No. 618,373. Patented Jan. 24, 1899.

J. E. BERTRAND.

SEWING MACHINE.

(Application filed June 8, 1898.)

(No Model.) 5 Sheets—Sheet 1.

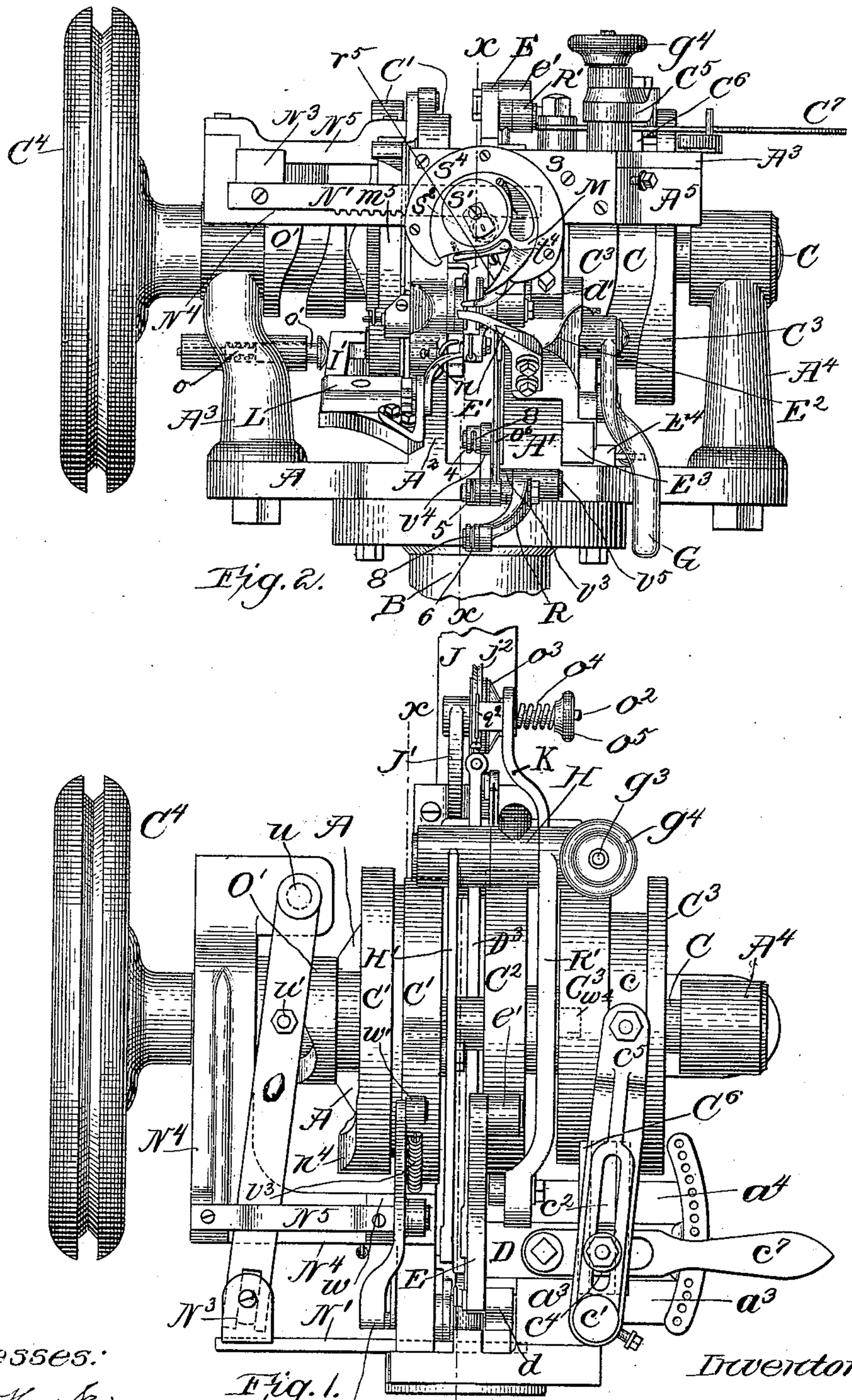

Fig. 2.

Fig. 1.

Witnesses:
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(No Model.) 5 Sheets—Sheet 2.

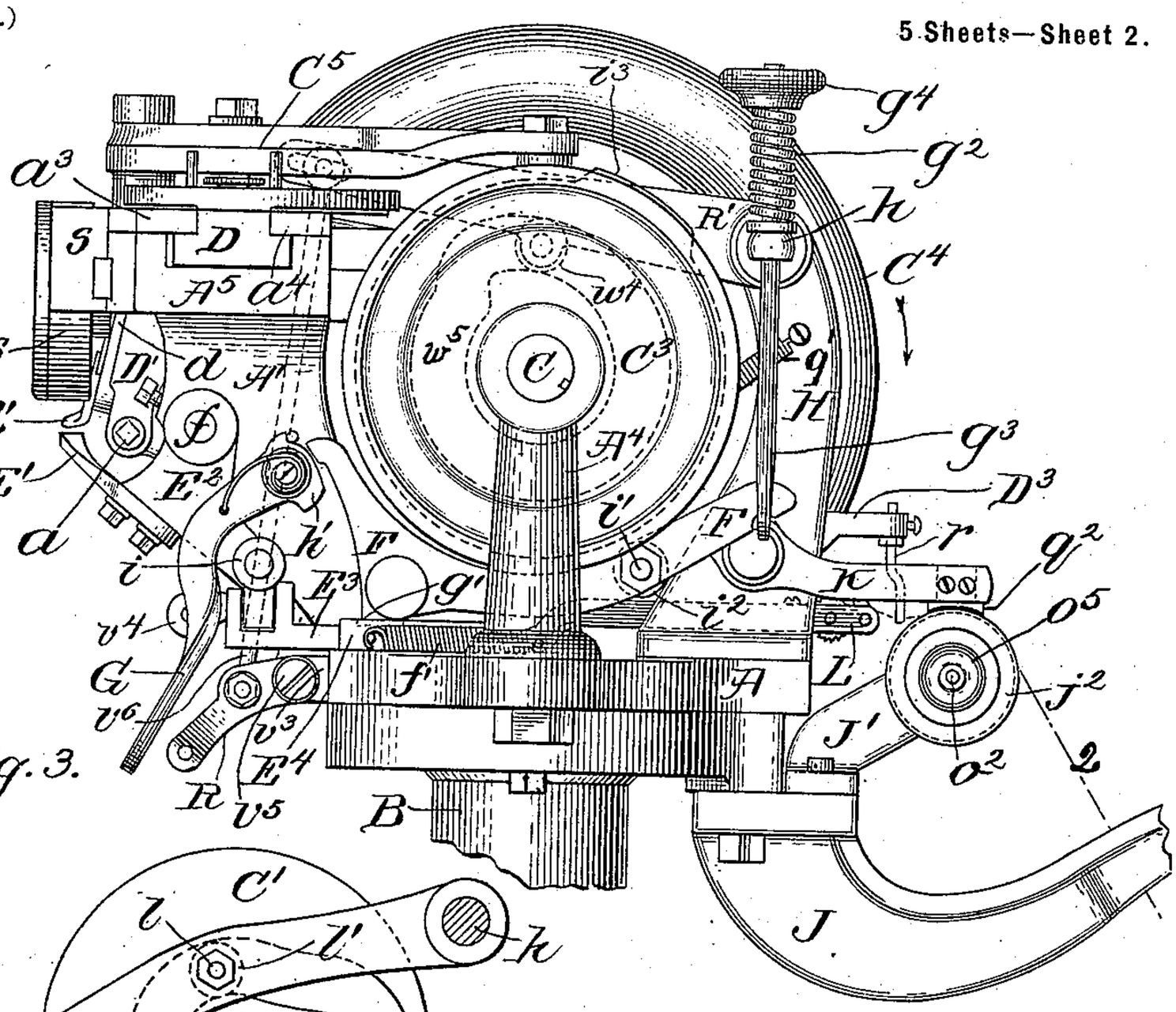

Fig. 3.

