-guide, which slot is straight at its lower part, but slightly bent to the left at its upper part, as clearly indicated in Figs. 1, 2, and 3.

A heart-shaped cam, I, mounted upon the back of the needle-bar F, receives in its slot an eccentric pin, *h*, projecting from a circular plate on the front part of the shaft C, so that, by means of said eccentric and cam, which are of the style usually employed for imparting reciprocating motion to the needle-bar, the latter will be moved up and down. It will be readily perceived that in thus moving up and down the needle-bar will be oscillated whenever the friction-roller *e*, on its upward stroke, enters the bent upper part of the slot *g*, and also whenever the said friction-roller *e*, on the downward stroke of the needle-bar, leaves the bent upper part of the slot *g*, the pin or roller *d* serving as the pivot on which the needle-bar vibrates while having its lower part moved by the pin *e* and slot *g*. The awl-bar G has also a forward-projecting friction roller or pin, *i*, which travels in a straight groove or slot, *j*, of the needle-guide *b*, said groove or slot being indicated by dotted lines in Figs. 2 and 3, as is also the friction-roller *i*. Another pin, *l*, projecting forward from the awl-bar G through a slot of the needle-guide *b*, enters the slotted end of a crank, *m*, which crank projects from an arbor, *n*, that is hung at the side of the guide *b*. Another crank, *o*, of the arbor *n* enters the groove of a pear-shaped cam, J, which cam is mounted upon the shaft C, and which serves to rock the arbor *n*, and thereby, and by the crank *m*, to impart reciprocating vertical motion to the awl-bar G. The pin *l* passes through a slot of the crank *m*, as shown in Figs. 1 and 2; and the slot in the needle-guide, through which said pin *l* passes, is also sufficiently wide to allow a vibratory movement in a horizontal direction to such pin. A spiral spring, *p*, is fitted into the slot of the crank *m*, on the left-hand side of the pin *l*, bearing against said pin, and having a tendency to crowd the said pin—and with it the lower part of the awl-bar—to the right, the terms "right" and "left" in this specification being used with reference to the position of the observer, looking at the machine as represented in Fig. 1.

L is a lever, pivoted by a pin, *q*, to the right of the needle-guide, and bearing with its lower end against the awl-bar G. The upper end of the lever L carries a pin in contact with the edge of a cam, M, that is mounted upon the shaft C. The cam M serves at proper intervals to vibrate the lever L, so that the same will swing the lower part of the awl-bar toward the needle-bar, while the spring *p* serves to keep the awl-bar continuously in contact with the lower end of the lever L, and tends—*i. e.*, attempts—to hold the upper end of the lever L, or rather the pin thereon, continuously in contact with the edge of the cam M. As the vibratory movement thus imparted by means of the lever L to the awl-bar serves to feed the leather or other fabric by means of the awl, and consequently determines also the length of stitch, it is necessary, in order to be permitted to vary the length of stitch, to provide means for varying the stroke of the lever L. This means consists of a screw, *r*, fitted through a lug that projects from the upper part of the lever L, which screw bears with its end against a stop, *s*, that projects from the edge of the needle-guide, or directly against said needle-guide. The less the screw *r* projects from the pin that holds it, the nearer will the upper part of the lever L be allowed to approach the circular part of the edge of the cam M, and the greater will consequently be the stroke of the lever L and the feed of the awl.

The shank H of the presser-foot is connected with a spring, *t*, that tends to hold the presser-foot continuously down upon the fabric, and the shank H furthermore carries at its upper part the usual lever *u*, for raising the presser-foot by hand off the fabric or leather. *v* is a pin that projects from the upper part of the shank H over the end of a lever, N, which is, at or near its middle, pivoted to a projecting lug of the arm B. The other end of the lever is beneath a pin, *w*, that projects from the awl-bar G, so that in descending the awl-bar carries the pin *w* in contact with the lever N, and thereby vibrates said lever, and causes the same to raise the presser-foot automatically; but, upon ascending, the awl-bar releases the lever N, and allows the spring *t* to lower the presser-foot. O is the awl, made with a bent shank, *x*, as shown in Fig. 5, so that the whole awl is similar to a spread letter **V**. The shank of the awl is inserted between the head of a fastening-screw, *y*, that passes through the lower part of the awl-bar G, said head clamping the shank *x* against the awl-bar. As the awl in this machine is used to feed the fabric, and after feeding to leave it in a position where the hole made by the awl shall be reached by the descending needle, and as for this purpose, in order to prevent the breaking of the needle, the hole must be brought to the exact position required for the reception of the needle, it is necessary that the parts should operate with the utmost exactitude. Yet, even though the parts of the machine be originally made to work with great precision, friction will wear them, and defeat the object sooner or later, and especially the friction of the edge of the cam M, which causes the feed, will, after a while, feed the fabric with a given position of the awl to a less distance than it did before friction abraded the cam edge. To counteract this the bent shank of the awl has been invented, whereby the awl can be moved sidewise, carrying it nearer to the needle, the more the edge of the cam M has been reduced by friction; therefore, the bent shank *x* of the awl constitutes a very important element of my invention. P is the needle, made like an ordinary sewing-machine needle, sufficiently strong for the purposes for which it is intended in the previous description, clamped and secured to the lower part of the needle-bar F. The uppermost enlarged part *z* of the needle, which I term the "shank" for the purpose of this

description, is made with a straight groove at that side which faces the awl, so that the vertical piercing part, or body of the awl, may enter such groove of the needle. This arrangement of the grooved shank of the needle is especially advantageous in making short stitches, for in that case the needle, on descending, will move very close to the body of the awl, the length of the shortest stitches being, in that case, equal to the shortest obtainable distance between the axis of the awl and that of the needle when they are thus nearest together. If it were not for the groove in the upper part of the shank of the needle the relative position of awl and needle could not be such as to make a stitch as short as that which can be made by the use of the grooved needle. In making longer stitches the groove in the shank of the needle will be unnecessary, but its presence renders the machine more useful.

