(No Model.) 3 Sheets—Sheet 1.

W. H. GARLAND & H. SCHULZE-BERGE.

SEWING MACHINE.

No. 344,825. Patented July 6, 1886.

Fig. 1.

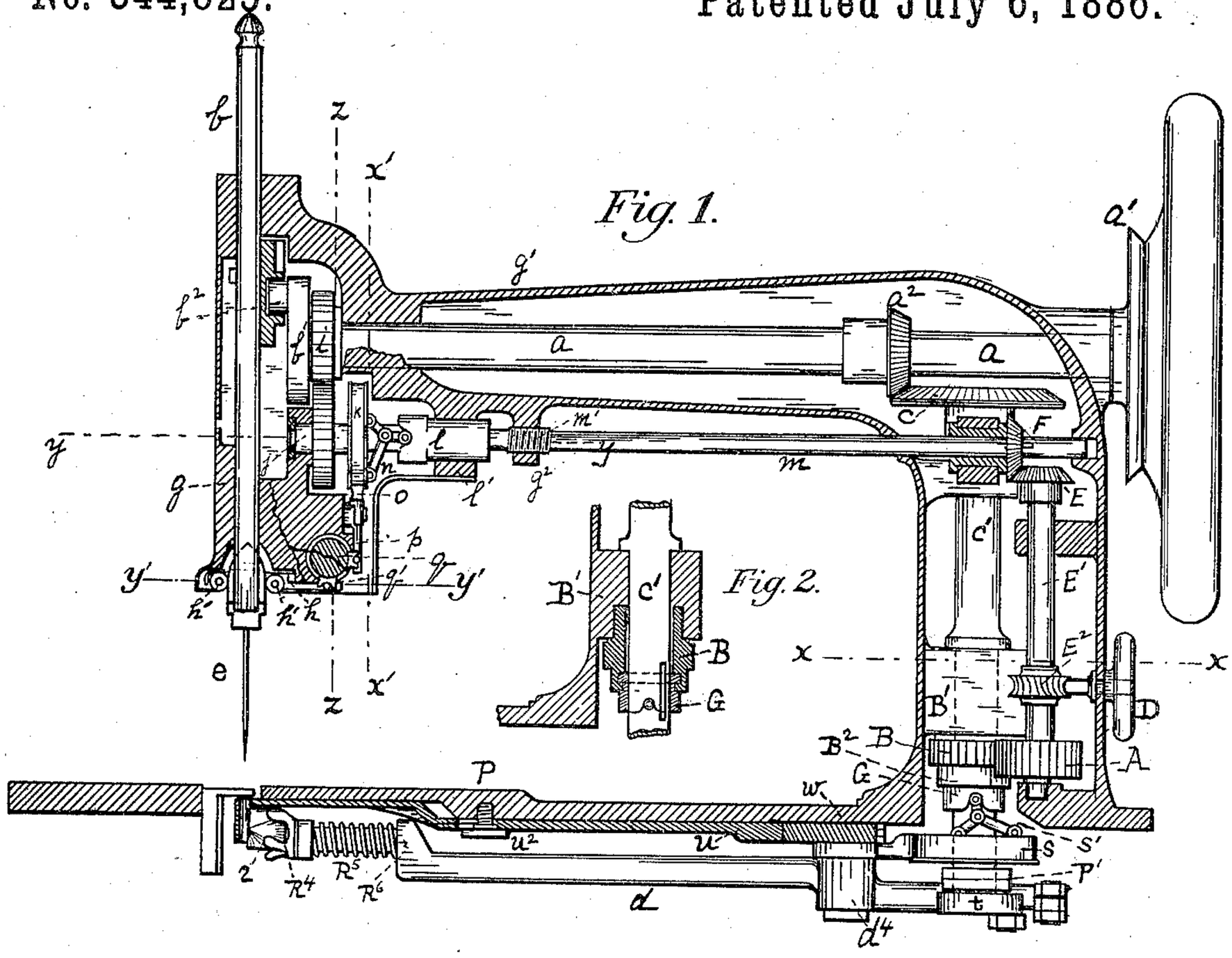


Fig. 2.

Fig. 3.

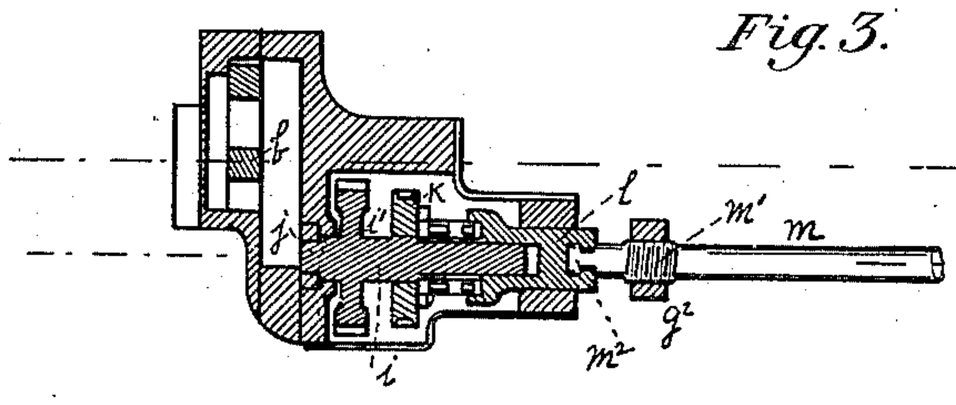
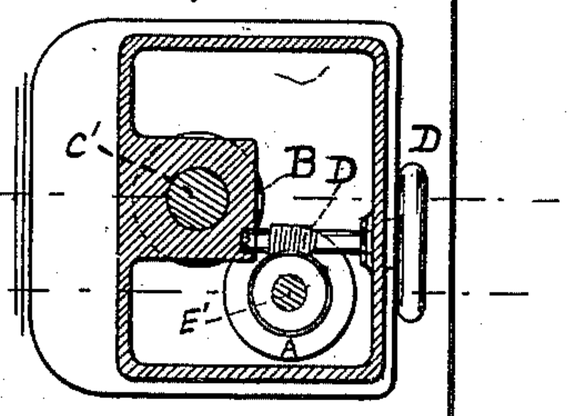


Fig. 3a



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 4.

