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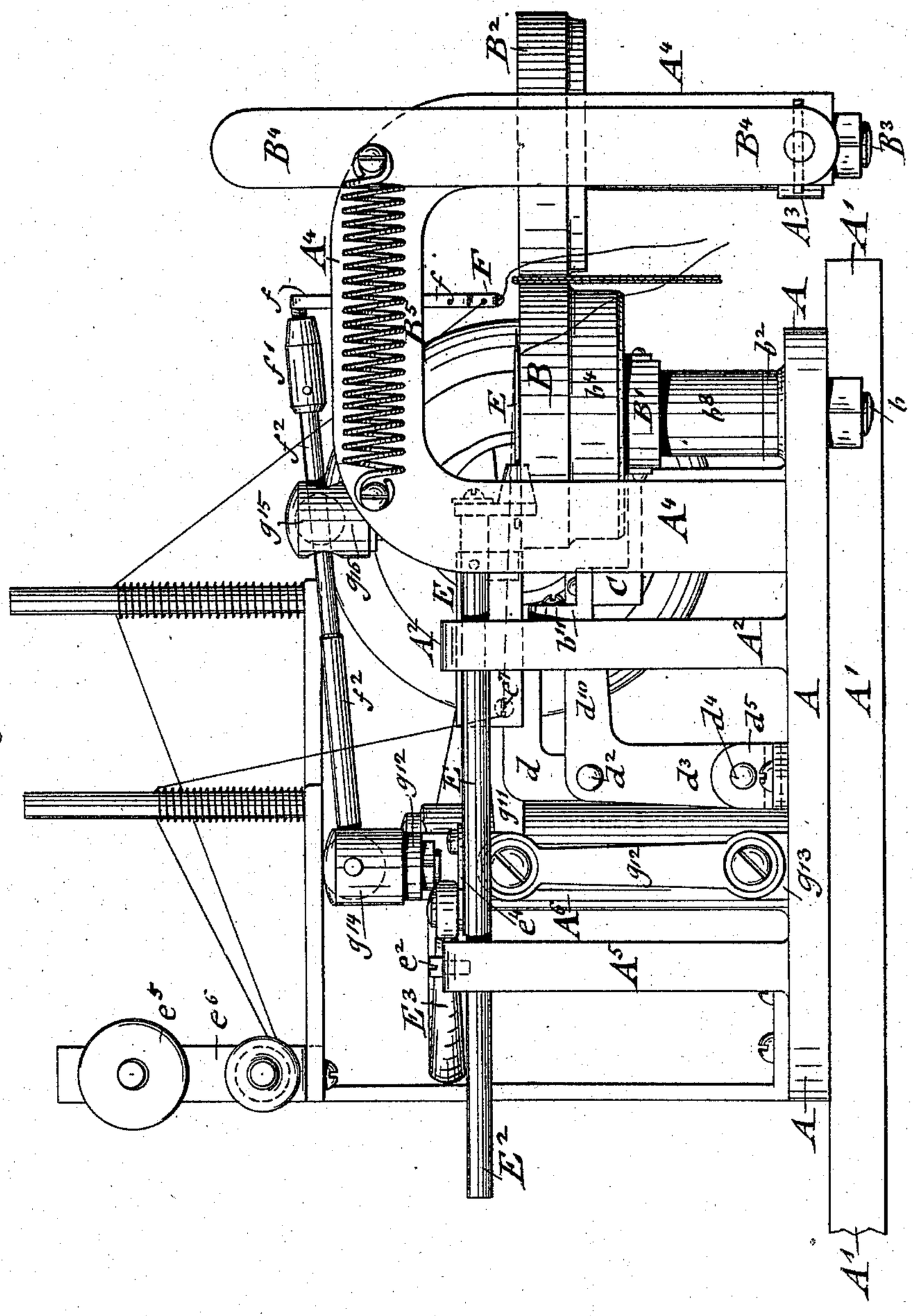
H. A. KLEMM.

OVEREDGE SEWING MACHINE.

No. 571,322. Patented Nov. 10, 1896.

Fig: 1.



