(No Model.) 2 Sheets—Sheet 1.

C. R. SQUIRE.

SEWING MACHINE.

No. 432,955. Patented July 22, 1890.

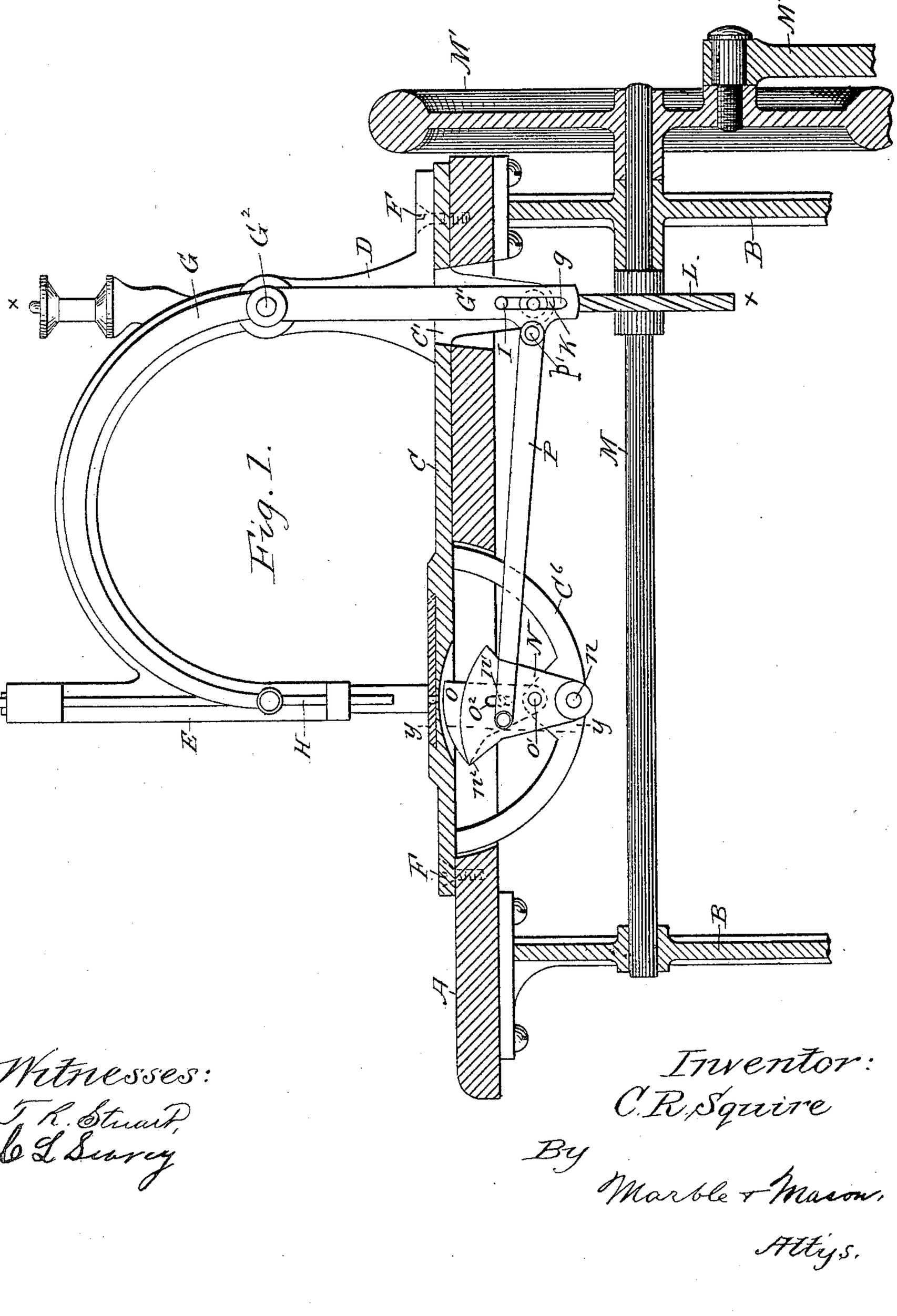

Fig. 1.

