

No. 620,135.

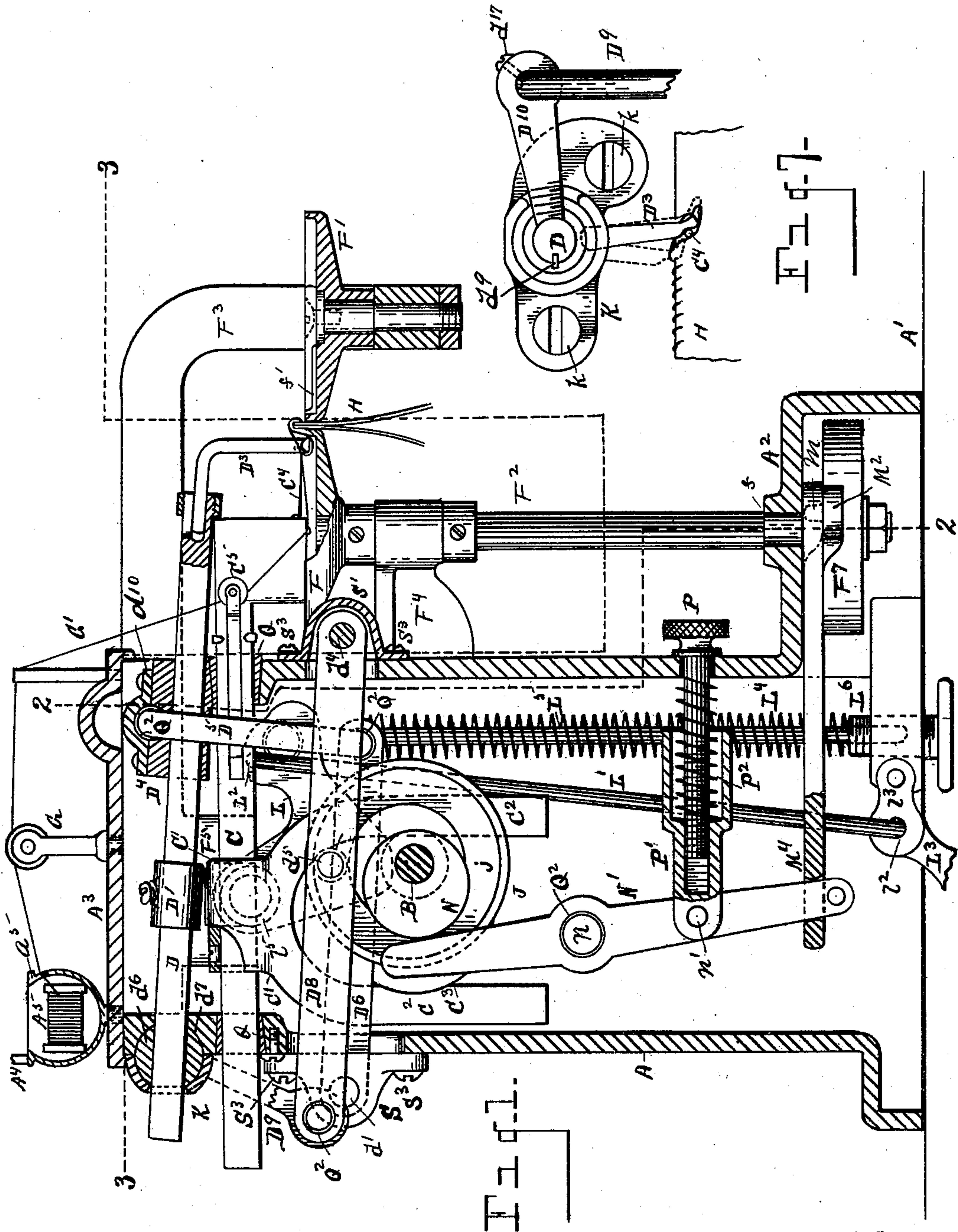
Patented Feb. 28, 1899.