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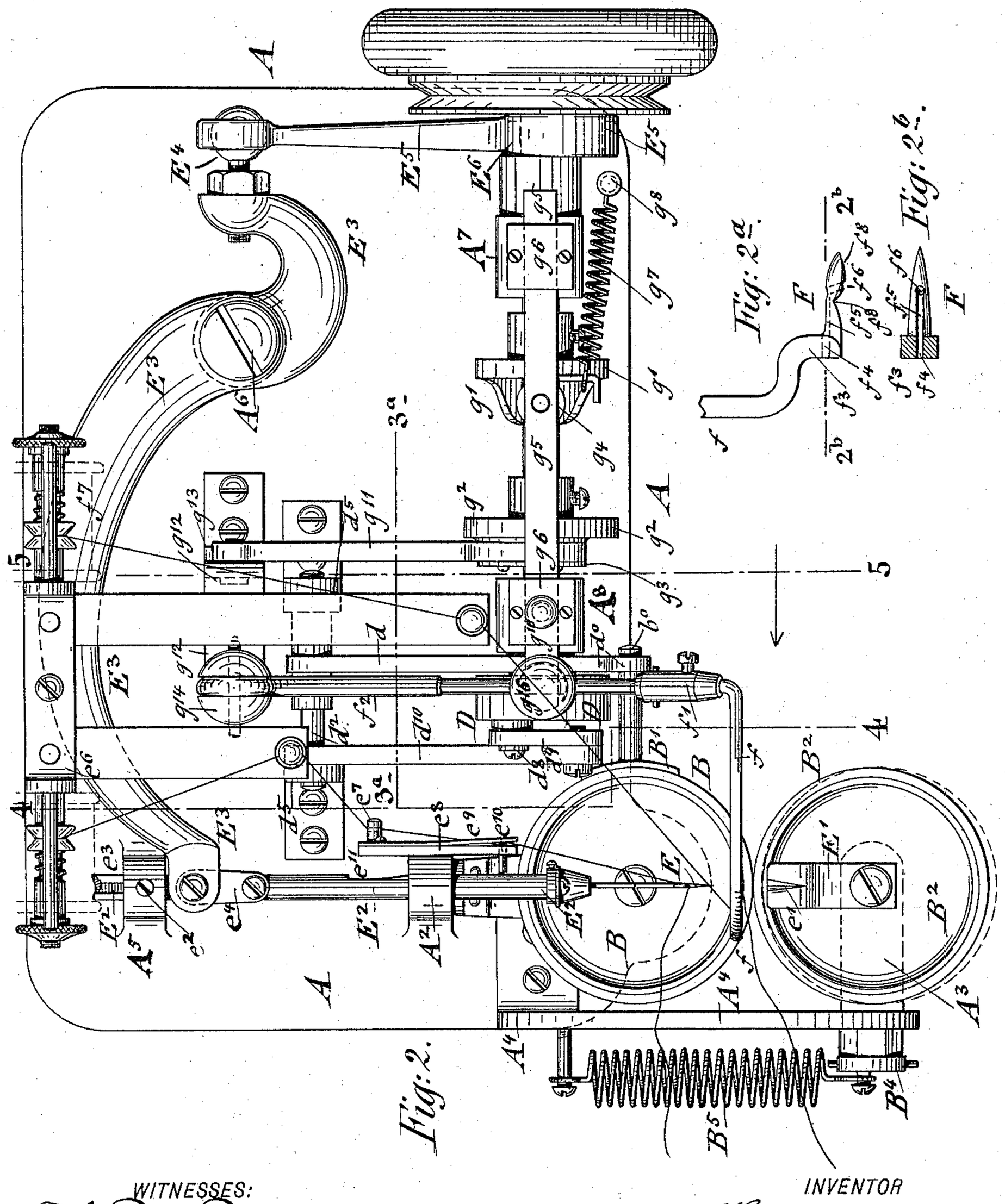

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OVEREDGE SEWING MACHINE.

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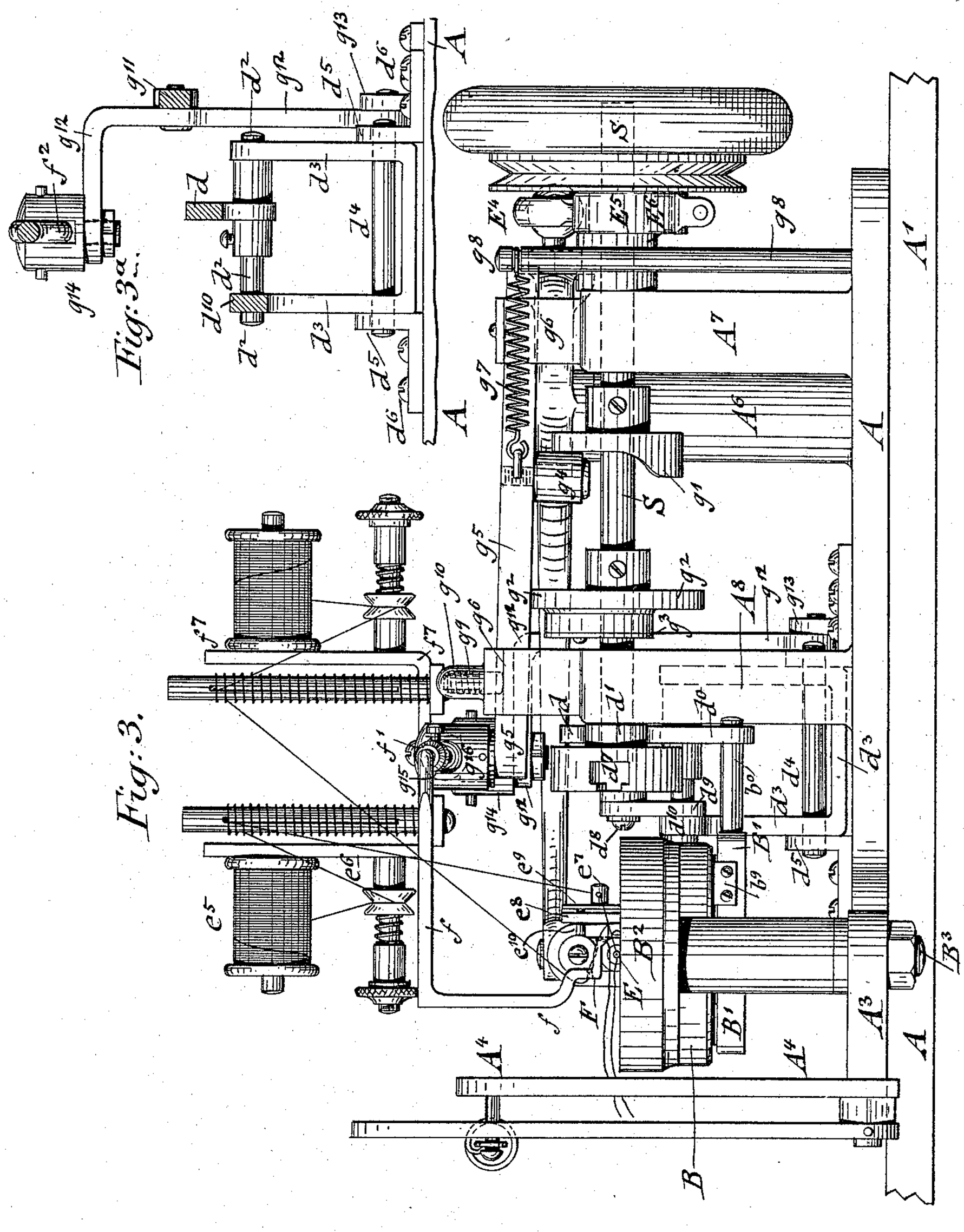

Fig. 3.