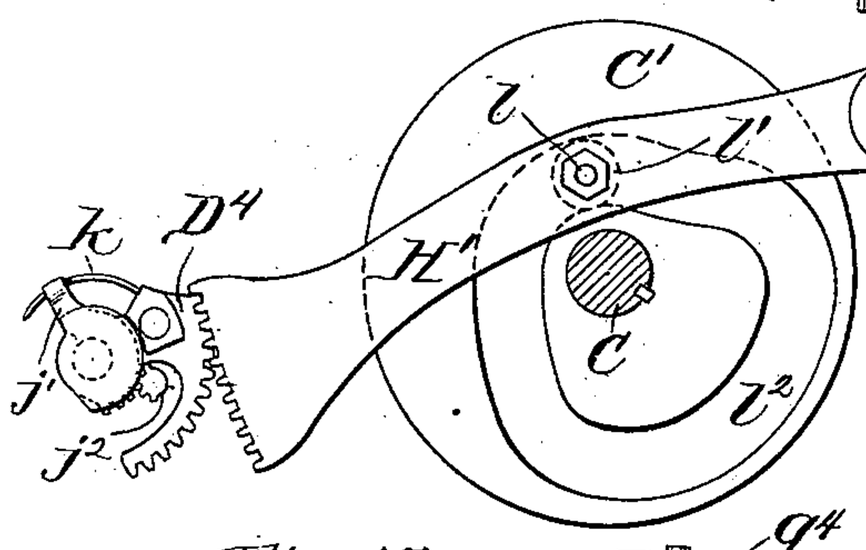

Fig. 15

Fig. 16.

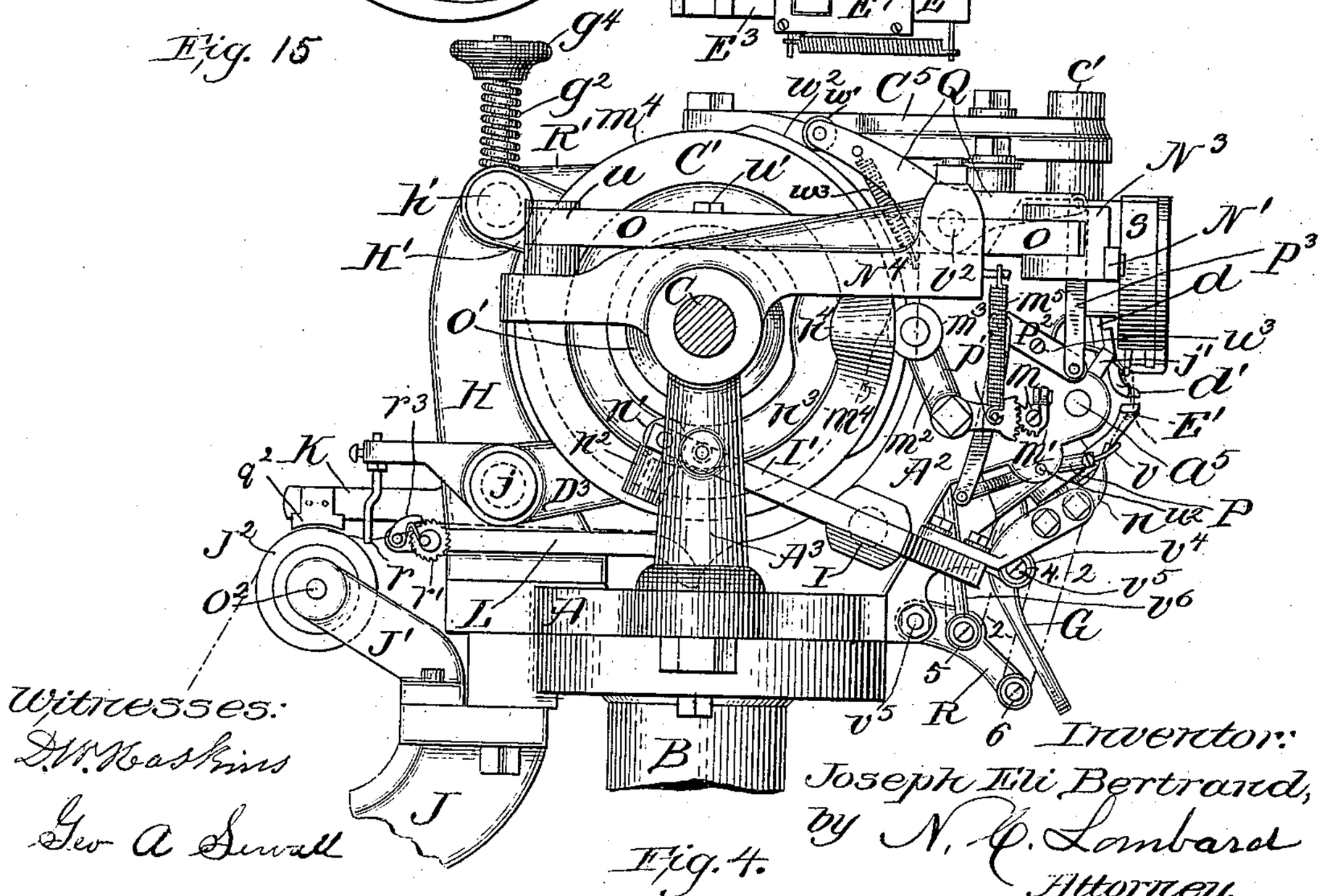

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Fig. 4.