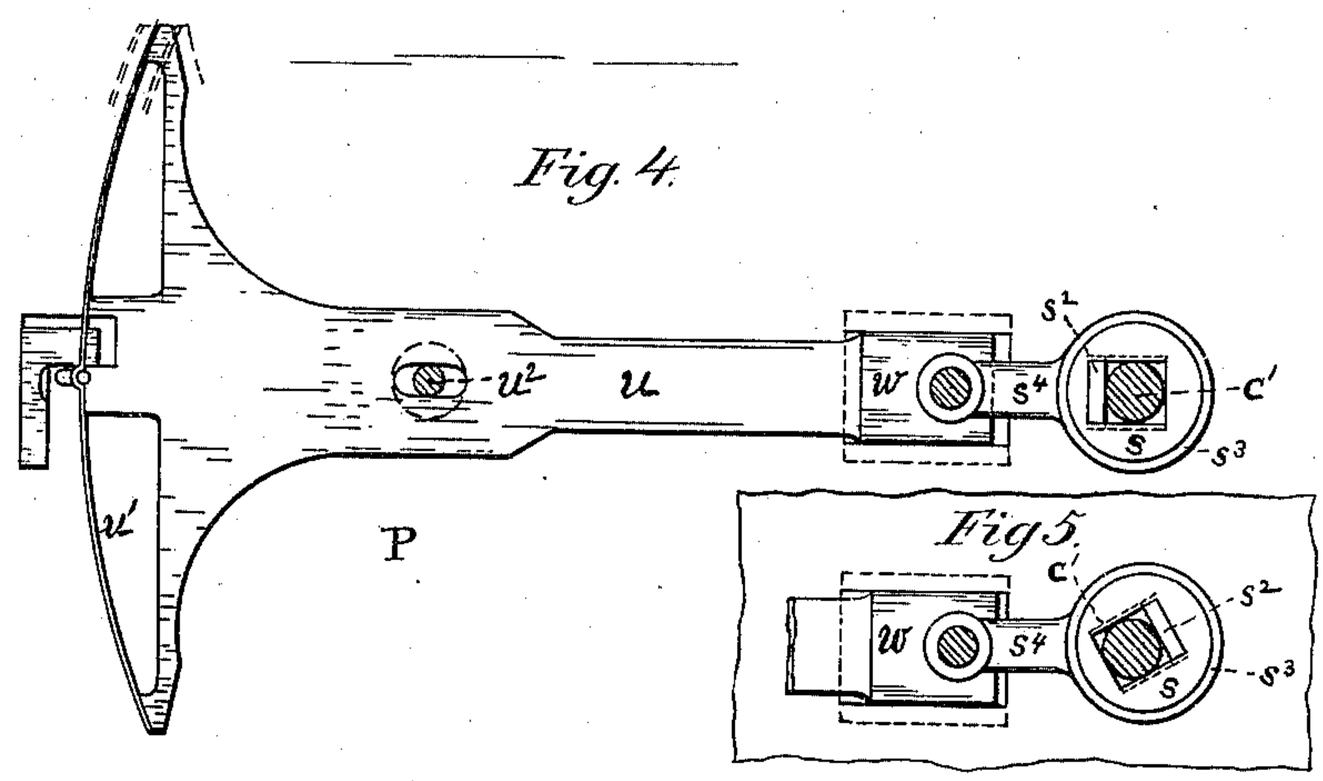

Fig 5.

Fig. 6.