Fig. 3a.

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OVEREDGE SEWING MACHINE.

No. 571,322. Patented Nov. 10, 1896.

Fig: 4.

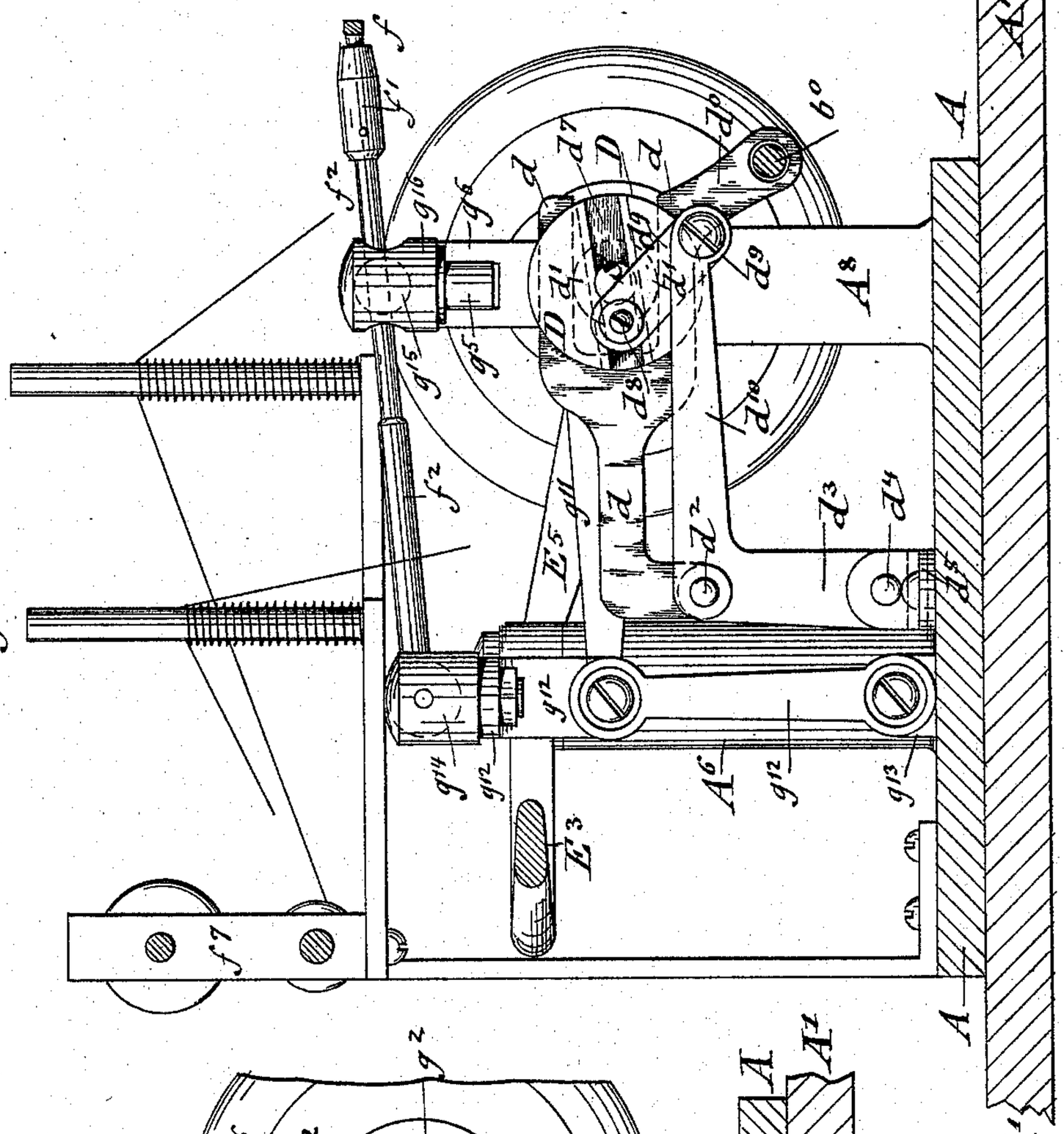
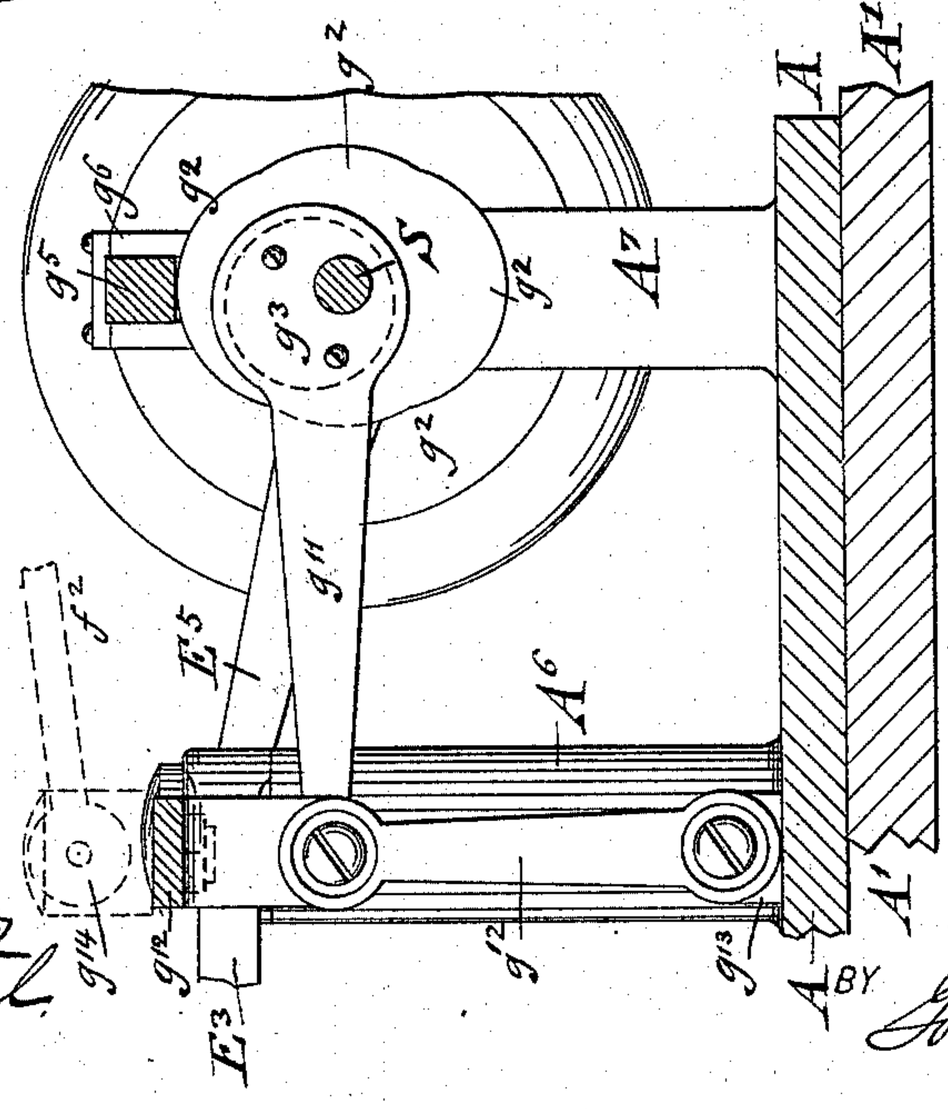