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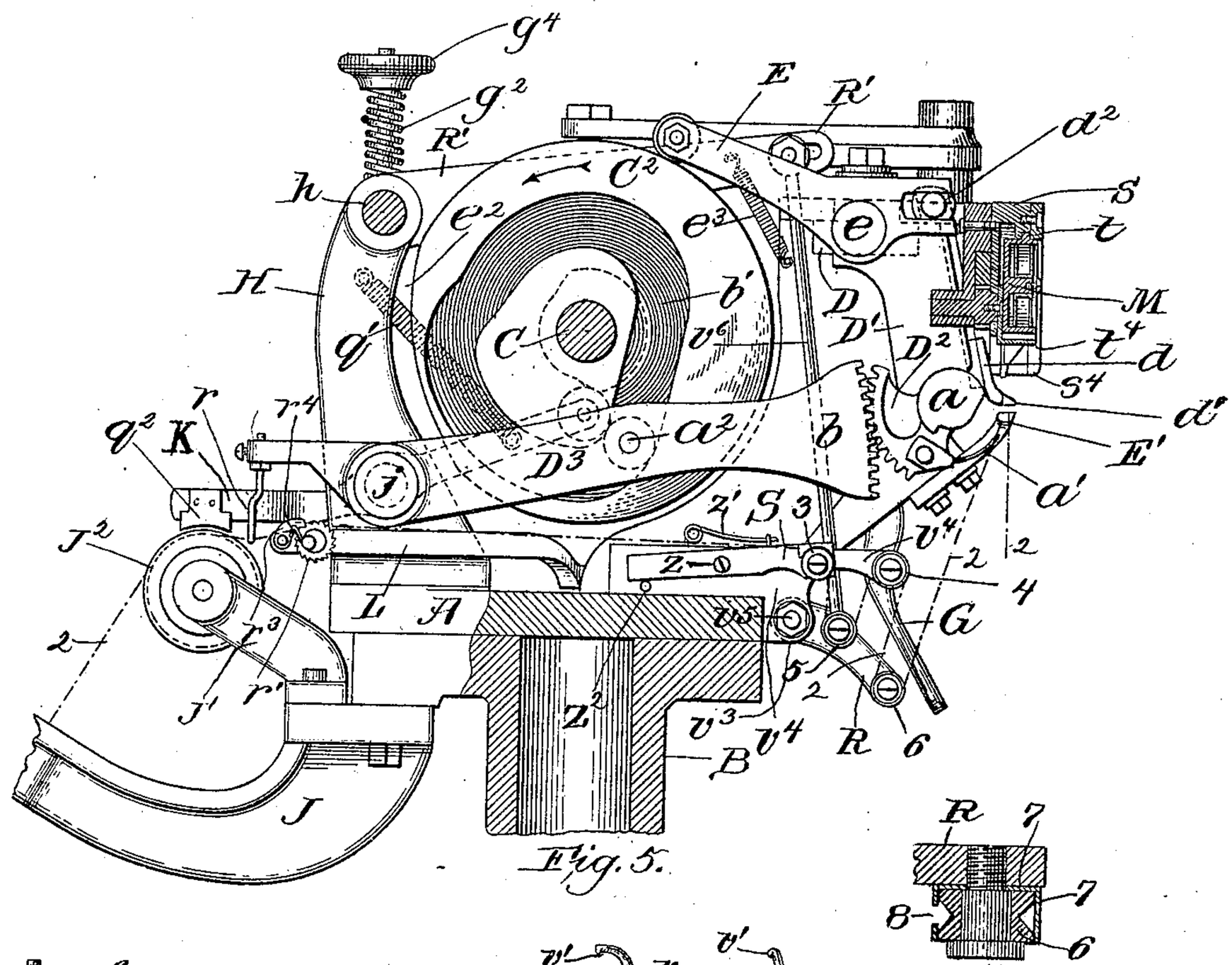
SEWING MACHINE.

(Application filed June 8, 1898.)

(No Model.) 5 Sheets—Sheet 3.



Witnesses:

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(Application filed June 8, 1898.)

(No Model.) 5 Sheets—Sheet 4.

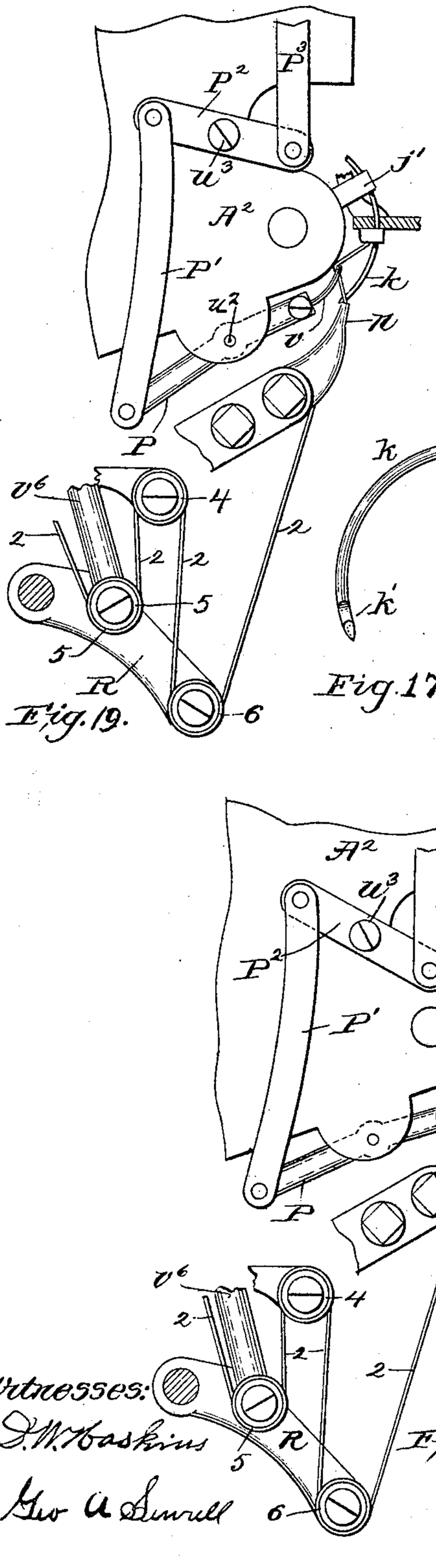

Fig. 19.

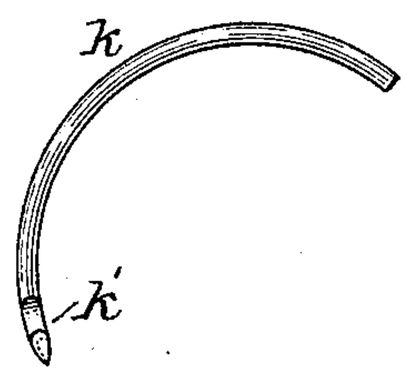

Fig. 17.

Fig. 18.

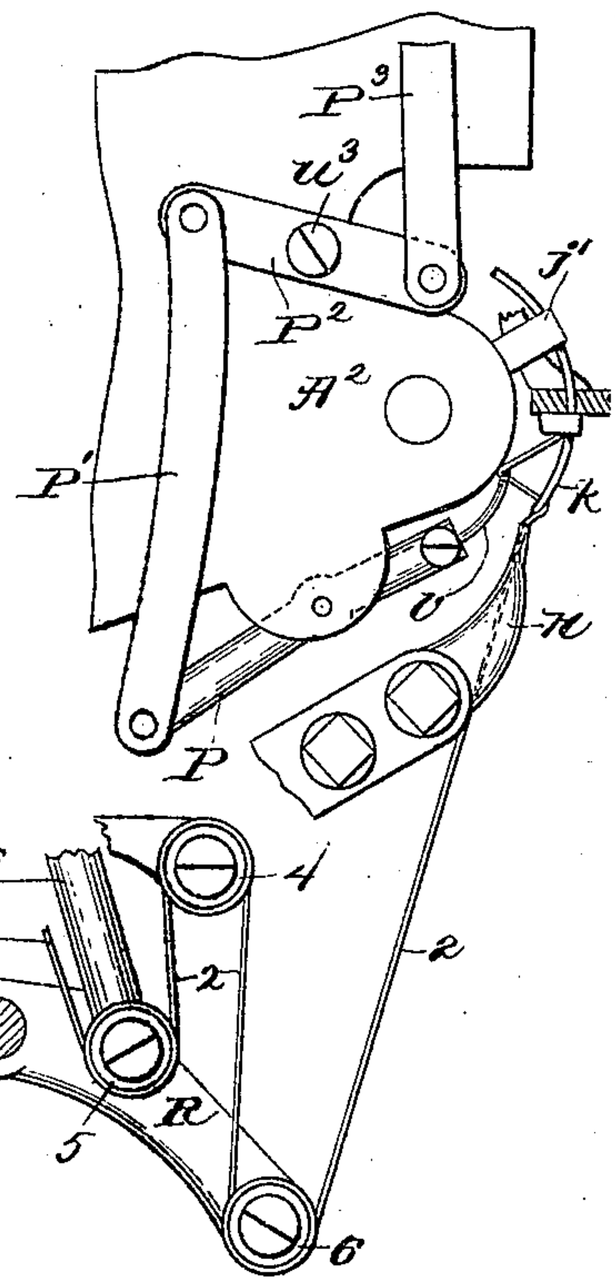

Fig. 20.