S. G. HOWE.
SEWING MACHINE.

(Application filed Sept. 10, 1897.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES

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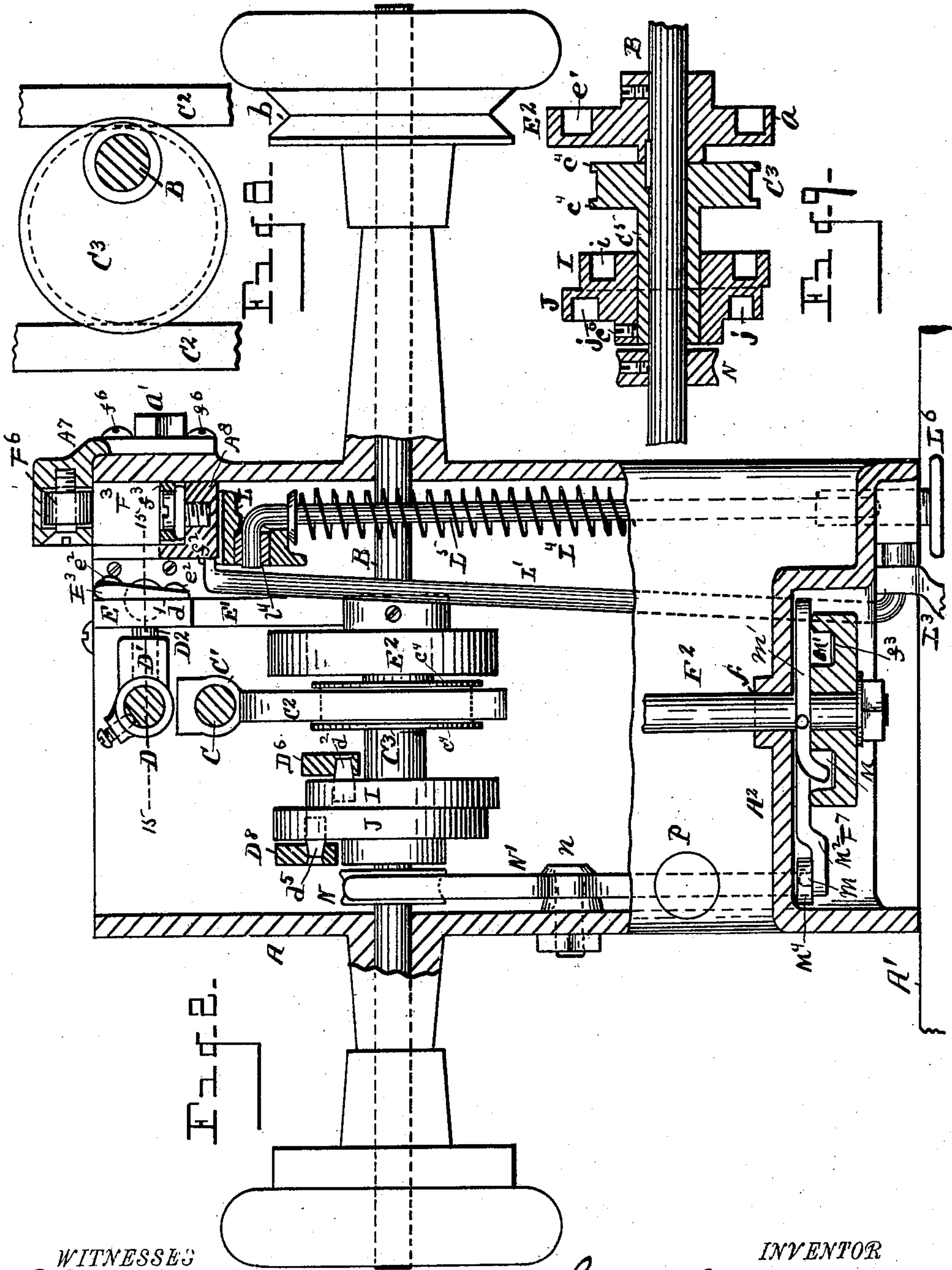
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5 Sheets—Sheet 2.