Fig: 5.



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(No Model.) 5 Sheets—Sheet 5.

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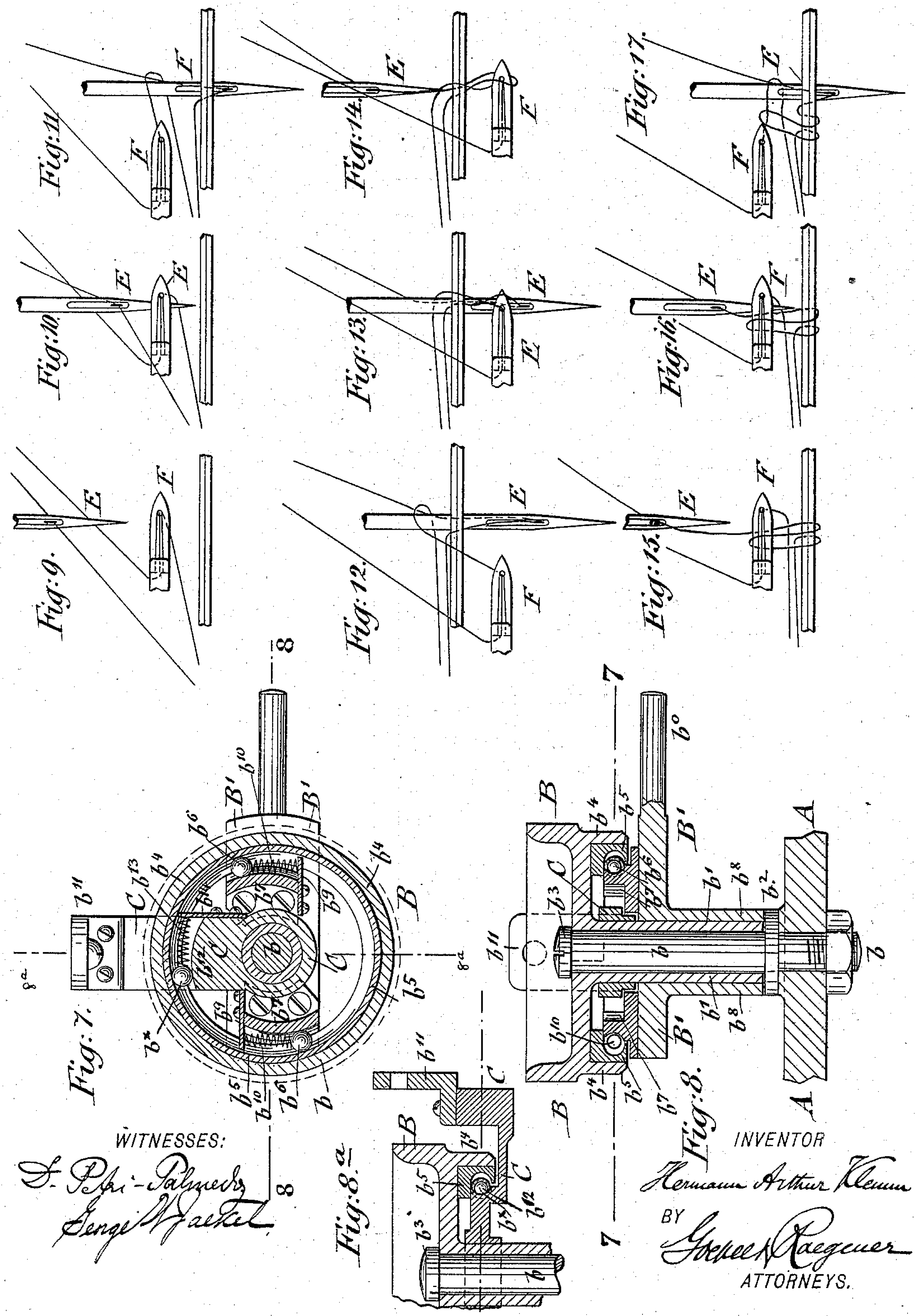

