(No Model.)

E. H. SMITH.

SEWING MACHINE.

No. 418,820. Patented Jan. 7, 1890.

Fig. 1.

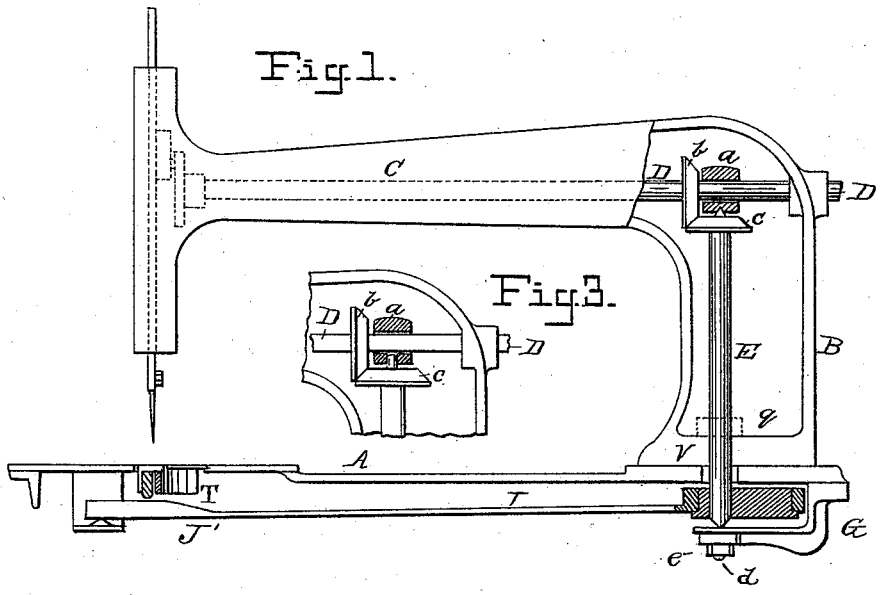


Fig. 2.

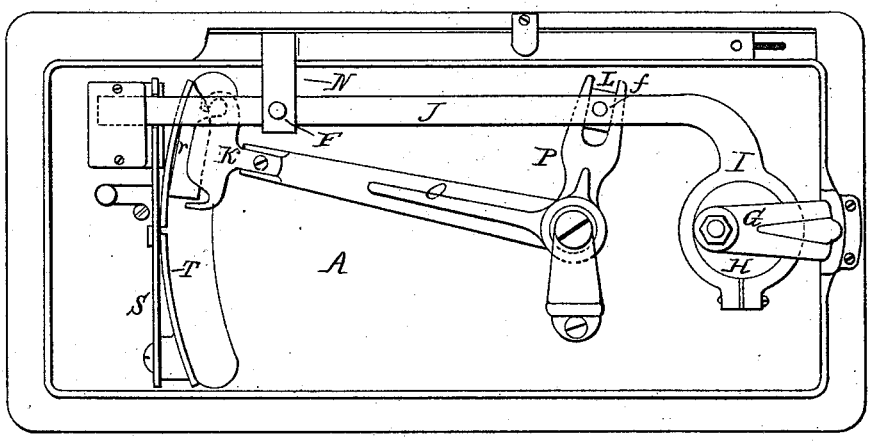
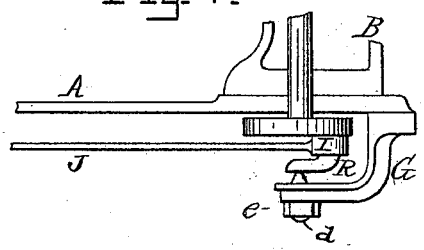


Fig. 4.



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EARLE H. SMITH, OF NEW YORK, N. Y.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 418,820, dated January 7, 1890.

Application filed November 16, 1888. Serial No. 291,032. (No model.)

To all whom it may concern:

Be it known that I, EARLE H. SMITH, of the city, county, and State of New York, have invented certain new and useful Improvements in Sewing-Machines, whereof the following is a specification.

My improvements relate to machines wherein the movements of the parts beneath the bed-plate are transmitted from a horizontal main shaft in an overhanging arm through a vertical shaft in the bracket-arm post.

The improvements are illustrated in the annexed drawings, which show that form or style of machine that employs the horizontal shaft geared to a vertical shaft by bevel-wheels; but in some forms of my invention other connections or gearing may be substituted for such wheels.

In the drawings, Figure 1 is a side elevation of the bed-plate and the overhanging or bracket arm and post, partly in section. Fig. 2 shows the bed-plate as inverted, exhibiting the working parts beneath it. Figs. 3 and 4 are modifications.

A is the bed-plate; B, the bracket-arm post, and C the overhanging or bracket arm, in which is the horizontal main shaft D. In the post B is a vertical shaft, as E, through which motion and power are transmitted to the working parts beneath the bed from the main shaft D, as by bevel-wheels *b c*.

Hitherto it has been customary to support the vertical shaft by means such as a collar *q*, (dotted in Fig. 1,) fixed on the shaft and resting as it revolves on some fixed part of the machine, as indicated in that figure. This plan I reject, and adopt one giving far less friction. It consists in having a journal formed at the extreme lower end of the shaft and providing a bearing therefor beneath the shaft. Such a bearing is seen in the bracket or hanger G, affixed to the bed-plate. For the best effect, the end of the shaft is made to rest on a point central to the shaft, which point may be made on the shaft, as indicated in Fig. 1, and revolve; or it may be formed on a set-screw *d* and be stationary, as seen in Fig. 4. This arrangement dispenses with the collar *q* aforesaid and all its attendant friction—a great desideratum—for not only is the friction considerable from the weight of the shaft, but in machines where the bevel-gears are used, as *b c*, the friction is enhanced by the downward thrust received by the vertical shaft from the action of such bevel-wheels—a thrust which increases with the increase of speed. As here contrived all this comes on a mere point central to the shaft.