WITNESSES

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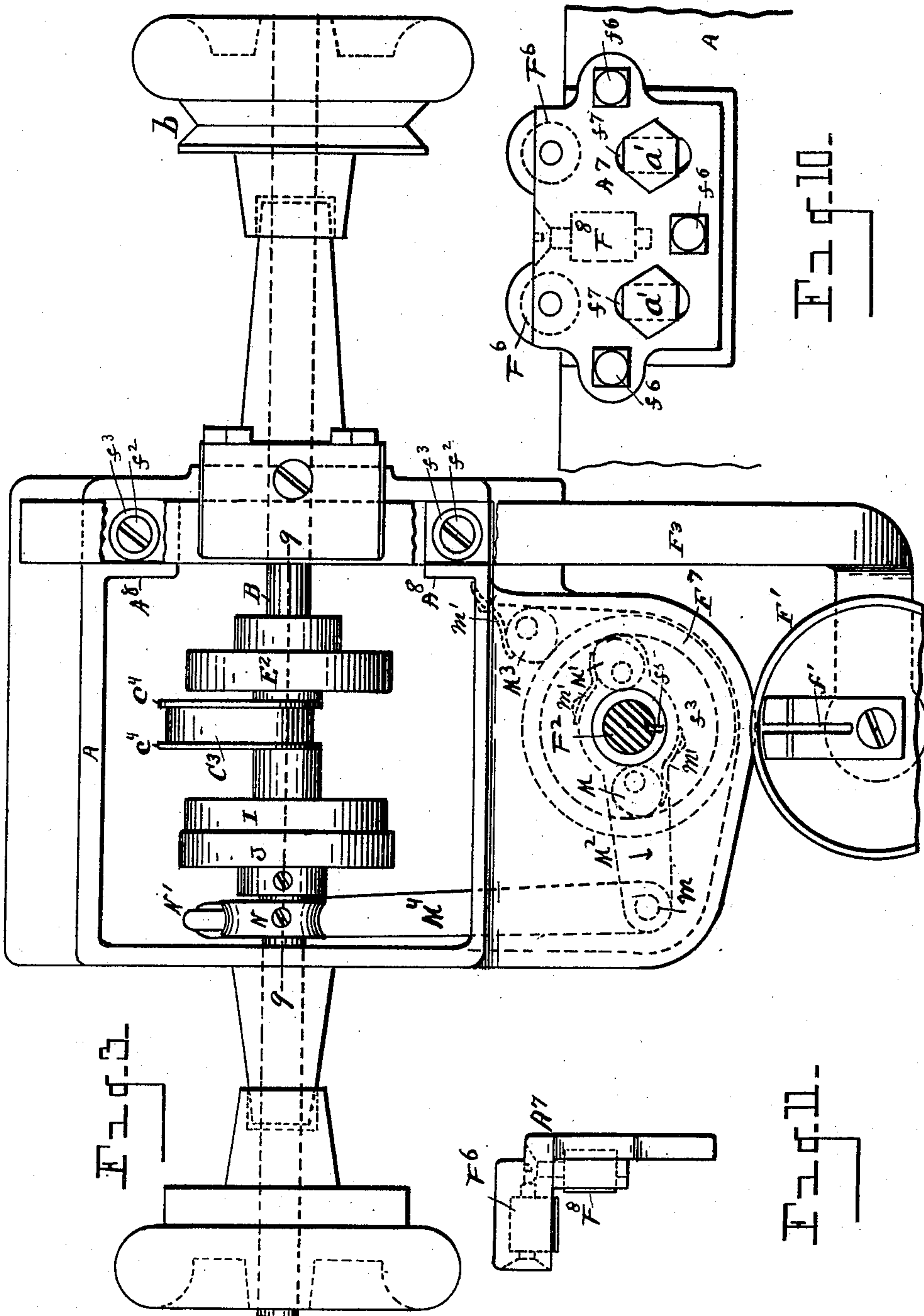
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