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HERMANN ARTHUR KLEMM, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CHRISTIAN ENGELHARDT, OF SAME PLACE.

OVEREDGE SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 571,322, dated November 10, 1896.

Application filed January 31, 1895. Serial No. 536,759. (No model.)

To all whom it may concern:

Be it known that I, HERMANN ARTHUR KLEMM, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Overedge Sewing-Machines, of which the following is a specification.

This invention relates to certain improvements in sewing-machines of that class which are known as "glove" or "overedge" sewing-machines, and which are intended for sewing furs, knit goods, gloves, and other articles, and in which the well-known elements of such sewing-machines, namely, two parallel feed-disks, a reciprocating needle, and an oscillating looper, are employed, the improvements being hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a front elevation of my improved overedge sewing-machine. Fig. 2 is a plan view. Figs. 2^a and 2^b are respectively a detail side elevation and a horizontal section, on line 2^b 2^b, Fig. 2^a, of the thread-carrying looper. Fig. 3 is a side elevation of the machine; Fig. 3^a, a detail vertical transverse section on line 3^a 3^a, Fig. 2. Figs. 4 and 5 are vertical transverse sections, respectively, on lines 4 4 and 5 5, Fig. 2, showing the mechanism by which motion is transmitted to the parts of the sewing-machine. Figs. 7 and 8 are respectively a horizontal section on line 7 7, Fig. 8, and a vertical section on lines 8 8, Fig. 7, of one of the feed-disks and the mechanism by which the intermittent or step-by-step rotary motion is imparted to the same. Fig. 8^a is a vertical section on line 8^a 8^a, Fig. 7, taken at right angles to the sectional plane of Fig. 8; and Fig. 9 is a diagram in plan representing the relative positions of the needle and the looper and their respective threads at the beginning of their movement for the formation of the first stitch in the fabric. Fig. 10 is a diagram in plan of the relative positions of the needle and looper and their respective threads after the needle has passed under the looper and engaged the looper-thread. Fig. 11 is a diagram in plan of said parts in the positions which they assume after the needle has passed forward through the fabric and the looper has been drawn laterally across the path of the needle at the rear side of the overedge-seam and formed a loop of the looper-thread. Fig. 12 represents the relative positions of said parts in plan after the needle has been pushed farther forward through the fabric and the looper has shifted forward over the seam of the fabric to the front side thereof. Fig. 13 is a diagram in plan representing the positions of said parts when the looper has moved toward the right partially across the needle and engaged the needle-thread preparatory to forming a loop therewith on the front side of the fabric. Fig. 14 is a diagram in plan of said parts, representing the needle as drawn back from the fabric and the looper engaging the needle-thread, a loop being formed thereon on the front side of the fabric. Fig. 15 is a diagram in plan in which the needle and looper are in the positions which they assume after completing a stitch, being the same position shown in Fig. 5, but also showing the threads in the fabric after the first stitch. Fig. 16 is a diagram in plan of the needle and looper in positions corresponding to those of Fig. 10, but after they have started in the formation of a second stitch. Fig. 17 is a diagram in plan corresponding to Fig. 11, but representing the threads after the formation of the first stitch and in the partial formation of a second stitch.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the base-plate of my improved overedge sewing-machine, which base-plate is supported on a suitable table A′. On the base-plate A are supported the mechanisms by which the reciprocating needle, the oscillating thread-carrying looper, and one of the feed-disks are actuated.

All the operative parts of the machine, to wit, the rotary feed-disks B B^2, the reciprocating needle E, and the thread-carrying looper F, are arranged in front of the mechanisms for actuating the same, so that the latter can be inclosed in a suitable casing and thereby protected against dust and injury. The inner feed-disk B is supported on a pillar *b*, which is attached to the base-plate A, the feed-disk being provided with a downwardly-