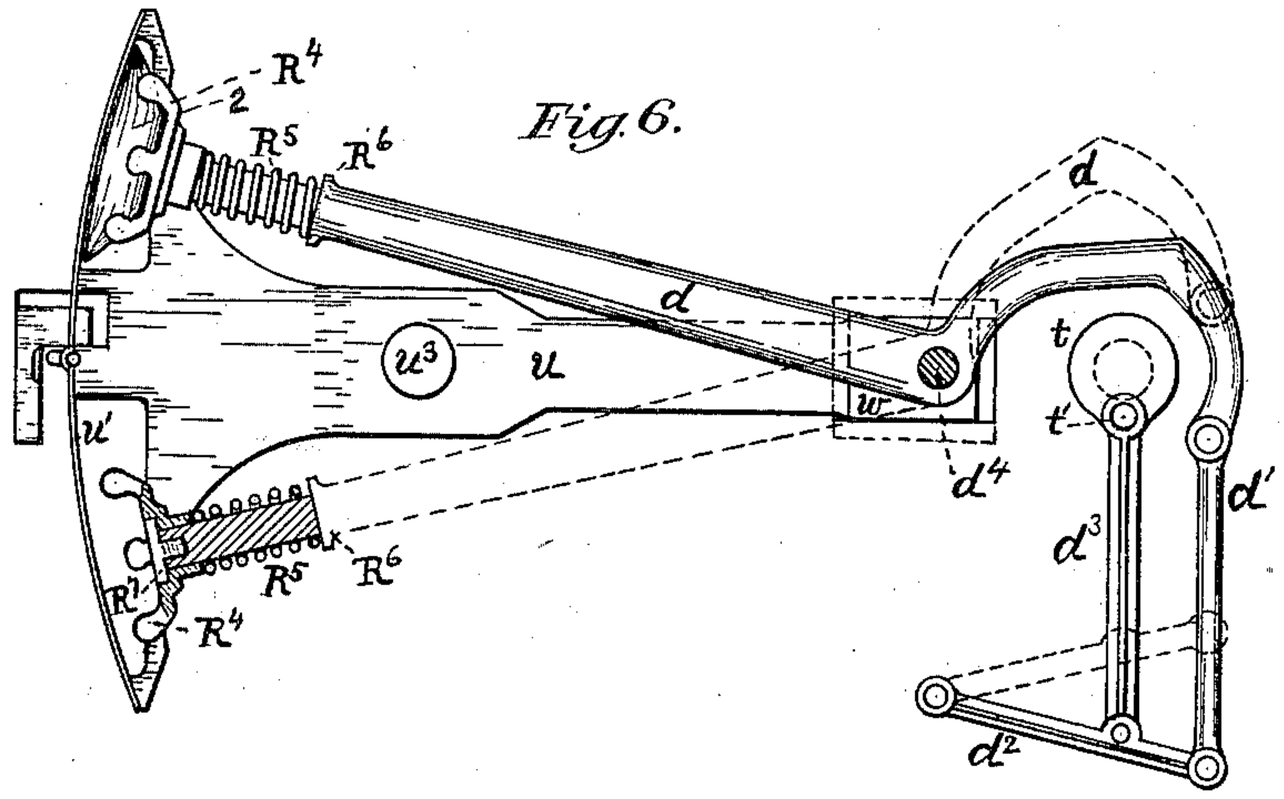

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Fig. 7.

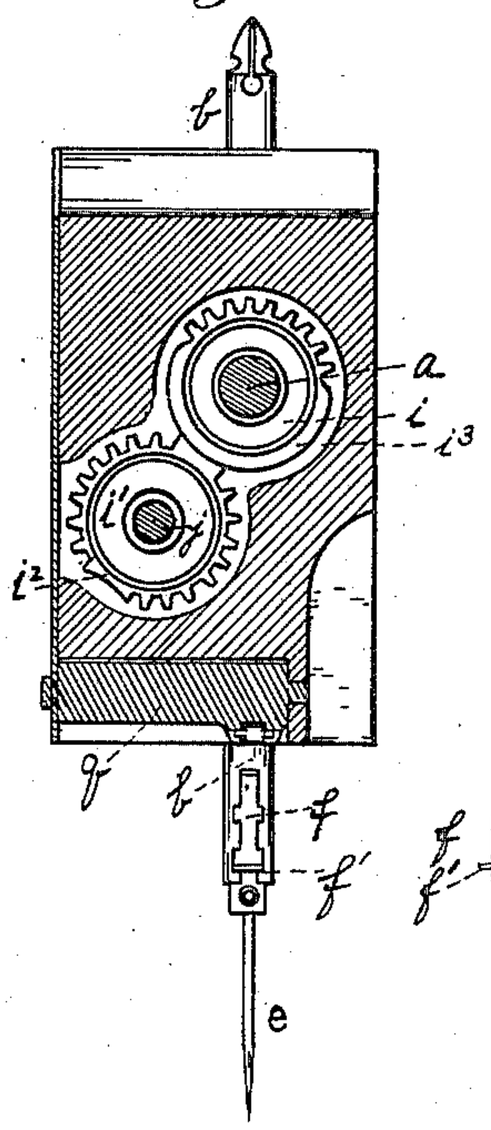


Fig. 8.

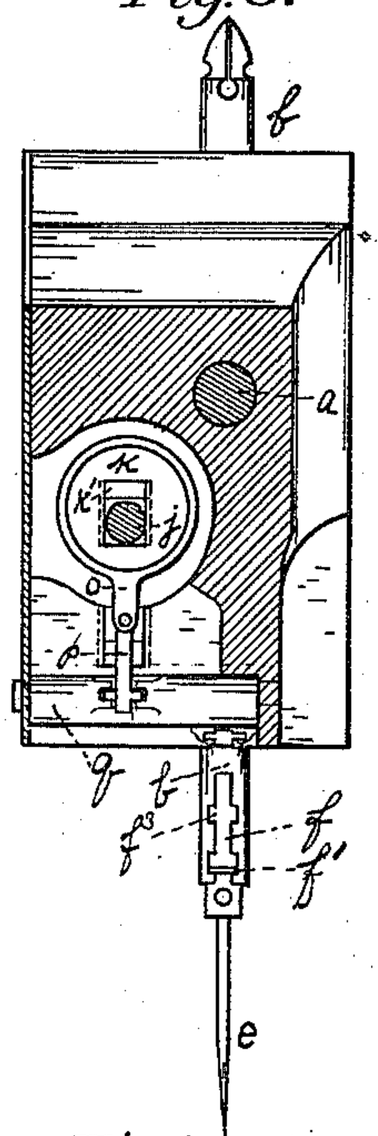


Fig. 9

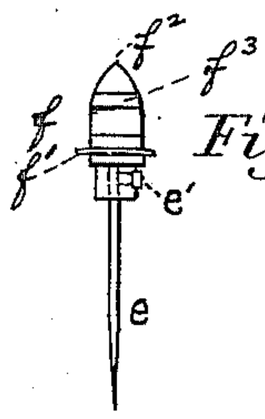


Fig. 10.