Fig. 21

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SEWING MACHINE.

(Application filed June 8, 1898.)

(No Model.)

5 Sheets—Sheet 5.

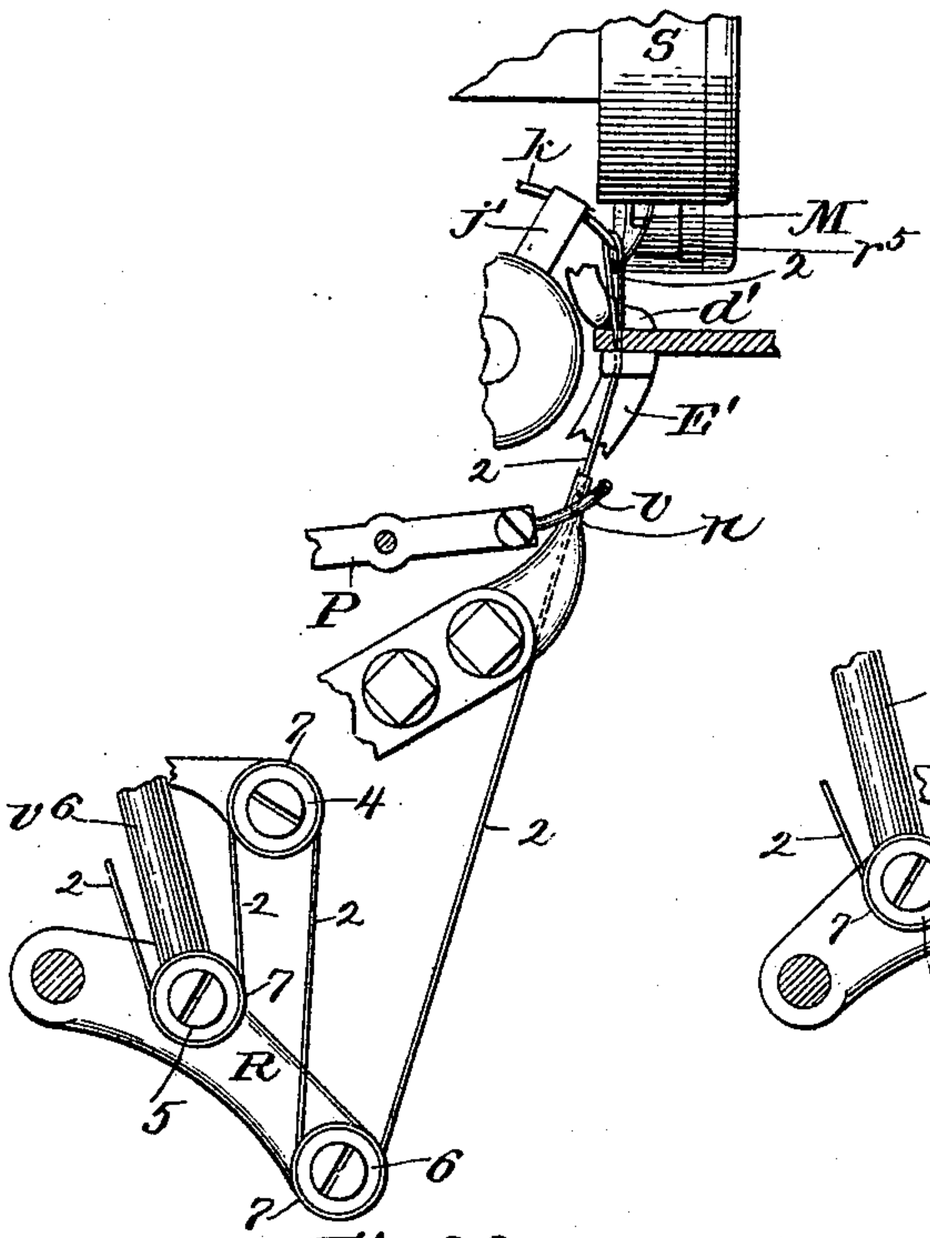


Fig. 25 Fig. 22.

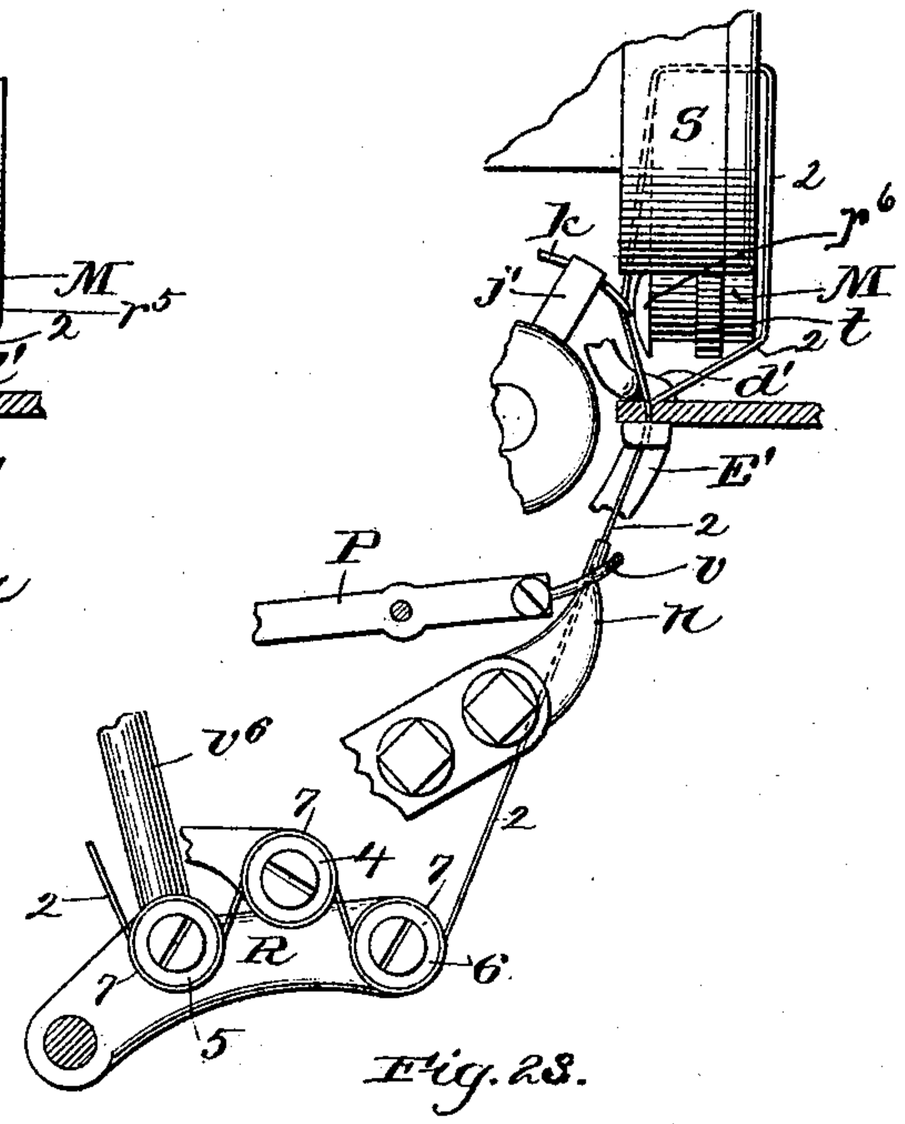


Fig. 23.