extending hub b', that rests on a stationary collar b^2 on the base-plate. The feed-disk B is secured to the pillar b by a headed screw b^3, which passes through the center of the feed-disk into a threaded hole in the upper end of the pillar, as shown clearly in Fig. 8. The feed-disk B is provided with a downwardly-extending circumferential flange b^4, to the inner surface of which is applied an annularly-grooved ring b^5 of hardened steel, said grooved ring serving for the purpose of guiding two hardened-steel balls b^6, which are located between said ring and two grooved eccentric wedge-pieces b^7, that are attached to a diametrical support B′ or made integral with the same, said support being provided with a downwardly-extending sleeve b^8, which extends around the hub b' of the feed-disk B and rests likewise on the stationary collar b^2, as shown in Fig. 8. The wider ends of the grooved wedge-pieces b^7 are closed by means of plates b^9, which are attached by screws at diametrically opposite sides of the supporting-piece B′, as shown clearly in Fig. 7. The closing-plates b^9 serve to prevent the escape of the steel balls b^5 from the space between the wedge-pieces b^7 and the grooved ring b^5 of the feed-disk B and as supports for small helical springs b^{10}, which press on the steel balls and move them as far as permitted by the gradual diminishing space formed between the wedge-pieces b^7 and the grooved ring b^5. On the pillar b is further arranged above the diametrical piece B′ and at right angles thereto a second stationary piece C, the outer end of which is attached by suitable screws to a slotted bracket b^{11}, which is attached to an upright post A^2, that is preferably cast integral with the base-plate A, as shown in Figs. 1 and 2.

The inner sleeve-shaped end of the stationary piece C encircles the hub b' of the feed-disk B and is supported on the diametrical piece B′, as shown in Figs. 7 and 8, a shoulder b^{12} of the stationary piece being provided, like the wedge-pieces b^7, with an eccentric groove, between which and the grooved ring b^5 of the feed-disk B is interposed a steel ball $b^\times$, which, like the steel balls of the wedge-pieces b^7, is moved into the diminishing space formed between the eccentrically-grooved shoulder b^{12} and the ring b^5 by means of a helical spring b^{13}, that is interposed between the steel ball $b^\times$ and a plate b^{14}, that is attached to the side of the stationary piece C, as shown clearly in Fig. 7.

The diametrical piece B′ is intended to impart by its steel balls b^6 a forward motion to the feed-disk B, said balls acting in the nature of feed-pawls on the same. The stationary piece C, with its locking steel ball $b^\times$, acts in the nature of a check-pawl and locks the feed-disk B in position when the diametrical piece B′ is moved in opposite direction, so that the steel balls b^6 are released from the feed-disk preparatory to the next forward motion of the piece B′.

For accomplishing properly the work which the stationary piece C has to accomplish it is necessary that the eccentricity of its grooved shoulder b^{12} be inclined in a direction similar to the eccentricity of the wedge-pieces b^7, so that while the steel balls interposed between the wedge-pieces b^7 and the ring b^5 grip the feed-disk and move the same in forward direction the steel ball of the stationary piece C is free to move with the grooved ring b^5 in its opposite or releasing direction, so as to exert no locking action on the feed-disk, but as soon as the diametrical piece B′ is moved in the opposite direction the steel ball of the stationary piece C is immediately applied by its spring to the feed-disk and locks the same firmly in position, so as to prevent any axial motion of the feed-disk while the diametrical piece B′ completes its return motion. The alternating locking action of the steel balls b^6, b^6, and $b^\times$ is far superior to the well-known pawls and check-pawl heretofore employed in imparting a step-by-step motion to the feed-disk B and renders the intermittent motion of the same absolutely reliable and certain.

Oscillating motion is imparted to the diametrical piece B′ by connecting the outer end of its shank b^0 with an eye or socket in the downwardly-extending arm d^0 of a forked and horizontally-reciprocating piece d, which is guided by its forked portion on an anti-friction-roller d' on a cam-shaft S, adjacent to a grooved eccentric D, which is keyed to the end of the cam-shaft S, as shown in Figs. 2 and 4. From the cam-shaft S and the cam on the same motion is transmitted to the different operating mechanisms of the sewing-machine. The rear end of the reciprocating piece d is applied to the transverse pivot d^2 at the upper end of a U-shaped yoke d^3, which is pivoted at its lower end by a transverse pivot d^4 to lug d^5, which is attached by screws d^6 to the base-plate A or cast integral with the same, said U-shaped yoke being clearly shown in Figs. 3 and 3^a. The eccentric D is provided in its face adjacent to the feed-disk with a diametrical dovetailed groove d^7, which serves for guiding the correspondingly-dovetailed base of a pivot d^8, which acts as a wrist-pin for a short crank d^9, that is pivoted at its opposite end to the front end of a forward-extending arm d^{10} of the yoke d^3, as shown in Figs. 3, 3^a, and 4. By adjusting the wrist-pin d^8 nearer to or farther away from the center of the disk D the axial motion transmitted to the feed-disk B can be made either smaller or larger, so that thereby the length of the stitch can be regulated by the corresponding forward motion of the feed-disk B. The pivot d^8, by which the connection with the grooved disk D is made, can be readily unscrewed and retightened, for which purpose it is provided with a suitable washer, so as to take up the friction and produce the proper clamping connection with the disk D.

The second feed-disk B^2 has no direct motion, but receives its motion by friction from

the circumference of the feed-disk B. The feed-disk B^2 is supported by its downwardly-extending hub on a pillar B^3, attached to a horizontal bracket-arm A^3, which is pivoted to the lower end of a stationary arm A^4 of inverted-U shape, which is attached to the base-plate A, as shown clearly in Figs. 1 and 3. To the outer end of the pivoted bracket-arm A^3 is keyed a lever-arm B^4, which is connected by a strong helical spring B^5 to the stationary arm A^4 and which serves to press the circumference of the feed-disk B^2 against the circumference of the feed-disk B, so as to hold the two layers to be sewed together firmly between the circumference of the feed-disks, as shown in Fig. 1. The lever-arm B^4 is also connected with a suitable treadle mechanism arranged below the table, (not shown in the drawings,) so that by depressing the treadle the arm is moved forward against the tension of the spring B^5 and thereby the feed-disk B^2 moved away from the circumference of the feed-disk B, so that the pressure on the layers of fabric is interrupted for permitting the removal of the work, or the insertion of new work, or the shifting of the work in the space between the feed-disks as required.