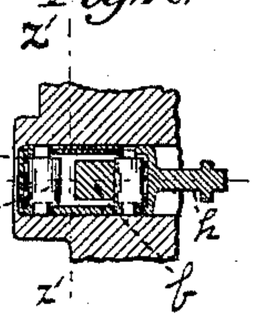


Fig. 11.

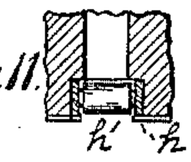


Fig. 12.

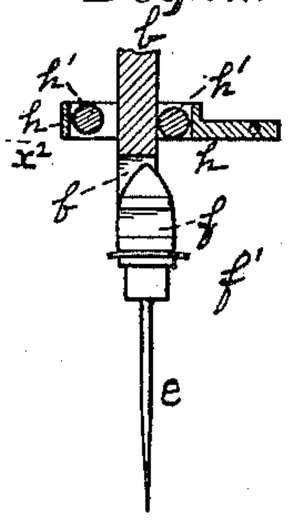


Fig. 13.

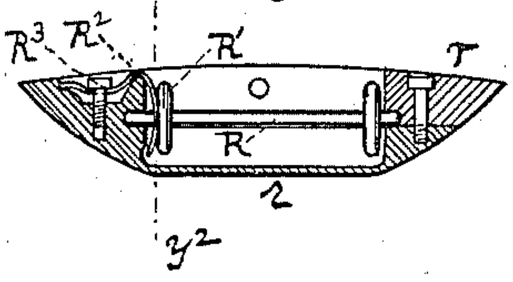


Fig. 14.

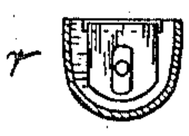


Fig. 15.

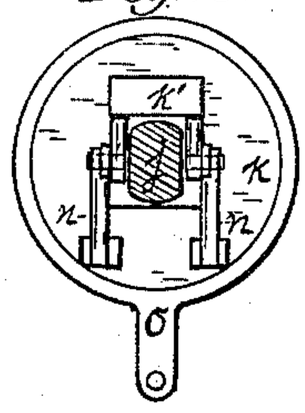
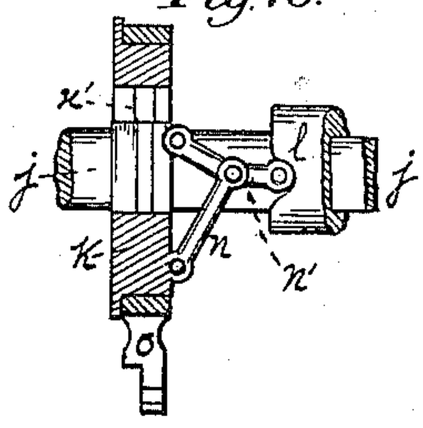


Fig. 16.



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UNITED STATES PATENT OFFICE.

WILLIAM HENRY GARLAND AND HERMANN SCHULZE-BERGE, OF ROCHESTER, PA.; SAID GARLAND ASSIGNOR TO SAID SCHULZE-BERGE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 344,825, dated July 6, 1886.

Application filed February 7, 1885. Serial No. 155,220. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM H. GARLAND and HERMANN SCHULZE-BERGE, both of Rochester, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Sewing-Machines; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of our improved machine. Fig. 2 is a vertical axial section of part of the shaft *c'* shown in Fig. 1. Fig. 3 is a horizontal section on the line *y y*, Fig. 1. Fig. 3ª is a horizontal cross-section on the line *x x* of Fig. 1. Fig. 4 is a bottom plan view of the adjustable shuttle-race. Fig. 5 is a detached view of a part of the mechanism shown in the latter figure, illustrating a difference in adjustment. Fig. 6 is a view similar to Fig. 4, showing in addition the shuttle, its lever, and mode of operation. Fig. 7 is a vertical cross-section of the fixed needle-arm of the machine on the line *z z* of Fig. 1. Fig. 8 is a section on the line *x' x'* of Fig. 1, in a plane parallel with the section plane of Fig. 7. Fig. 9 is a detached front view of the needle-foot shown in Figs. 7 and 8. Fig. 10 is a horizontal section on the line *y' y'* of Fig. 1. Fig. 11 is a vertical cross-section on the line *z' z'* of Fig. 10. Fig. 12 is a vertical longitudinal section on the line x^2 x^2 of Fig. 10. Fig. 13 is an axial section of the shuttle. Fig. 14 is a vertical cross-section of the same on the line y^2 y^2 of Fig. 13. Fig. 15 is a plan view of the adjustable eccentric marked *k* in Fig. 1. Fig. 16 is a side view of the same, partly in section.

Like letters of reference indicate like parts in each.

The machine shown in the drawings is of the well-known "Singer type," and the improvement consists in providing it with certain mechanism whereby the needle is caused to change its position laterally with relation to the line of motion of the sewed cloth.

It also consists in providing the shuttle with suitable mechanism for causing it to move in unison with the needle, and in several other new and improved devices, which will be hereinafter described, and more particularly indicated in the claims.

Heretofore a difficulty in the operation of sewing-machines which produce a serrated or zigzag stitch by the lateral oscillation of the needle-foot is that the zigzag appears only on the upper part of the cloth, and not underneath, and that the reciprocating shuttle often misses the loop of the thread and drops its stitch, by reason of variation in time of the arrival of the shuttle-point at the loops formed in the two different lines.

A principal object of our invention is to obviate these difficulties.