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SEWING MACHINE.

No. 432,955. Patented July 22, 1890.

Fig. 2.

Fig. 3.

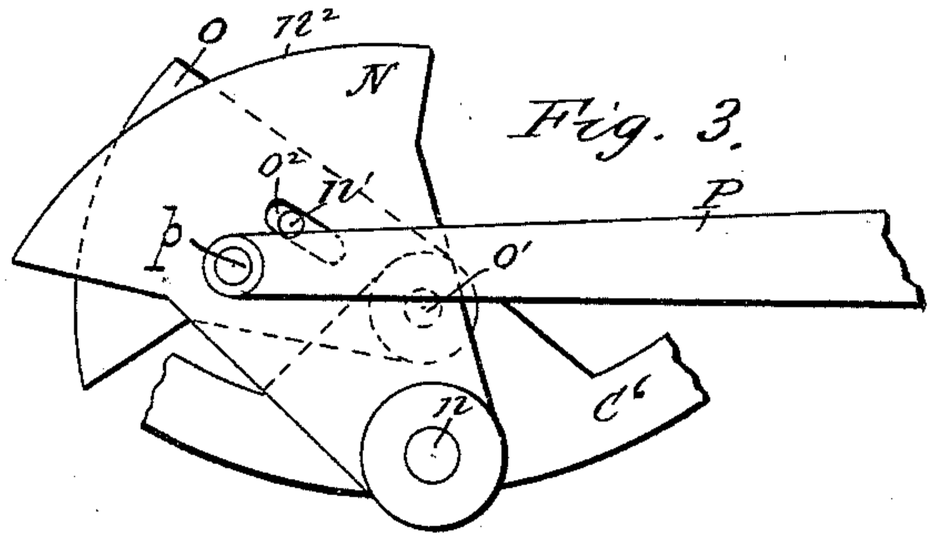


Fig. 4.