The horizontally-reciprocating needle E is moved by suitable mechanism diametrically across the feed-disk B, the needle being located in a vertical plane that passes through the axes of both feed-disks and through the point of tangential contact between said disks. The needle is secured to a socket on the end of the needle-bar by a suitable clamping device in such a manner that its eye is in a vertical position. By the forward motion of the needle the same is carried across the contact-point of the feed-disks into a groove e' of a radial thread-support E', that is attached to the pillar of the feed-disk B^2, as shown clearly in Fig. 2. The grooved support E' serves to support the thread on the under side of the needle and insure the formation of the loop on the upper side of the needle at the initial retiring movement of the same.

The needle E is attached to a needle-bar E^2, which is guided in the upright post A^2 and a second post A^5, that is made integral with the base-plate A of the machine, said needle-bar being prevented from turning on its axis by means of a screw e^2, which engages a groove e^3 in the rear end of the needle-bar, as shown in Fig. 2. The needle-bar E^2 is connected by a pivot-link e^4 with the end of a curved arm E^3, that is fulcrumed to an upright post A^6 of the base-plate A. The opposite shorter end of the fulcrumed and oscillating arm E^3 is connected by a suitable ball-and-socket joint E^4 with a strap-rod E^5, which extends around an eccentric E^6 on the driving cam-shaft S, as shown in Figs. 2 and 3. Rotary motion is imparted to the crank-shaft S by a suitable belt-and-pulley transmission from a suitable power-shaft that is arranged either overhead or below the table of the machine.

The thread is guided to the needle E from a spool e^5, supported in a suitable spool-holder e^6, and over suitable tension devices through an eye e^7, that is applied to an arm e^8, attached to the post A^2. To the arm e^8 is applied a spring-plate e^9, which is provided with a pin e^{10}, that is operated in connection with a longitudinal depression e^{11} of the needle-bar E^2, as shown in Fig. 2, the spring-plate e^9 serving for the purpose of permitting the thread to pass freely along the arm e^8 when the needle is moved in the early part of its advancing stroke and through the edge of the goods to be seamed while it clamps the thread when the needle is moved in the latter part of its advancing stroke, so that the stitch formed by the needle-thread in the fabric is pulled tight, the arm e^8 and spring-plate e^9 acting in the nature of a clamping device for the thread when the stitch is tightened. The length and the location of the groove or depression e^{11} in the needle-bar E^2 are so arranged that the proper clamping of the thread, and thereby the tightening of the stitch, takes place at the proper time during the forward motion of the needle.

The oscillating thread-carrying looper F is arranged adjacent to and above the point of contact of the feed-disks and in a position at right angles to the vertical plane passed through their axes and the contact-point of the feed-disks.

The looper F receives a sextuple motion in connection with the reciprocating motion of the needle. After the machine is threaded up preparatory for the seaming operation the needle and looper assume the positions indicated in Fig. 9, in which they are in condition to begin the formation of a stitch, the needle being drawn back to the limit of its backward stroke and the looper being at right angles to said needle in front and across the path thereof, the transverse recess f^9 on the under side of the looper being in line with the path of the needle.

As the machine is operated the reciprocating needle E moves forward and passes through said recess f^9 between the looper and the looper-thread, then passes through the fabric. During the passage of the needle through the fabric the looper F has an upward movement and a lateral movement toward the left, crossing the needle and forming a loop around the needle with the looper-thread. Then the needle continues to move forward until its eye is considerably in advance of the fabric through which the needle projects, and the looper also moves forward transversely above and across the edges of the fabric into the position shown in Fig. 12. Then the looper takes a downward and lateral movement toward the right, passing over the needle and engaging the needle-thread, as indicated in Fig. 13, the needle being drawn backward during this movement of the looper. Then the looper takes an upward movement and the needle-thread continues to move backward, a loop being formed on the needle by the action of the looper.

Then the looper, as shown in Fig. 14, passes rearward across the edges of the fabric being stitched, and during this movement the needle continues in its back stroke. The first stitch is then completed, and the operation is continued for the formation of the seam. These movements are the result of the combined action of several actuating-cams on the driving-shaft S and transmitting mechanism, which is fully described hereinafter.

The thread-carrying looper F is arranged at the lower end of an angular arm f, which is adjustably secured in a socket f' in the transverse arm f^2. The looper F comprises a vertical shank f^3 and a horizontal body f^{10}. The body f^{10} is provided near its point with a vertical eye f^6 for the passage of a thread. The shank f^3 is provided with a horizontal eye f^4, and a groove f^5 in the upper face of the body of the looper connects the eyes f^4 and f^6, the thread passing through the eye f^4 and groove f^5 to the vertical eye f^6. The body of the looper is provided on its under side with a transverse recess f^9, and a thread which passes through the vertical eye f^6 spans this recess, and the needle E, which operates in conjunction with the looper, passes through the recess f^9 for engaging the looper-thread. The under side of the body of the looper at the right of said recess is rounded off to permit the looper to ride back over the needle after the needle has passed through the recess and engaged the looper-thread. The looper-thread is supplied to the looper from a spool f^7 and passes therefrom over suitable tension devices to the horizontal eye f^4 in the vertical shank of the looper, then along the groove f^5 in the top of said looper, then downward to the vertical eye f^6 in said looper, and backward out over the recess f^9 thereof to the seam. This looper-thread unites with the needle-thread and forms an overedge-stitch which will not ravel, the stitch being practically locked.