The motive power of the machine is derived from a belt-wheel *a'*, which is driven by the usual treadle arrangement, and is affixed to a rotary shaft, *a*. The rotation of the shaft *a* gives to the needle-bar *b* its necessary vertical reciprocating motion by means of the usual cam, *b'*, and roller b^2. The oscillatory movement of the shuttle *r* is imparted from the shaft *a* through beveled gear-wheels a^2 and *c*, the gear-wheel a^2 being of one-half the diameter of that of the pinion *c*, so that the shaft *c'*, to which the latter is affixed, performs one revolution while the shaft *a* revolves twice. The shuttle-lever *d*, which is geared directly to the shaft *c'*, as hereinafter described, makes one complete oscillation for each revolution of the shaft, and the shuttle will therefore have moved once forward or backward while the needle-bar has made a complete double motion and has driven its needle *e* through the cloth once. The lower end of the needle-bar *b* is provided with a vertical slot having lateral grooves within which moves a needle foot or slide, *f*, as shown in Figs. 1 and 7 of the drawings. The needle-foot has lateral ribs f^3, which fit movably in these grooves. It also has a spring-plate, *f'*, which fits against the needle-bar at the base of the vertical slot and prevents accidental displacement of the foot. The needle *e* is secured to the needle-foot by a set-screw *e'*.

The needle-foot *f* tapers to a point, f^2, at its top, and is movable laterally by the following mechanism: The fixed arm *g* of the sewing-ma-

chine has a recess at its base through which the vertical needle-bar *b* passes. Within this recess, and movable laterally with relation to the course of the cloth, is a slide-frame, *h*, having two parallel and opposite rollers, *h'*. The rollers are separated, so that the needle-bar *b* may pass freely between them, and so that the widest part of the needle-foot *f*, which projects from the needle-bar laterally, may equal in width the distancé between the rollers. Sufficient space is left in the recess to allow a considerable movement of the slide from side to side. When the slide is fixed and the needle-bar lowered, as shown in Fig. 12, so as to be off the center of the space between the rollers, the rise of the needle-bar will cause one of the tapered sides of the needle-foot to strike against one of the rollers of the slide-frame, and to move the needle-foot laterally in its grooves in the needle-bar until the other side of the foot strikes the other roller. By moving the slide-frame alternately backward and forward after each descent of the needle-bar the needle-foot will be given a corresponding reciprocating movement. It is in this manner that we produce the desired zigzag stitch. If the slide-frame is kept stationary, the needle-foot will not move back and forth, and a straight stitch is made. The slide-frame *h* is moved in this manner by means of the intermittent gear-wheels *i i'*. (Shown in Figs. 1 and 7.) The gear-wheel *i* is situate within the arm *g*, and rigidly mounted upon the drive-shaft *a* of the machine. It is provided with a series of gear-teeth extending about one-half of its circumference. The rest of the circumference i^3 is untoothed and convex, the diameter of this part being preferably bounded by the pitch-line of the two gear-wheels. The other gear-wheel, *i'*, is rigidly mounted on a shaft, *j*, and is provided with two opposite series of gear-teeth, each having the same number of cogs as is on the single series of the gear-wheel *i*, and capable of meshing into that series. The series of teeth on the wheel *j* are separated by two opposite lock-teeth, i^2, the peripheries of which are concave, the concavity being determined by the convexity of the untoothed part of the gear-wheel *i*, so that when these two parts are in conjunction, as shown in Fig. 7, the gear-wheel *i* may revolve freely and in contact with the concave locking-tooth. Suppose the gear-wheel *i* to be revolving continuously and the two gear-wheels *i* and *i'* to be in the relative positions shown in Fig. 7, with one of the concave lock-teeth i^2 in contact with the convex part i^3 of the wheel *i*. It is evident that the lock-tooth will hold the gear-wheel *i'* and its shaft *j* stationary until the first tooth of the toothed segment of the gear-wheel *i* engages the side of the locking-tooth, thereby releasing the part i^3 therefrom. The wheel *i'* will then begin to revolve with the cog-wheel *i*, and will continue to do so until the opposite lock-tooth, i^2, has reached the convex part of its periphery, when the driven wheel will again come to rest and will remain so for another semi-revolution of the drive gear-wheel *i*—*i. e.*, until the toothed segment of the latter wheel again engages the side of the lock-tooth. In this manner there will be a continual intermission of motion of the driven wheel *i'*. It will rotate for a semi-revolution during one semi-revolution of the gear-wheel *i*, and will be at rest during the other semi-revolution, and will altogether perform one-half as many revolutions as the drive-wheel.

We do not desire to claim the combination of the two lock-gear wheels *i i'*, of the peculiar construction described, because it has been made the subject-matter of a separate application for Letters Patent, filed December 20, 1884, Serial No. 150,801. The shaft *j* has its bearings in the sewing-machine arm *g*, and just back of the lock-gear wheel *i* it is provided with a disk, *k*, having a rectangular slot, *k'*, which extends across the center of the disk. At the point where the disk fits upon the shaft *j* the latter is square, so as to fit within the slot *k'*. When the rotatory shaft is at one end of the slot and in the center of the disk the latter will rotate concentrically; but when the disk is moved until the shaft is at the other end of the slot the disk will become an eccentric. The greater the distance of the axis of the shaft from the center of the disk the greater will be the throw of the cam. In order to make the eccentric thus mechanically adjustable, there is a sleeve, *l*, which fits upon the squared part of the shaft back of the disk *k*, the internal bore of the sleeve being also squared, so that it must rotate with the shaft, and may be movable thereon toward and away from the face of the disk. The shaft *j* terminates in the sleeve *l*, and the latter has its bearings in a suitable box, *l'*, attached to the horizontal arm *s'* of the machine. Swiveled within the rear end of the sleeve *l* is a horizontal shaft, *m*, a part of which, *m'*, is screw-threaded and bears within a female screw-socket, g^2. If now the shaft *m* be turned, the screw m' g^2 will cause it to push the sleeve *l* on the shaft *j* toward and away from the disk *k*, according to the direction of rotation of the shaft. One of the arms of a toggle-joint lever, *n*, is pivoted to the square part of the shaft *j*, while the other arm is pivoted eccentrically to the disk *k*. An arm, *n'*, is pivotally connected with the knee-joint of the toggle-lever at one end, and at the other end is pivoted to the sleeve *l*. When, therefore, the sleeve is moved toward the disk *k* by the turning of the horizontal shaft *m*, it will spread the legs of the toggle-joint *n* and will move the disk upon the shaft *j*, so as to make it an eccentric, as before described. When the shaft *m* is reversed, it will draw back the sleeve *l*, thus bringing the legs of the toggle-joint together and drawing the center of the disk toward the axis of the shaft.