Fig. 27.

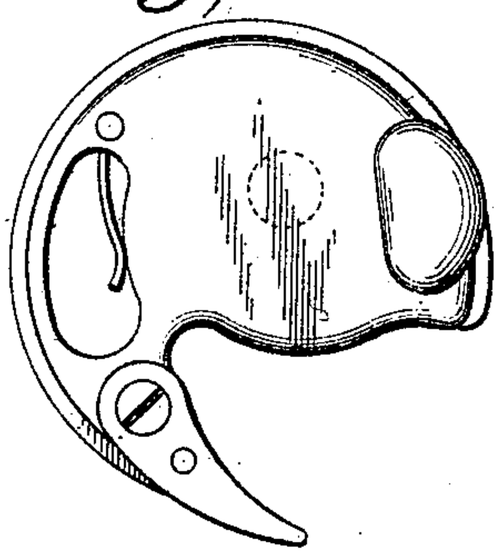
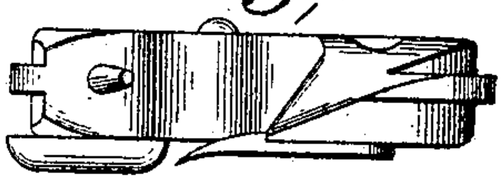


Fig. 26



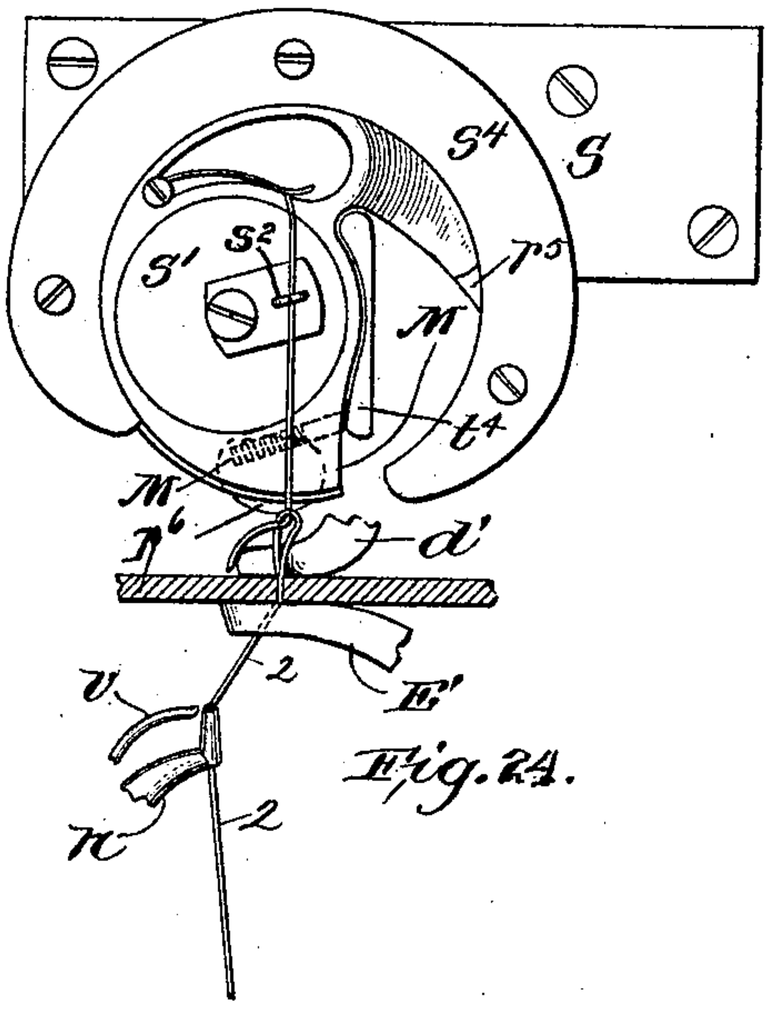
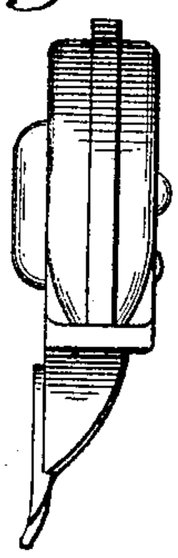


Fig. 24.



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Inventor:

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UNITED STATES PATENT OFFICE.

JOSEPH ELI BERTRAND, OF BOSTON, MASSACHUSETTS.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 618,373, dated January 24, 1899.

Application filed June 8, 1898. Serial No. 682,928. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH ELI BERTRAND, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Waxed-Thread Sewing-Machines, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to waxed-thread sewing-machines, and to that particular class of such machines which are used for stitching outer soles to welts by what is known as a "lock-stitch;" and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the accompanying drawings and to the claims hereto appended, and in which my invention is clearly pointed out.

Figure 1 of the drawings is a plan of the head of a sewing-machine, illustrating my invention. Fig. 2 is a front elevation of the same. Fig. 3 is an elevation of the right-hand side of said head. Fig. 4 is an elevation of the opposite side. Fig. 5 is a sectional elevation, the cutting-plane being on line *x x* on Figs. 1 and 2 and looking toward the right of said figures. Fig. 6 is a rear elevation of the shuttle-race, the rack, and the pinion for operating the shuttle-carrier removed from the frame and drawn to an enlarged scale. Fig. 7 is a section on line *y y* on Fig. 6. Figs. 8 and 9 are respectively a plan and an elevation of a portion of the rear end of the arm L, its thread-guiding sheave, and the sheave-locking device, drawn to a still larger scale. Figs. 10 and 11 are respectively an elevation and a section of one of the thread-guiding sheaves on the stitch-setting arm. Figs. 12 and 13 are respectively a rear elevation and a side elevation of the thread-finger and its lever. Fig. 14 is an elevation of the thread-measuring fork, looking toward the front of the machine. Fig. 15 is an elevation of the needle-segment, the lever and cam for operating the same, the needle-guide, and the inner gear-segments for operating the same. Fig. 16 is a plan of the sliding bar E^2 and its sheave-carrying arm. Figs. 17 and 18 are two elevations of the needle. Figs. 19, 20, 21, 22, 23, and 24 are illustrative diagrams to be hereinafter referred to. Fig. 25 is a rear elevation of the shuttle removed from the machine. Figs. 26 and 27 are edge views of the same.

In the drawings, A is the base-plate of the frame of the machine-head, having formed in one piece therewith the two upwardly-projecting plate-like standards A′ and A^2 and firmly secured to a supporting-column B of any suitable construction. The base-plate A has set therein the columns A^3 and A^4, provided at their upper ends with suitable bearings, in which is mounted the shaft C, upon which are mounted between said bearings the three cam-disks C′, C^2, and C^3, which are firmly secured thereto in fixed positions, so as to revolve therewith, and said shaft has also secured thereon, outside of the column A^3, the driving-wheel C^4, which receives a suitable belt for operating the machine by power and by which the machine may be operated by hand when desired.