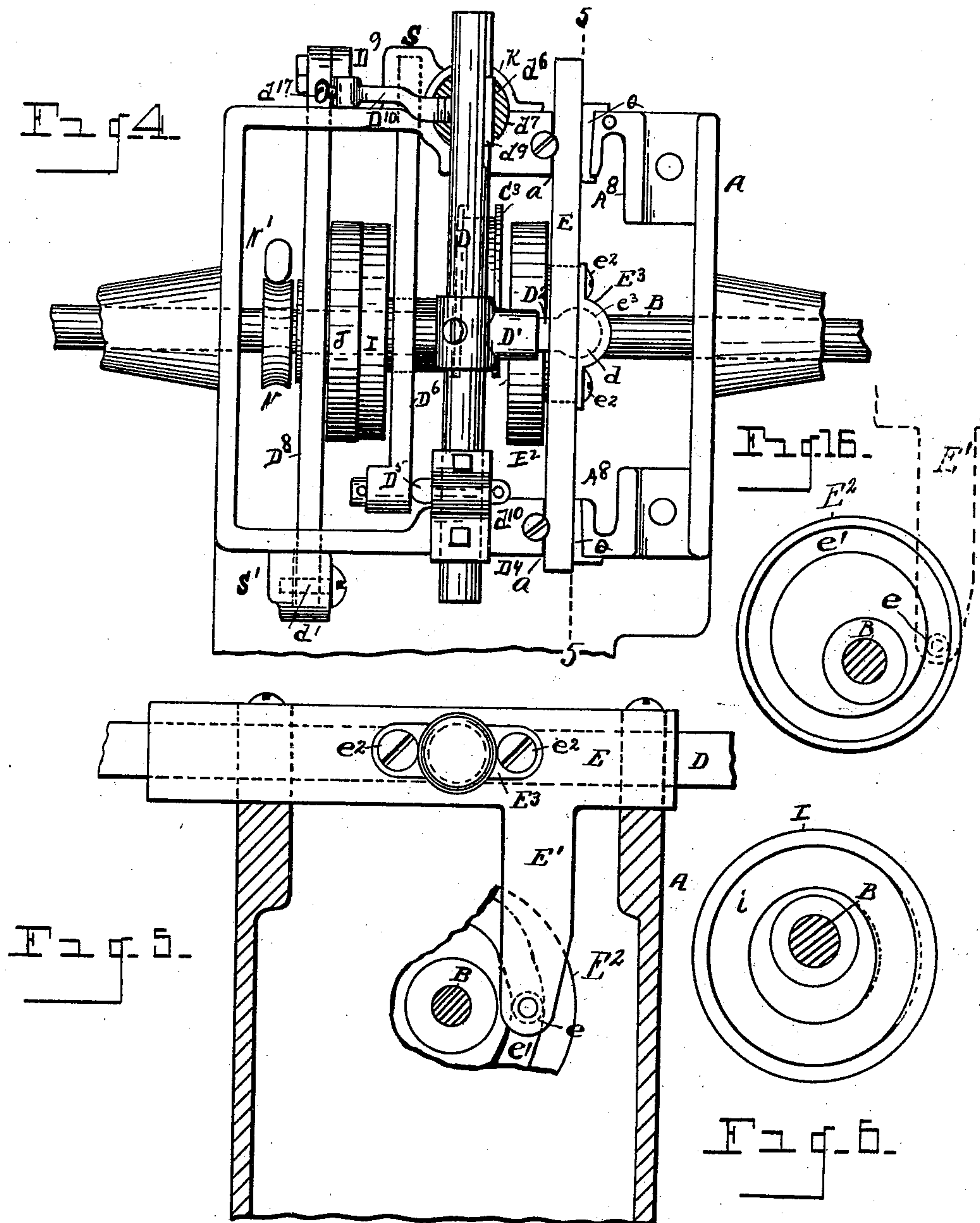
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5 Sheets—Sheet 4.