At some convenient part of the frame of the machine, and above the work-plate, preferably in the vertical part of the arm B, I secure a reservoir, R, for receiving oil, melted wax, or other substance with which the thread of the needle is to be coated or charged. From this reservoir a pipe, S, extends under the work-plate, close to the groove a^2, into which the descending needle carries its thread, as indicated in Fig. 8, so that the waxing or lubricating substance will be brought by the pipe S directly to the needle-thread, and also to the shuttle-thread, upon the making of each stitch, and in fact directly to such part of the thread as is required for the stitch under process of construction. A cock, b^2, is fitted into the pipe S for regulating the flow of the liquid through the same.

The operation of this reservoir R and pipe S need not be further referred to, but that of the stitch-making and feeding mechanism will now be more fully described.

When the fabric or leather to be stitched has been placed under the presser-foot, and the needle properly threaded, as also the shuttle, the presser-foot is first let down upon the fabric to hold the same in position. Upon revolving the shaft C the first necessary action is the forcing of the awl through the leather, for the purpose of making a hole through which the needle may subsequently be inserted. To do this the awl is forced down by the action of the cam J, which rocks the arbor *n*, and thereby also the crank *m*, which takes hold of the awl-bar by means of the projecting pin *l* of the same. Being thus forced down, the awl pierces the leather, making the requisite aperture, and while in the leather the awl is moved toward the needle by means of the lever L, said lever being vibrated on its pivot *q* by the cam M. The motion thus imparted to the awl-bar causes the awl to feed the leather in the direction in which the awl is thus moved. While descending to pierce the leather, the awl-bar causes the presser-foot to be elevated by bringing its pin *w* in connection with the lever N, and thus the presser-foot does not prevent the fabric from being fed by the awl. Fig. 2 represents the position of the parts thus far described—that is to say, the elevated presser-foot and the lowered awl after it has been vibrated by the lever L. The continued motion of the shaft C causes the awl to be raised out of the leather, and the presser-foot thereby to descend, holding the leather in the position in which it was left by the awl. The ascending awl-bar is (as soon as the projecting part of the cam M has cleared the lever L) swung aside by the action of the spring *p*, so as to be carried entirely out of the way of the needle, and vertically over the place at which the leather is to be next pierced, the position of the screw *r* regulating the amount of motion thus imparted by the spring *p*. Fig. 3 shows the awl thus elevated and moved aside, the degree of its motion being clearly perceptible by comparing the positions of Figs. 2 and 3. The needle, whose bar F has its projecting pin *e* at this stage in the upper part of the slot *g*, as in Fig. 3, is, by the continued motion of the shaft C, carried down, and is at the same time moved sidewise toward the awl, so that its point is brought directly over the hole formerly made by the awl, and the continued descent of the needle causes it to pass through the leather just where the same had been pierced by the awl, the position of the parts being now like that shown in Fig. 1.

The shorter the stitch to be made the less far will the awl by the spring *p* be carried away from the needle, and the closer therefore will the needle, during its descent, move along the awl, so that for very short stitches the above-mentioned groove in the shank *z* of the needle is of great importance, as will appear more fully by reference to Fig. 1.

After the needle has descended and produced a stitch it is raised again, and simultaneously with its elevation the awl descends, and makes a new hole at the requisite distance from the last position of the needle in the fabric. Just after the needle has cleared the fabric the awl begins to feed, and just as the awl begins to feed the pin *e* enters the upper part of the slot *g*, so that the needle will be carried out of the way of the awl.

Thus it is that by imparting vibratory motion to needle and awl, together with the vertically-reciprocating motion imparted to these two devices, I can produce an awl-feed without vibrating the head or needle-guide *b*.

It will be observed that the groove in the shank *z* of the needle P is at the side of the needle—that is to say, facing the awl—while the groove in the lower part or body of the needle is at the front—that is, facing the operator. It is necessary to have the upper groove at the side to permit the entrance of the awl in the manner described.

I claim as my invention—

1. The V-shaped awl O, made in one piece with the shank *x*, arranged at an angle to its

axis, substantially as herein shown and described.

2. The needle P, made with the groove in the side of its shank *z*, in combination with the vibrating and reciprocating awl O, substantially as specified.

3. In a sewing-machine which has an awl above the fabric, the combination of the needle-bar F with its horizontal pivot-pin *d*, and with the awl-bar G and the horizontal pivot-pin *i*, arranged as described, whereby the needle-bar and the awl-bar are capable of reciprocating motion and also of vibrating motion on their horizontal pivots, substantially as set forth.

4. The vertically-reciprocating needle-bar F, provided with the projecting pins *d e*, and combined with the needle-guide *b*, which has the straight slot *f* and the curved or bent slot *g*, for the purpose of causing the needle-bar to vibrate during its reciprocating motion, as specified.

5. The vertically-reciprocating awl-bar G, provided with the projecting pins *i l*, and combined with the grooved needle-guide *b*, operating lever or crank *m*, and vibrating lever L, substantially as herein shown and described.

6. The combination of the presser-foot H and lever N with the stationary needle-guide *b*, and with the awl-bar G and pin *w*, whereby the descending awl-bar will cause the presser-foot to rise, substantially as set forth.

The above description of my invention signed by me this 30th day of June, 1875.

LOUIS CHEVALLIER.

Witnesses:
E. C. WEBB,
F. V. BRIESEN.