The sextuple motion is imparted to the looper at the proper time by means of three cams g' g^2 g^3, which are arranged on the cam-shaft S, the cam g' acting on an antifriction-roller g^4, which is applied to the under side of a horizontal bar g^5, that is guided in keepers g^6 of upright posts A^7 A^8, cast integral with the base-plate. The bar g^5 is located above the cam-shaft S, the keepers g^6 being arranged above the journal-bearings of the shaft in the posts A^6 A^8. A helical spring g^7 is attached to the horizontal bar g^5 and to a stationary rod g^8 of the base-plate, so as to hold the antifriction-roller g^4 in contact with the edge of the raised cam g'. A horizontally-reciprocating motion is imparted to the bar g^5 by the cam g' and roller g^4 and the tension-spring g^7. Besides the reciprocating motion imparted to the bar g^5 an up-and-down motion is imparted within the inner keeper g^6 by the cam g^2 against the downward pressure of a helical spring g^9, which is arranged in a cap g^{10} on the keeper g^6, attached to the top of post A^8. This spring holds the bar g^5 in contact with the circumference of cam g^2 and imparts with the cam an up-and-down motion thereto. Adjacent to the cam g^2 is located the cam g^3, to which is applied a strap-rod g^{11}, which is pivoted at its opposite end to an angular supporting-arm g^{12}, that is pivoted at its lower end to a lug g^{13} on the base-plate A and that is provided at its upper end with a universal joint g^{14}, to which is pivoted the rear end of the rod f^2, the front end of which carries the angular shank of the looper, as shown in Figs. 4 and 5. The rod f^2 passes through a perforated ball g^{15}, located in a stationary socket g^{16}, located on the end of the reciprocating bar g^5, so that the rod f^2 can yield readily to the different motions that are imparted to it by the reciprocating bar g^5 and the oscillating supporting-arm g^{14}.

The cams g' g^2 g^3 and the motion-transmitting mechanisms described impart the before-mentioned sextuple motion to the looper, which takes place in connection with the reciprocating needle, so that the proper formation of the lock-stitch by the needle and looper-threads is accomplished, as illustrated in Figs. 9 to 17, by which successively the formation of the stitch formed by the needle-thread, and of the lock-stitch formed by the action of the looper on the needle-thread is shown.

As the looper can be set by its adjusting mechanism into proper relative position toward the needle and the feed-disks, and as it requires a comparatively simple mechanism for imparting the different motions to the same, the construction of the overedge sewing-machine is comparatively simple, while the important advantage is obtained that the overedge-stitches formed are lock-stitches and not chain-stitches, whereby a better and more reliable sewing together of the fabric is obtained than by the overedge sewing-machines heretofore in use.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination in an overedge sewing-machine, of a rocking arm, means for rocking said arm, a looper, a looper-carrying bar pivoted to the rocking arm and slidingly mounted in a bearing-block, an arm carrying said block and connected by a universal joint to the looper-carrying bar, bearings in which the said arm reciprocates longitudinally, a rotary shaft and cams thereon having contact with and arranged to reciprocate the said arm and vibrate it in a plane substantially perpendicular to the general direction of the longitudinal axis of the looper-carrying bar, whereby the proper movements are imparted to the looper.

2. In an intermittent rotary device, the combination of an oscillating member, a rotary member, and a fixed member; a circular surface on said rotary member concentric with its center of rotation, inclined or non-concentric surfaces on said oscillating and

fixed members, facing said circular surface, and a clutch ball or roller interposed between said surfaces of the oscillating and rotary members, and a clutch ball or roller interposed between said surfaces of the fixed and rotary members; the said device adapted when the oscillating member is oscillated, to cause the intermittent rotation of the rotary member in one direction and prevent its rotation in an opposite direction.

3. In an overedge sewing-machine, the combination of a pair of rotary feed-disks, a horizontally-reciprocating needle, an oscillating thread-carrying looper, and mechanism for imparting intermittent or step-by-step motion to the inner feed-disk, said mechanism consisting of an oscillating diametrical piece having wedge-pieces and spring-actuated locking-balls between said wedge-pieces and a ring of the inner feed-disk, and a radial stationary plate having a wedge-piece and a spring-actuated ball between the same and the rim of the feed-disk, said ball acting as a check device for the feed-disk, substantially as set forth.

4. In an overedge sewing-machine, the combination of a pair of rotary feed-disks the outer feed-disk being moved by frictional contact with the inner feed-disk, with mechanism for imparting an intermittent or step-by-step motion to the inner feed-disk, said mechanism consisting of a diametrical piece, below the inner feed-disk, eccentric wedge-pieces on the same, means for imparting oscillating motion to said diametrical piece, a grooved ring at the under side of the inner feed-disk, spring-actuated balls located between the wedge-pieces and ring, and a check device for the feed-disk consisting of a stationary plate below the same, an eccentric wedge-piece on said plate inclined in similar direction to the wedge-pieces on the diametrical piece, and a spring-actuated check-ball between said wedge-piece and ring, whereby the feed-disk is positively arrested during the return motion of the diametrical piece but released during the forward or feed motion of the same, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HERMANN ARTHUR KLEMM.

Witnesses:
PAUL GOEPEL,
GEORGE W. JAEKEL.