In order to secure steadiness of action, we prefer to have two sets of toggle-joint levers acting on the disk *k*, one on each side of the

shaft *j*, and both arranged and operated in the manner above described. (See Fig. 15.)

The adjustable disk *k* is provided with a circumferential yoke or annulus, *o*, which is mounted loosely on its periphery, so that the disk may turn readily therein. The annulus *o* has a rigid arm, *p*, which extends downward vertically, and is pivoted at its extremity to an auxiliary arm, *q'*, which is pivotally and eccentrically connected with a rotatory disk or roller, *q*. The roller *q* is connected with the slide-carriage *h*, an arm of the latter being eccentrically pivoted to the roller. If now the sleeve *l* be adjusted so as to make the disk *k* an eccentric, it is clear that the intermittent revolution of the latter will act on the yoke *o* in such manner as to cause the rod *p* to rise and fall with each revolution of the disk, thereby partially rotating the roller *q* backward and forward, and through it giving a horizontally-reciprocating motion to the slide-frame *h*. At each forward or backward movement of the slide-frame *h* the needle-foot *f*, striking against its rollers, will move correspondingly from side to side of the needle-bar *b*.

The slide-carriage *h* is actuated primarily by the intermittent rotation of the lock-gear wheel *i*. This wheel and the disk *k* revolve one-half while the shaft *a* revolves once, and while the needle-bar *b* performs one complete reciprocation. This semi-revolution of the disk *k* is sufficient to throw the slide-frame *h* forward or backward, as the case may be, for its full length, and its action is so timed as to be during the downward stroke of the needle-bar. The slide will then be locked stationarily until the needle-bar, having risen, has engaged the needle-foot with the rollers of the slide and has shifted its position. Then as the needle moves down in a different vertical line the eccentric disk *k* will again move the roller, so that the upward stroke of the needle will replace the needle-foot in its original position, as before described. In this manner there is kept up a continual backward and forward movement of the slide-frame *h*, and a corresponding vibration of the needle, one movement occurring before each entrance of the needle-point into the cloth. The position of the puncture of the needle being thus regularly shifted a zigzag stitch is produced. It is evident that the extent of motion of the slide-carriage *h*, and the consequent width of the zigzag, is determined by the throw of the eccentric *k*, and that this throw is accurately regulable by the screwing or unscrewing of the shaft *m*. When the disk *k* and shaft *j* are made concentric, there will be no motion of the needle-point, and consequently no zigzag stitch.

Instead of the roller *q* a bell-crank lever or other mechanical equivalent may be employed to transmit the motion of the eccentric *k* to the slide-frame. The rollers of the slide-frame *h* need not be rotary. If not made so, they will be less advantageous than if made as herein shown and described, but would be equivalents of this feature of our invention, and we desire to cover such construction in the following claims.

We will now describe the means whereby the shuttle is caused to change its course correspondingly to the change of position of the needle-foot *f*. Figs. 4, 5, and 6 show the arrangement of the parts underneath the bed-plate P of the machine, the cloth-feeding arrangement being omitted for the sake of clearness, because it is of the usual construction and well understood. The vertical pinion-shaft *c'*, which gears with and is driven by rotation of the shaft *a*, is provided near its lower end with an adjustable eccentric disk, *s*, similar in all respects to the disk *k* on the shaft *j*, before described, having a toggle-lever, *s'*, and being mounted upon a square neck of the shaft, so as to be movable horizontally thereon in its slot s^2. The disk *s* is surrounded by a loose yoke-annulus, s^3, like the annulus *o*, and having a similar rigid arm, s^4. In Fig. 4 the disk *s* is shown concentric upon the axis *c'*, and in Fig. 5 it is eccentric thereon.

Below the disk *s* on the shaft *c'* is the cam P', for operating the cloth-feeding mechanism, and below it is affixed the eccentric disk *t*, which operates the shuttle-lever *d*. The shuttle-lever *d* is pivoted to the under side of the bed-plate P at d^4, and is caused to oscillate by the eccentric *t* through the medium of the mechanism shown in Fig. 6 of the drawings. A pitman, d^3, at one end is connected eccentrically to the disk *t* by a crank-pin, *t'*, and at the other to a lever, d^2. The latter lever connects pivotally at one end with the bed-plate of the machine, and at its other end with a link, *d'*, which forms the connecting-link between the lever d^2 and the rear end of the shuttle-lever *d*. The pin d^4, upon which the lever *d* is pivoted, is mounted upon a slide, *w*, which moves in a suitable groove under the bed-plate P. This slide is pivotally connected with the arm s^4 of the eccentric ring s^3. If, therefore, the adjustable disk *s* be made eccentric on its shaft *c'*, it is evident that its rotation will act on the annulus s^3 so as to impart to the slide *w* and to the lever *d* a longitudinally-reciprocating movement.