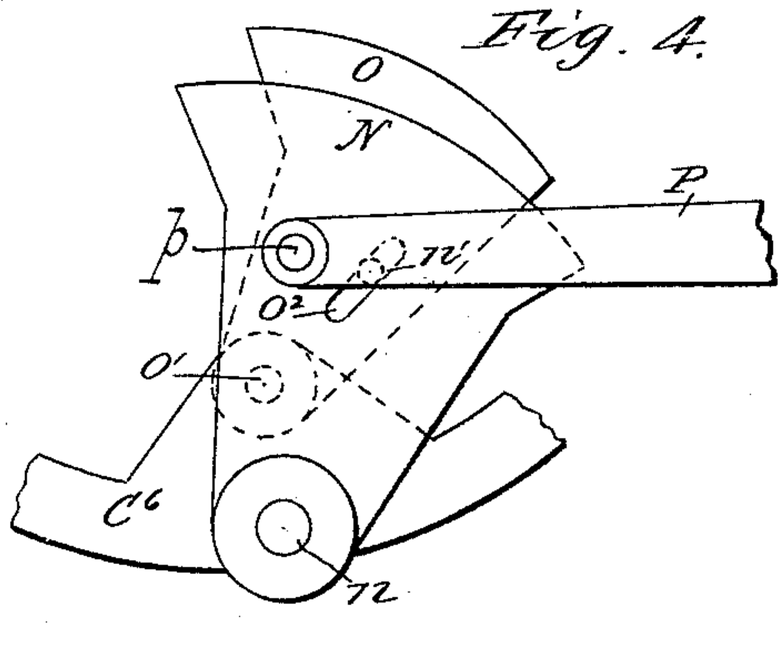
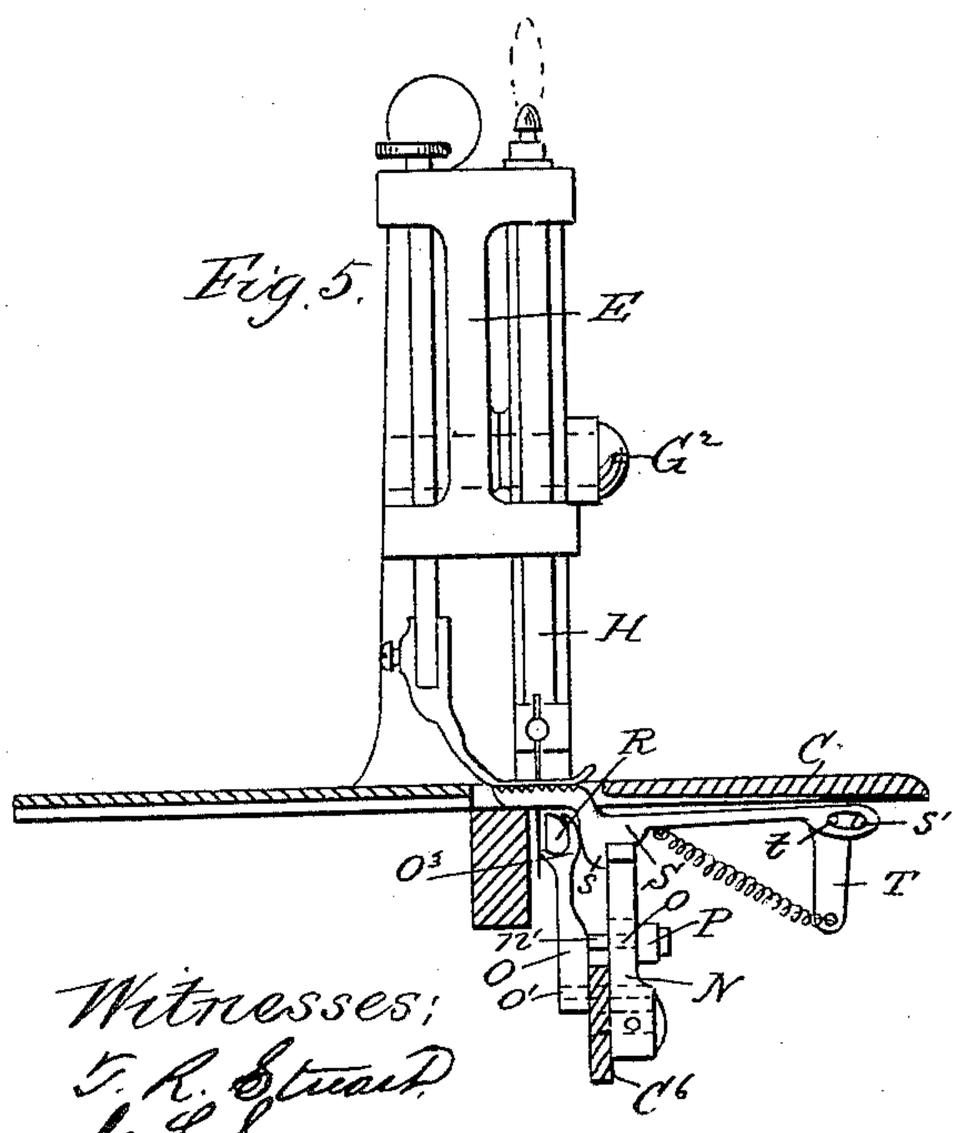


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES R. SQUIRE, OF BROOKLYN, NEW YORK, ASSIGNOR TO FREDERIC CONDIT, OF MORRISTOWN, NEW JERSEY.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 432,955, dated July 22, 1890.

Application filed August 31, 1887. Serial No. 243,383. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. SQUIRE, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Like letters indicate like parts.

Figure 1 is a front elevation, partly in vertical section, showing such parts of a sewing-machine as embody my invention. Fig. 2 is a transverse vertical section on the line *x x* of Fig. 1. Figs. 3 and 4 show in front elevation the feed and shuttle carriers at the end of their forward and backward movements, respectively, and the link operating the same. Fig. 5 is a side elevation as seen on section-line *y y* of Fig. 1.