I have also devised means for reducing friction at the upper end of the vertical shaft. Heretofore it has been customary to place the upper bearing of this shaft below the laboring-point—that is, below the place where the power and motion are received from the horizontal shaft. (Represented here by the junction of the bevel-wheels *b c*.) Instead I place the bearing above and at the very end of the shaft, providing a block *a* therefor. By thus disposing the upper bearing above the laboring-point such bearing, if a journal, as shown in Fig. 3, may be reduced to half the usual size, or it may be displaced altogether for a simple point or "center," as in Fig. 1. By these means the friction of the upper bearing is reduced almost to nothing.

In practice the block *a* is cast in the arm C and bored out slightly larger than the shaft D, which passes freely through it above the bearing of the vertical shaft. In some cases a small journal, like that shown in Fig. 3 for the upper end, may be used for the lower extremity instead of the center bearing *d*, in which case no other bearing than those at the extremities need be used. At the lower end, below the bed, the said shaft E carries an eccentric H, (or crank,) placed above the supporting-bracket G, which eccentric is encircled by a follower I, having such connecting devices as to give a vibrating movement to a shuttle-lever by the reciprocating motion imparted to such connection by said eccentric. At the same time the lateral motion is utilized for operating a feeding device, whereby all the active movements of the parts beneath the bed are obtained from a single eccentric or crank. As illustrated in Fig. 2, the said connections consists of a horizontal bar J, formed in one with the follower I. Said follower-bar receives a reciprocating motion longitudinally from the eccentric through the said follower, and also a lateral or side-to-side movement therefrom. It is arranged

to slide over an ordinary fulcrum-pin F, as usually attached to a stitch-regulator N in the ordinary way, whereby a vibrating motion is given to the front end, where it engages the feed-bar S, to move it back and forth. Said bar J is also furnished with an inclined surface J′, to raise and drop the feed, thus producing the required four motions.

O is a horizontally-moving shuttle-lever, having at the free end the usual cradle K, for holding the shuttle *r* and driving it back and forth. The movement of this lever O is derived from the same bar that works the feed. For this purpose the horizontal shuttle-lever O has a short side arm P, formed in one therewith, which arm is connected with the bar J in such manner as to allow freedom of lateral motion of such bar. In this instance it is provided with a wrist-pin *f*, set therein. The short arm P is forked at the end, and the pin works in a block L between the forks, where it is free to slide laterally as to the shuttle-lever O. Such block also oscillates on said wrist-pin *f*. The side-to-side motion of this bar in operation moves said wrist nearest the fulcrum of the lever O when driving the shuttle forward, and further from the fulcrum when driving it back, causing the shuttle to advance quickly into the loop and return more slowly, a feature that allows a more equalized movement of the needle than otherwise, and thus easing the movement of the machine, and in practice it is best to have the needle rise slowly during the forward movement of the shuttle.

From the foregoing it will be seen that the invention embraces a construction of sewing-machines wherein a vertical shaft is sustained by end bearings above and below the upper and lower laboring-points, which bearings receive the end-thrust and other strains at their extremities. By "vertical shaft" is meant an operative member having rotary motion around a vertical axis and performing the duty of conveying motion and power from the main shaft above to the mechanism below the bed.

The improvements described are susceptible of modification within the invention—for instance, a crank may be substituted, as indicated in Fig. 4, for the eccentric shown in Fig. 1 with the same effect. In that figure, R is a wing fixed to the crank reaching to the axis-line of the shaft E, and the center bearing, as of the pointed screw *d*, is in the said wing instead of the end of the shaft. A check-nut *e′* prevents the screw *d* from becoming loose and turning accidentally.

I claim as my invention—

1. The combination, with a sewing-machine having the horizontal main shaft in the bracket-arm and a horizontal shuttle-lever and feed-bar beneath the bed, of a vertical shaft receiving rotary motion from the former shaft by miter-wheels for operating all the parts below, and provided with a fixed support under its lower end to take the downward thrust of the miter-wheels and concentrate the same upon a center point.

2. The combination, with a sewing-machine having the main horizontal shaft in the bracket-arm geared to a vertical shaft by miter-wheels, of a pillow-block *a* in the bracket-arm, furnishing the bearing of the upper journal of the vertical shaft, such bearing being at the extreme upper end above the laboring-point and under the main shaft, as set forth.

3. The combination, with a sewing-machine having the horizontal main shaft in the bracket-arm and the shuttle and feed beneath the bed, of a single rotary shaft in the arm-post, receiving motion from the former shaft by miter-wheels for operating all the parts below, provided with an upper bearing placed at the extreme upper end above the laboring-point, as described, and a fixed central support under the lower end, for the purpose specified.

4. The combination, with the vertical rotary shaft, the feed-bar, and the shuttle-lever having a side arm thereon, of the follower-bar I J at one end embracing an eccentric on the said vertical shaft, at the other end engaging the feed-bar, and between the ends having a wrist-pin connecting with the shuttle-lever by the side arm thereof.

5. In combination, the vertical shaft E, means connecting with and operating the same, the eccentric thereon, the shuttle-lever having a side arm P, and the follower-bar I J, embracing the eccentric and having a wrist-pin *f*, connecting with the arm P of the shuttle-lever, such follower-bar receiving from said eccentric a longitudinal movement for vibrating the shuttle-lever, and also a side-to-side motion, whereby said wrist is carried toward and away from the shuttle-lever fulcrum, thus moving the shuttle faster in the forward than in the backward or returned movement.

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