The standard A′ has formed integral therewith at its upper end the laterally-projecting branch A^5, in the upper side of which is a suitable groove parallel to the axis of the shaft C, in which is fitted so as to be movable endwise therein the feed-slide D, the inner end of which has formed thereon or secured thereto the pendent arm D′, in the lower end of which is firmly secured a stud *a*, upon which is mounted the segment D^2, with the teeth of which the gear-segment *b*, formed on the front end of the lever D^3, engages to impart an oscillating motion to the segment D^2 and the awl *a′* as said lever D^3 is vibrated by the action of the cam-path *b′*, formed in the side of the cam-disk C^2, upon a truck mounted at a^2 upon a stud set in said lever, as shown in Fig. 5, all in a well-known manner.

The feed-slide is confined in the groove in the standard A′ A^5 by the cap-plates a^3 and a^4 and has an intermittent reciprocation imparted thereto to feed the work by the action of the cam-path *c* in the periphery of the disk C^3 upon a truck carried by the rear end of the lever C^5, fulcrumed at *c′* on the cap-plate a^3 and provided with a longitudinal slot c^2, in which is adjustably mounted a pin c^3, the lower end of which enters a block c^4, set in a slot in the plate c^6, firmly secured to said feed-slide at right angles thereto, said pin and block being adjusted by means of

the lever c^7 to vary the feed and regulate the length of the stitch in a well-known manner.

The pendent arm D′ has mounted on its front face, so as to be movable endwise thereon, the plate d, to the lower end of which is secured the presser-foot d', and having set in its upper end a stud, upon which is mounted the block d^2, which is engaged by the forked front end of the lever E, fulcrumed at e upon the inner end of the feed-slide D and carrying at its rear end the truck e', which is acted upon by the face-cam e^2, formed upon the periphery of the cam-disk C^2 to force the presser-foot downward upon the work, said presser-foot being raised by the reaction of the spring e^3, all in a well-known manner.

E′ is the work-support, adjustably secured to the lever E^2, pivoted at f to the standard A′, and engaged at its lower end by the forked front end of the bar E^3, fitted to and movable endwise in a guideway E^4, secured to the base-plate A, said bar being pressed toward the front of the machine by the tension of the spring f', thereby moving the front end of the work-support E′ upward to clamp the work between it and the presser-foot.

The top plate of the guideway E^4 has cut through it a rectangular opening, in which is placed a steel plate g, which rests upon the bar E^2 and is pressed hard upon said bar to lock it against rearward movement by the heel or point g' of the lever F being forced downward by the tension of the spring g^2, surrounding the upper portion of the rod g^3 between the nut g^4 and the pin h, through which said rod passes, said rod being connected at its lower end to the rear end of the long arm of said lever F, as shown.

The front arm of the lever F projects forward and upward, as shown in Fig. 3, and is acted upon by the lifter-toe h', formed upon the hand-lever G, to release its locking-grip when it is desired to insert or remove the work, said hand-lever also acting upon a truck i, mounted upon a stud set in the lower end of the lever E^2 to move said lever about its fulcrum and depress the work-support against the tension of the spring j'. The rear or long arm of the lever F has mounted on a stud set therein at i' the truck i^2, which is acted upon at a given time in each revolution of the shaft C by a cam-surface i^3 on the periphery of the inner portion of the cam-disk C^3 to automatically release the locking-grip of said lever F.

The lever D^3, which operates the awl-segment, is fulcrumed upon a stud j, set in the stand H, firmly secured to the base-plate A at the rear of the cam-disk C^2, as shown in Fig. 5.

The standard A^2 has firmly secured therein, in axial line with the stud a, upon which the awl-segment is mounted, the stud a^5, upon which are mounted so as to be revoluble thereon the needle-segment D^4 and the needle-guide j'.

The needle-segment D^4 has firmly clamped thereto the curved barbed needle k, which is provided with a barb k' on its right-hand side, as viewed from the front of the machine, and with a shallow groove k^2, extending from said barb toward the point of the needle, the effect of which is that the two portions of the loop of thread drawn up through the work by the needle are in a vertical plane at right angles to the plane of movement of the point of the shuttle, and said loop is slightly opened by the action of the grooved end portion of the needle upon the front strand of said loop when said needle is in its uppermost position, so that the shuttle may enter, open, and pass through said loop without the aid of any other loop-opener.

The needle-segment D^4 is engaged by the teeth of the gear-segment formed on the front end of the lever H′, fulcrumed at h on the stand H and provided between its two ends with a stud l, carrying a cam-truck l', which engages with and is acted upon by the path l^2, formed in the side of the cam-disk C′, to impart an oscillating movement to the needle-segment to cause the needle to enter and be withdrawn from the work in a well-known manner.

The needle-guide j' has formed thereon a toothed segment, which is engaged by the segment or pinion j^2, formed upon or secured to the inner end of the short shaft m, having a bearing in the standard A^2 an dhaving secured upon its outer end the gear-segment m', which is engaged by a gear-segment formed on the front end of the lever m^2, fulcrumed on the standard A^2, and carrying at its rear or upper end the truck m^3, which is acted upon by a cam-surface m^4, formed upon the periphery of the cam-disk C′, to vibrate said lever and move the needle-guide, the truck m^3 being held in contact with said cam by the tension of the spring m^5, all in a well-known manner.

The standard A^2 has set therein a forked headed stud I, so as to be movable about its axis, and has pivoted in said forked head the lever I′, carrying at its front end the looper n and at its rear end the cam-trucks n' and n^2, arranged with their axes at right angles to each other, the former of which enters and is acted upon by the cam-path n^3, formed in the outer side of the cam-disk C′, and the latter is acted upon by the side face-cam n^4, formed upon the outer side of said cam-disk C′, said truck n^2 being held in contact with said face-cam by the tension of the spring o, acting upon the plunger o', set in a bearing in the column A^3, as shown in Figs. 2 and 4, mostly in dotted lines.

J is a bracket bolted to the under side of the flange of the column B and projecting to the rear therefrom to serve as a support for the wax-pot, which, with the rear portion of said bracket, is not shown. A smaller bracket J′ is bolted to the bracket J and has mounted therein the spindle o^2, upon which is mounted

the tension-wheel J^2, the pressure-disk o^3, the spring o^4, and the spring compressing or adjusting nut o^5, all of well-known construction.

K is a lever fulcrumed upon the same stud j which forms the fulcrum of the lever D^3, but upon the opposite side of the stand H from said lever D^3 it has a vibratory motion imparted thereto by the action of the face-cam q, formed on the hub of the cam-disk C^2, upon a truck carried by the forward end of said lever and the tension of the spring q', said spring and cam being shown in dotted lines in Fig. 5. The rear end of said lever K has secured thereto the plate q^2, which when depressed serves as a brake-shoe to press upon the thread 2 within the groove of the tension-wheel to prevent thread being drawn therefrom when the shuttle is passing through the loop and when the stitch is being set.

The lever D^3, which operates the awl-segment, has a short arm projecting to the rear from its pivotal connection to the stand H, in the rear end of which is adjustably secured by a set-screw or other suitable means the pendent rod r, having its lower end forked or provided with a V-shaped notch to engage the thread 2 between the tension-wheel J^2 and the thread-guiding sheave r' and press said thread downward from a straight line into a V shape, and thus draw off from the tension-wheel and from the wax-pot the required amount of thread for the next stitch.