My invention relates to means of imparting reciprocating motion to the needle-arm and feed-carrier and shuttle-carrier of a sewing-machine without the use of a driving-belt; and it consists of a worm-wheel rigidly mounted upon the main driving-shaft of the machine and gearing with a worm mounted on a shaft at a right angle with said main shaft, which worm, by means of a crank-pin at its end, moves backward and forward a link-bar, thereby giving an oscillating movement to the pivoted feed-carrier and the pivoted shuttle-carrier connected with the said feed-carrier, as hereinafter described.

In the drawings, A represents the table, B the legs, and C the bed-plate of a sewing-machine. The bed-plate is secured to the table by screws or otherwise. The fixed arm D has the integrally-formed standard E, and is fastened to the bed-plate by bolts F. A vibrating needle-arm G is pivoted at G^2 to the arm D. The bed-plate C has an opening at C′. The needle-arm, below its pivot-bearing, extends vertically downward through said opening C′ and below the table A. At its opposite end the needle-arm G carries a needle-bar H in the usual manner. The needle-bar H has the usual reciprocating motion vertically in the guide of the standard E. The lower end of the needle-arm G is longitudinally slotted, as shown at *g*. A shaft I′ is supported by hangers C^2 C^3, which extend downward from the bed-plate C. The shaft I′ has a crank I, and the crank end of said shaft passes through and is mounted in the bearing C^4, formed in the hanger C^2, and the opposite end of said shaft has a conical recess *i*, which receives a correspondingly-shaped coned screw-bolt C^5, which passes through the hanger C^3, and is adjusted therein to support said shaft at that end and to take up the lost motion in the shaft-bearings. The pin of the crank I engages with the slot *g* of the needle-arm G. Said shaft I′ also has a worm-gearing K formed upon it.

M is the main driving-shaft of the machine, mounted in the legs B B. A fly-wheel M′ is mounted upon the main shaft, and a treadle-bar or pitman revolves said shaft and wheel by the usual treadle. A worm-wheel L is secured upon said shaft M and engages with the worm K of the shaft I′. A bracket C^6 is cast or secured upon the under side of the bed-plate C. A feed-carrier N, which is sector-shaped, is mounted upon said bracket by a pivot, and is capable of an oscillating motion, which is communicated to it by a link or bar P. The link P is pivoted to the feed-carrier N at one end, as shown in Figs. 3 and 4, at *p* and at the other end to the lower end of the needle-arm G at *p′*. (See Fig. 1.) A shuttle-carrier O is mounted upon the bracket C^6 by a pivot *o′*. The carrier O has a shorter radius than that of the carrier N, and is pivoted upon said bracket at a point higher than the pivot *n′*. The carrier O derives motion from the carrier N by means of a pin *n′*, which projects from its face and which engages in a slot o^2 of the carrier N. The carrier O has a rest o^3, (see Fig. 5,) in which the shuttle R is supported.

The feed-bar S (whose shape is shown in Fig. 5) is suspended horizontally beneath the bed-plate C, and is supported at one end by a pin *t*, secured to a bracket T, which projects downward from said bed-plate. Said feed-bar is slotted at one end at *s′* to receive

the pin *t* and at its opposite end rests upon the periphery of the carrier N.

The peculiar construction of the feed-carrier N and its cammed edge is made the subject of a separate application for Letters Patent filed by me March 15, 1889, Serial No. 303,443, and needs no further description here.

The operation of my device is as follows: The pitman M^2 is operated by a treadle in the usual manner, and revolves the fly-wheel M′ and the main shaft M. The worm-wheel L, rigidly mounted upon the shaft M, turns with it, and, engaging with the worm K of the shaft I′, turns the shaft I. By this worm-gearing the shaft I′ is rotated in a direction at a right angle with the shaft M. The crank I turns with the shaft I′, and by means of its pin engaging with the slot *g* of the needle-arm G, gives a vibrating motion to said needle-arm, which motion causes the needle-bar H to alternately move up and down, and at the same time communicates a reciprocating motion to the link or bar P, pivoted to said needle-arm at *p′*. The pivotal connection *p* of the link-bar P with the feed-carrier N causes said carrier N to oscillate vertically upon the bracket C^6. The pin-and-slot connection $n\,o^2$, between the feed-carrier N and shuttle-carrier O, gives an oscillating movement to the shuttle-carrier O, which has its separate pivotal bearing on the bracket C^6 at *o′*. As the pivot *o′* is located above the pivot *n*, and the distance between the points *n′ o′* is less than the distance between the points *n p*, it is evident that the carriers have a differential motion and that the shuttle-carrier O has a quicker travel and describes a longer arc, so that the shuttle-carrier can advance rapidly and pass the shuttle through the loop of the stitch while the feed-carrier follows more slowly and gives time for the needle to pass into and out of the cloth while the feed itself is at rest, as will be more fully specified in my other application for Letters Patent.