Rigidly attached to the slide *w*, and movable backward and forward with it, is a shuttle-race frame, *u*, which is held in position against the under side of the bed-plate P by means of a set-screw, u^2, which passes through a slot, u^3, in the frame into the bed-plate. At the end of this frame *u* is the usual circular shuttle-race, *u'*, which serves as a guide to the shuttle *r* as it moves backward and forward through the loop of the thread from the needle *e*. The consequence is that when the disk *s* is made eccentric the shuttle-race *u* will move backward and forward with the slide *w* and with the shuttle-lever *d*, so as to be always in contact with the shuttle to act as a guide therefor. The action of the eccentric disk *s* is so timed with relation to the eccentric *k* that when the latter is at its highest or lowest po-

sition, and the sliding frame *h* moved either backward or forward to its fullest extent, the throw of the eccentric *s* may also be at its highest or lowest point corresponding to the position of the cam *k*. The shaft *c'*, which drives the eccentric *s*, revolves only one half as fast as does the main shaft *a*, thus giving the cam *s* the same number of revolutions for a given time as has the intermittent cam *k*, which actuates the needle-foot. It will therefore be apparent that the movement of the shuttle *r* and the shuttle-race will exactly correspond with the lateral movement of the needle *e*. The action of the eccentric *s* is also so timed with relation to the eccentric *t*, which oscillates the shuttle-lever, that the former may have moved the lever and the shuttle-race completely forward or backward when the shuttle passes the point where the needle enters the cloth.

The shuttle *r* is shown in Figs. 6, 13, and 14. It is provided with the usual bobbin, R, from which the shuttle-thread is unwound, but it is unlike the ordinary shuttle, in that it is so pointed at each end as to be capable of traversing the loop and of sewing during its forward and backward motion. This is made possible by the gearing of the shaft *c'* with the main shaft *a*, which, as before stated, gives the shuttle-lever only a single movement for each time that the needle enters the cloth. The movement of the shuttle is therefore slow and easy, and by means of this part of our improvement we are enabled to overcome the difficulty in operation which has heretofore proved so objectionable to sewing-machines using a reciprocating shuttle.

The bobbin R is provided with a brake for regulating the tension of the thread which is drawn from it. It consists of a spring, R^2, which extends over a recess in the upper part of the shuttle, whence it is bent downward, so as to press against a fixed washer, R', on the bobbin-shaft R. A set-screw, R^3, passes through the spring into the bottom of the recess, and it is evident that as the former is screwed down it will cause the spring to bear correspondingly upon the face of the washer, so as to exert an adjustable friction and resistance to the rotation of the shaft R.

The arrangement of the shuttle-carrier R^4 also forms a part of our invention. It is mounted upon a neck at the end of the shuttle-lever *d*, and is provided with a spring, R^5, which bears against a shoulder, R^6. A small plate or stop, R^7, is arranged on the end of the lever *d* and seats against the face of the carrier R^4. The spring R^5 keeps the shuttle-carrier against the plate and at a proper distance from the shuttle-race *u'*, to keep the shuttle *r* in position between them. To remove the shuttle the carrier R^4 is pushed away from the shuttle-race and against the spring R^5, thereby releasing the shuttle and rendering the substitution of a fresh one easy. The latter is the purpose of our invention, and its fulfillment does away with a difficulty which has heretofore caused considerable annoyance.

The mechanism for adjusting the eccentric disk *s* is yet to be described. It consists of a vertical shaft, E', which has suitable bearings in the arm *g'* of the machine, and is provided at its base with a gear-wheel, A, which meshes into a gear-wheel, B, of equal diameter and number of teeth. The gear-wheel B fits loosely around the vertical shaft *c'*, and is provided with a screw-shank which works in a female screw within the bearings B' of the shaft *c'*. It is also provided at its base with a coupling-sleeve, B^2, which is rigid to the gear-wheel B and loosely couples it with a collar, G, which is mounted upon an angular shank of the shaft *c'*, so that it will rotate therewith and still be movable upward and downward thereon. The lever which connects with the knee of the toggle-lever *s'* of the disk *s* is also pivoted to the collar G, so that as the collar is depressed it may spread the legs of the toggle and adjust the disk eccentrically upon the shaft *c'*, as before explained with reference to the toggle *n* of the disk *k*. The upright shaft E' is provided with a worm-wheel, E^2, into which meshes a pinion-screw, D. By turning the pinion the shaft E' will be caused to turn and to rotate the pinion B. The threaded shaft of the latter pinion acting on its bearings in B' will force the pinion B and its collar B^2 downward, thus spreading the toggle-lever *s'* and causing the disk *s* to become eccentric upon its axis. Turning the pinion D' in a reverse direction brings the toggle-legs together and makes the disk *s* concentric again. The periphery of the gear-wheel A is made somewhat broad, so that the wheel B may not be thrown out of gear as it moves downward on its shaft.

The upper end of the same shaft E' which operates the toggle-lever *s'* is provided with a beveled pinion, E, which meshes into a beveled gear-wheel, F, on the horizontal shaft *m*. The latter gear-wheel is loosely mounted upon its shaft *m* by a spline or feather, (shown in Fig. 1,) which causes revolution of the shaft E' to turn the shaft *m*, while permitting the latter to move lengthwise without throwing the gearings F and E out of gear.