The sheave r' is mounted upon the screw-stud r^2, set in the rear end of the arm L, formed in one piece with or secured to the sliding bar E^3, as shown in Figs. 8, 9, and 16. The sheave r' has formed upon its periphery, at one side of its thread-receiving groove, a series of ratchet-teeth, with which the stop-pawl r^3 engages to prevent a rearward movement of the top of said sheave when the notched thread-measuring rod r descends to draw thread from the tension-wheel, and a looped-wire thread-guard r^4 is secured to said arm L in position to prevent the thread being displaced from said sheave, all as shown in Figs. 8 and 9.

M is the shuttle, provided with a hook r^5 and with the rearwardly-projecting convex loop-spreading boss r^6 (see Figs. 23 and 24) and mounted on the shuttle-race s, so as to be movable about its axis in both directions, and having formed therein a circular chamber to receive the thread-holding bobbin s', provided with the thread-guiding eye s^2, concentric with the axis of motion of said shuttle, as shown in Fig. 2. The shuttle race or holder is firmly secured in a fixed position to the upper portions of the standards A' and A^2 and has formed in its front side a chamber M', the inclosing side walls of which extend around about four-fifths, more or less, of a complete circle, being open at the bottom and provided with the inwardly-projecting lip s^3, which, with the cap-segment s^4, embraces the outwardly-projecting peripheral lip t of the shuttle, as shown in Figs. 5 and 7.

The rear or back plate of the shuttle-race has firmly secured thereto the stand N, in bearings in which and in said back plate is mounted the short shaft t', to which is firmly secured the shuttle-carrier t^4, and having formed thereon or secured thereto the pinion p^2, which is engaged by the toothed rack N', mounted in guideways in said stand N, the block N^2, and the rear face of the shuttle race or casing s, as shown in Figs. 6 and 7.

The rack N' has formed upon or secured to one end thereof the forked or slotted block N^3, between the ears of which is pivoted the block t^3, which is engaged by the forked front end of the lever O, fulcrumed at u and resting near its front end upon the horizontal plate or bar N^4, formed in one piece with the column A^3 and secured at its right-hand end to the standard A^3, said bar N^4 having secured thereto the cap-bar N^5 to compel said lever O to move in a straight horizontal direction as it is vibrated by the action of the cylinder-cam O', fast on the shaft C, the path of which engages a truck mounted on a stud set in the under side of said lever O at u'.

The standard A^2 has pivoted thereto at u^2 the lever P, having adjustably secured in its upper end the curved thread-finger v, provided at its end with the rearwardly-projecting rounded hook v', which engages the thread 2 between the looper and the work-support and carries it to the rear, said hook moving in an arc of a circle in a plane parallel with and in near proximity to the plane of movement of said needle, as shown in Fig. 19, and holds it in said retracted position until the looper n has carried said thread around the needle and deposited it in the notch of the needle-barb, the lower or rear end of said lever P having pivoted thereto one end of the link P', the other end of which is pivoted to the rear end of the lever P^2, fulcrumed on a stud u^3, set in a standard A^2 and having pivoted to its other end one end of the link P^3, the other end of which is pivoted to the front end of the lever Q, fulcrumed upon a stud v^2, set in an ear w, projecting upward from the bar N^4 and carrying at its rear end the truck w', which is acted upon by the face-cam w^2, formed upon the periphery of the cam-disk C' to move said lever Q about its fulcrum in one direction, the spring w^3 serving to hold said truck in contact with said cam and move said lever in the opposite direction.

The base-plate A has formed upon its front edge near the standard A' an outwardly-projecting ear v^3, to which is firmly secured in a fixed position the stand-like plate v^4 by means of the horizontal stud v^5, upon which is mounted, so as to be movable about said stud, the lever R, to which is pivoted one end of the link or rod v^6, the upper end of which is pivoted to the front end of the lever R', fulcrumed at its rear end on the pin h and carrying between its two ends a cam-truck w^4, which fits into and is acted upon by the path-

cam v^5 formed in the side of the cam-disk C^3, but shown only in dotted lines in Fig. 3. The plate v^4 has pivoted thereto at z the lever S, having set in its front end a fixed stud upon which is mounted the revoluble thread-guiding sheave 3, said lever being normally held by the tension of the spring z' with its front end in the raised position and its rear end in contact with the stop-pin z^2, as shown in Fig. 5. The front end of the plate v^4 has mounted thereon the sheave 4, and the lever R has mounted upon studs set therein the sheaves 5 and 6, as shown in Figs. 2, 4, 5, and 19. Each of the sheaves 4, 5, and 6 is inclosed in cup-like casings 7, which are clamped to the plate v^4 and lever R, respectively, so as to be non-revoluble relative thereto, and are provided with peripheral slots 8, through which the thread 2 passes to and from said sheaves, as shown in Figs. 2, 4, 5, 11, and 19. The thread 2 after leaving the wax-pot (not shown) passes to and once around the tension-wheel j^2, thence to and once around the sheave r', thence over the sheave 3, under the sheave 5, over the sheave 4, under the sheave 6, then through the eye of the looper, and thence to the work, as shown by the dotted line 2 in Figs. 3, 4, and 5.

The operation of my invention is as follows: The several parts of the machine being in the positions shown in Figs. 1, 2, 3, 4, and 5 of the drawings, the operator presses the lever G toward the rear to raise the front end of the lever F and unlock the bar E^3 and retract said bar to depress the work-support E'. The work is then placed upon the work-support and beneath the presser-foot d', when the lever G is released and the reaction of the spring f' causes the work to be firmly clamped between the presser-foot and said work-support, and the tension of the spring g^2 causes the locking-lever F to firmly lock said bar E^3 against backward movement, and thus firmly hold the work-support in said clamped position. Now if the wheel C^4 be revolved in the direction indicated by the arrows on Fig. 3 the first effect produced is to move the shuttle M from the position shown in Fig. 2 to the position shown in Fig. 24, during which time the awl a' has pierced the work from below. The shuttle then returns to the position shown in Fig. 2, during which time the needle remains in its uppermost position and the upper end of the thread-finger v is moved backward, describing an arc of a circle in a plane parallel with and in near proximity to the plane of movement of said needle, engaging the thread between the work and the looper and bending it out of a straight line, as shown in Fig. 19, thereby placing it in a better position to insure its being laid into the barb of the needle at the proper time. At this time the thread 2 extends from the top of the tension-wheel J^2 to the top of the sheave r' in a straight line and the brake-shoe q^2 is pressed upon the thread on said tension-wheel to firmly clamp said thread thereto and prevent it being pulled therefrom or from the wax-pot. The feed-slide D, the awl, and its carrier are then moved toward the left to feed the work until the awl and needle occupy the same vertical plane, the presser-foot d' having been previously raised to relieve the pressure on the work by the reaction of the spring e^2 acting upon the lever E. The brake-shoe is now raised to relieve the pressure upon the thread on the tension-wheel, and simultaneously the needle begins to descend or move toward the work, and when the point of the needle has nearly reached the point of the awl the awl begins to recede and the needle follows it through the same hole from which the awl is being withdrawn until the needle has reached the limit of its downward movement, which is a little in advance of the completion of the downward movement of the awl, during which time the thread-measuring fork r has descended upon the thread 2 between the sheave r' and the tension-wheel J^2 and depressed it, so as to draw from said tension-wheel and the wax-pot a sufficient amount of thread for the next stitch, the thread-guiding sheave r' being locked by the pawl r^3 against rearward revolution, so that the thread cannot be drawn from the slack at the front of the machine. The looper is now carried around the end of the needle to lay the thread into the barb thereof, as shown in Fig. 20, during which operation the needle and awl both begin to move upward and the thread-finger v moves forward into the position shown in Fig. 21, when the bight of thread carried thereby is discharged therefrom by said forward movement, and as the thread-measuring fork r is carried by the same lever D^3 which imparts motion to the awl-segment said fork begins to rise at the same time that the awl begins to move upward. The needle continues its upward movement, carrying in its barb a loop of thread, till it reaches the limit of its upward movement, as shown in Fig. 22, at which time the brake-shoe has descended upon the thread to clamp it to the tension-wheel to prevent the thread being drawn from said tension-wheel and the wax-pot while the shuttle is opening and passing through the loop of thread held by the barb of the needle. The upward movement of the awl is arrested before its point reaches the level that would be occupied by the upper surface of the work-support when in its lowest position, so that the work may be inserted between the presser-foot and work-support by depressing said support by means of the hand-lever G without being obstructed by the awl. The shuttle is now moved forward, the point of its hook, which occupies and moves in a plane parallel to and at the rear of the rear face of the shuttle, entering between the two strands of the loop held by the barb of the needle, as shown in Fig. 23, and opens said loop without the aid of any other loop-opener and passes