In sewing-machines as hitherto constructed the power is communicated from the wheel to the stitch-forming mechanism by means of a belt passing over said wheel and over a pulley, the latter turning a main shaft on the machine which extends beneath the bed-plate. My device dispenses entirely with such belt-connection and substitutes a worm-gearing for it.

In the sewing-machine as commonly constructed only a comparatively few stitches can be produced by each revolution of the driving-wheel. The number of stitches formed is in ratio to the relative diameters of the wheel and pulley. On the one hand the driving-wheel cannot practically exceed a certain diameter and weight and on the other hand the pulley cannot practically be of less than a certain diameter. If the pulley is too small, the belt will slip upon it, because there is not a sufficient binding-surface and the leverage at which the power is applied to the pulley is too short. Especially when heavy fabrics are used and the resistance to the needle which they offer is consequently great, the belt must be tightened in order to secure the necessary frictional hold upon the pulley. Again, it is a common experience in the use of such machines to find that the belt is stretched by the constant strain and fits loosely, so that it is necessary to occasionally shorten the belt in order that it may bind the wheel and pulley more snugly.

By substituting the worm-gearing for the belt I secure a simple and durable driving mechanism which is positive and certain in its motion and capable of great speed and enables the formation of a greater number of stitches for each revolution of the fly-wheel.

I claim as a new and useful invention, and desire to secure by Letters Patent—

1. In a sewing-machine, the combination of the driving-shaft suitably mounted, the worm-wheel fastened on said shaft, the worm-shaft suitably mounted and having a crank, the worm formed on said worm-shaft and engaging with the worm-wheel of the main shaft, the bed-plate and standard, the needle-arm pivotally mounted on said standard and slotted at its lower end to engage with the crank of the worm-shaft, and the needle-bar pivoted to the needle-arm and adapted to reciprocate vertically in guides of the standard, substantially as specified.

2. In a sewing-machine having a bed-plate, standard, and stitch-forming mechanism, the combination of a needle-arm pivoted to said standard, and driving mechanism consisting of a suitably-mounted rotatable worm-gearing and crank-pin adapted to impart a reciprocating motion to said needle-arm, substantially as specified.

3. In a sewing-machine having a bed-plate and standard, the combination of a driving-shaft suitably mounted and having a worm-wheel, a worm-shaft suitably mounted and having a worm and crank, a vibrating needle-arm pivoted to said standard and engaging with said crank, a link-bar pivoted to said needle-arm at its lower extremity, and an oscillating feed-carrier pivoted to said link-bar and mounted upon a bracket of the bed-plate, substantially as specified.

4. In a sewing-machine, the combination, with a stitch-forming mechanism and a vibrating needle-arm having a slotted end, of a driving-shaft provided with a worm-wheel, and a worm-shaft engaging with said worm-wheel and provided with a crank connecting with the slotted end of said vibrating needle-arm, substantially as specified.

5. In a sewing-machine, the combination, with a worm and worm-shaft and a driving-shaft provided with a worm-wheel, of an oscillating feed-carrier pivoted upon a bracket of the bed-plate, and an intermediate link-connection between said feed-carrier and worm-shaft, substantially as specified.

6. In a sewing-machine, the combination,

with the reciprocating needle-bar and needle, a driving-shaft having a worm-wheel and a worm-shaft and worm, of a connected feed-carrier and shuttle-carrier, and an intermediate link-connection between said feed-carrier and worm-shaft, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES R. SQUIRE.

Witnesses:
SOLON C. KEMON,
J. MIDDLETON.