As before stated, the shaft *m* is screw-threaded at *m'*, so that when it is rotated it will move lengthwise and act upon the toggle-levers *n*, throwing the disk *k* into an eccentric or concentric position. It will therefore be apparent that the same motion of the pinion D which makes an eccentric of the disk *k* will also move the collar G downward, spreading the toggle-links *s'* and making the disk *s* an eccentric. The pitch of the thread *m'* on the shaft *m* is so made that a given rotation of the pinion D will move the shaft *m* and the collar G the same distance, so as to make the eccentricity of both disks *k* and *s* equal. By means of the pinion D the width of the zig-zag stitch can be varied instantly and without slacking the running of the machine, and by

reversing the pinion to its fullest extent both disks can be made concentric and the machine caused to sew a straight stitch. It will be observed that during the side motions of the needle *e*, required for the zigzag stitch, the shuttle *r* moves correspondingly and through the same distance, so that it cannot miss the loop of the needle, and will produce a zigzag stitch on both sides of the cloth.

This machine is also capable of sewing button-holes, overseaming, and darning, and it is evident that if the needle-foot is provided with two needles standing a given distance apart and in a line lateral to the feed of the cloth, so that the loops of the two threads are formed opposite each other on the outer side of the needles lateral to the feed of the cloth, and that if the shuttle-lever *d* be branched off and prolongated from its shoulder R^6, passing below the shuttle and the race, so as to carry a second shuttle of a cresent shape opposite the first shuttle and distanced from it the same distance as the two needles are set apart by the shuttle-race, the machines operating under such conditions will sew two separate straight lines, and eventually, if sewing zigzag stitch, a double zigzag stitch on both sides of the cloth will result, because two needles with their two respective shuttles will participate in the motions.

We are aware that a vibrating needle-bar and a shuttle having devices for regulating or stopping the vibratory movement is described in English Letters Patent No. 2,649 of 1865, and we do not desire to claim the same, broadly.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a sewing-machine, the combination, with a needle and needle-bar, of devices, substantially as described, for imparting to the needle a motion lateral to the feed of the cloth to produce a zigzag stitch, a shuttle, and an oscillating shuttle lever, said lever being pivoted to a pivot which is movable laterally, and means, substantially as described, for imparting movement thereto corresponding to the lateral motion of the needle, substantially as and for the purposes described.

2. In a sewing-machine, the combination, with a needle and needle-bar, of devices, substantially as described, for imparting to the needle a lateral motion, to produce a zigzag stitch, a shuttle, an oscillating shuttle-lever pivoted to a pivot which is movable laterally, corresponding to the lateral motions of the needle, and a shuttle-race attached to the shuttle-lever pivot, so as to be movable therewith, substantially as and for the purposes described.

3. The combination, in a sewing-machine, of a needle and needle-bar, said needle having a reciprocating motion lateral to the feed of the cloth to produce a zigzag stitch, with an oscillating shuttle-lever pivoted to a movable pivot, and an eccentric or crank for imparting to said pivot a reciprocating movement corresponding to the lateral reciprocating movement of the needle, substantially as and for the purposes described.

4. The combination, in a sewing-machine, of a needle and needle-bar, said needle having a reciprocating motion lateral to the feed of the cloth to produce a zigzag stitch, with an oscillating shuttle-lever pivoted to a movable pivot, a disk for imparting to said pivot a reciprocating movement corresponding to the lateral reciprocating movement of the needle, said disk being movable and adjustable eccentrically and concentrically upon its axis, so as to be capable of increasing, diminishing, and stopping the reciprocating motion of said shuttle-lever pivot, substantially as described.

5. In a sewing-machine, the combination, with a needle and needle bar, said needle being movable laterally in the needle-bar, of a slide pivoted with rollers through which the said needle-bar passes, so as to move the needle laterally by the needle-foot striking against the rollers, said slide being movable and having devices, substantially as described, for fixing it at different points, so as to vary the position of the needle in the needle-bar, substantially as and for the purposes described.

6. In a sewing-machine, the combination of a needle-bar, a needle movable laterally in the needle-bar, a slide provided with rollers through which said needle-bar passes, said slide being arranged to move the needle laterally by reason of the needle-foot striking against the rollers thereof, said slide being movable, devices for fixing the slide at different points, so as to vary the position of the needle in the needle-bar, and an eccentric for imparting such motion to said slide, substantially as and for the purposes described.

7. In a sewing-machine, the combination of a needle-bar, a needle movable laterally in the needle-bar, a slide provided with rollers through which said needle-bar passes, said slide being arranged so as to move the needle laterally, by reason of the needle-foot striking against the rollers thereof, said slide being movable, devices for fixing the slide at different points, so as to vary the position of the needle in the needle-bar, an eccentric for imparting such motion to said slide, and intermittently-moving gearing actuating said eccentric, so as to impart alternate periods of motion thereto, substantially as and for the purposes described.

8. The combination, in a sewing-machine, of a needle, a needle-bar, and a shuttle, said needle and shuttle having reciprocating motions laterally to the feed of the cloth, and eccentrics for producing said motion, said eccentrics being adjustably movable, so as to be eccentric or concentric with their axes, substantially as and for the purposes described.

9. The combination, in a sewing-machine, of a needle and its operating mechanism and a shuttle and its operating mechanism, said operating mechanisms being arranged so as to produce reciprocating motions laterally to the

feed of the cloth, eccentric disks *k* and *s*, for producing said motion, said disks being provided with radial slots within which their axes fit, levers for moving the surface of said disks toward and away from their axes, and an adjustable rotary shaft connected with said toggle-levers, so as to actuate them simultaneously, substantially as and for the purposes described.

In testimony whereof we have hereunto set our hands this 24th day of November, A. D. 1884.

WILLIAM HENRY GARLAND.
HERMANN SCHULZE-BERGE.

Witnesses:
W. B. CORWIN,
T. W. BAKEWELL.