through the same, drawing thread from the sheaves 4, 5, and 6 to supply the amount necessary for the enlargement of the loop through which the shuttle is passing, an upward movement of the lever R at this time giving off the necessary thread for the purpose without drawing from the tension-wheel. When the shuttle has finished its forward movement and is in the position shown in Fig. 21, the lever R is moved suddenly downward to discharge the loop from the shuttle and the barb of the needle and to set the stitch, the thread being clamped to the tension-wheel, so that no thread can be drawn therefrom by said downward movement of the lever R.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a lock-stitch sewing-machine, the combination with a curved barbed needle and a curved awl, constructed and arranged to enter the work from opposite sides thereof, a looper for delivering the thread to the barb of the needle; and means for feeding the work, while the awl is inserted therein, of a stitch-setting lever an oscillating shuttle arranged to move in a plane at right angles to the plane of reciprocation of said needle, said shuttle having the point of its hook in a plane at the rear of and parallel to the rear surface of the main body of the shuttle, and also at a greater distance from its axis of motion than the main body of said shuttle, and in position to intersect the path of said needle, and provided upon its rear face at its periphery and about ninety degrees from the point of its hook, with a convex boss, or rearward projection, adapted to increase the expansion of the loop just at the end of the forward movement of the shuttle and thus assist the discharge of the thread from the barb of the needle, when the stitch-setting lever is moved downward to draw the loop from the shuttle; and means for imparting to said shuttle a forward movement of about three-fourths of a revolution, and a corresponding backward movement, with a standstill at the end of each movement.

2. In a lock-stitch sewing-machine, the combination with a curved barbed needle and a curved awl, constructed and arranged to enter the work from opposite sides thereof, a looper for delivering the thread to the barb of the needle; and means for moving the awl laterally to feed the work, of an oscillating shuttle arranged to move in a plane at right angles to the plane of reciprocation of said needle, with the point of its hook in a position to intersect the path of the needle; a raceway for said shuttle a pinion and its shaft mounted in a fixed bearing; a shuttle-carrier secured to said pinion, within said raceway; a reciprocating rack mounted in fixed bearings; a lever and cam, for reciprocating said rack, proportioned and timed to impart to said shuttle a forward movement of substantially three-fourths of a revolution, and a corresponding backward movement, with a standstill after each movement.

3. In a lock-stitch sewing-machine the combination with a curved barbed needle, a curved awl, an awl work-feeding mechanism, a looper, and mechanism for moving said looper around the needle, of mechanism for imparting to said needle downward and upward strokes, each complete in a single movement, with a standstill after each movement; a fixed raceway, located above the needle; a shuttle mounted in said raceway and arranged to oscillate in a plane at right angles to the plane of reciprocation of said needle, with the point of its hook in a plane at the rear of and parallel to the plane of the rear face of said shuttle, and at a greater distance from the axis of revolution of said shuttle than the periphery of the main body of the shuttle and in position to intersect the path of the needle; and means for imparting to said shuttle intermittent movements, in opposite directions, through arcs approximating two hundred and seventy degrees.

4. In a lock-stitch sewing-machine, the combination with a curved barbed needle, a curved awl, an awl work-feeding mechanism, a looper and mechanism for moving said looper around the needle, of mechanism for imparting to said needle downward and upward strokes, each complete in a single movement, with a standstill after each movement; a fixed raceway located above the needle; a shuttle mounted in said raceway, and arranged to oscillate in a plane at right angles to the plane of reciprocation of said needle, with the point of its hook in a plane at the rear of the plane of the rear face of said shuttle and in position to intersect the path of the needle, and provided with a bobbin-receiving chamber, a thread-delivering orifice through the wall of said chamber, and a thread-guiding eye located in the axial line of said shuttle, said thread-delivering orifice and thread-guiding eye both always lying in a plane cutting longitudinally through the axis of said shuttle and which plane is substantially vertical when said shuttle has completed its forward movement; and means for imparting to said shuttle a forward movement, of approximately three-fourths of a revolution, and a corresponding backward movement, with a standstill after each movement.

5. In a lock-stitch sewing-machine the combination with a curved barbed needle; a curved awl, means for reciprocating said needle and awl, an awl work-feeding mechanism, a looper and means for moving the thread-carrying end of said looper around the end of the needle when in its lowest position, a thread-manipulating finger; means for operating the same, coöperating with the other elements of the stitch-forming mechanism to discharge the thread from the barb of the needle; an oscillating shuttle mounted in a suitable raceway above said needle with the point of its hook in position to intersect the path of the needle, and in a plane at the rear

of the rear face of the main body of said shuttle, and at a greater distance from its axis of motion than the periphery of the main body of said shuttle; means for imparting to said shuttle a forward and a backward movement through an arc of about two hundred and seventy degrees with a period of rest after each movement and means to maintain the needle in a fixed position, at the extreme of its upward movement while the shuttle makes both its forward and backward movement.

6. In a lock-stitch sewing-machine the combination with a curved needle provided with a barb upon its side toward which the shuttle moves to enter the loop, a curved awl, means for reciprocating said needle and awl, an awl work-feeding mechanism, a looper and means for carrying the thread-carrying end of said looper around the end of the needle when in its lowest position, an oscillating shuttle constructed and arranged to enter, open, and pass through the loop of thread, drawn through the work by the needle, a brake or clamping device to prevent the thread being drawn from the source of supply while the shuttle is passing through the loop of thread held by the barb of the needle; a pivoted sheave-carrying lever; a system of thread-guiding sheaves arranged between said clamping device and the work-support, and means for intermittently vibrating said sheave-carrying lever, constructed, arranged and timed to raise said lever while the shuttle is passing through the loop, to give off thread to enlarge said loop, and then move said lever abruptly downward when the shuttle has completed its forward movement, to set the stitch.

7. In a lock-stitch sewing-machine the combination of a curved needle provided with a barb upon the side thereof toward which the point of the shuttle-hook moves to enter the loop of thread held thereby, and with a groove on its front or convex side extending in a straight line from said barb to its point; means for reciprocating said needle in a curved path; an oscillating shuttle located above said needle with the point of its hook in position to intersect the path of said needle; and means for intermittently oscillating said shuttle whereby said shuttle is adapted to enter, open and pass through the loop of thread held by the barb of said needle.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 6th day of June, A. D. 1898.

JOSEPH ELI BERTRAND.

Witnesses:
N. C. LOMBARD,
E. H. TANSEY.