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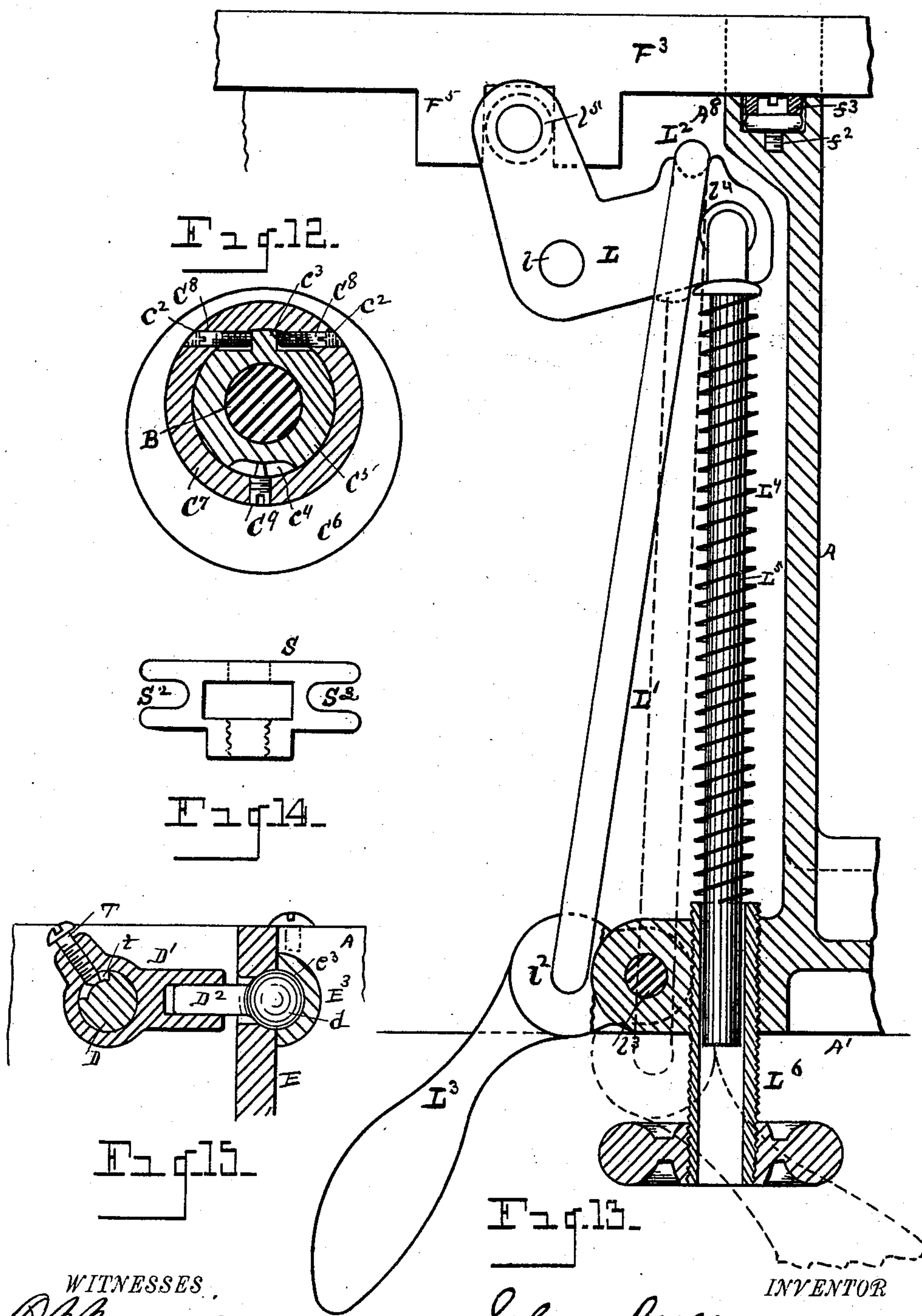
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(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

SOLON G. HOWE, OF DETROIT, MICHIGAN, ASSIGNOR TO JEROME W. HYDE,
OF SPRINGFIELD, MASSACHUSETTS.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 620,135, dated February 28, 1899.

Application filed September 10, 1897. Serial No. 651,239. (No model.)

To all whom it may concern:

Be it known that I, SOLON G. HOWE, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Sewing-Machines; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to certain new and useful improvements in sewing-machines, and more particularly in overseaming glove and fur sewing machines and machines for analogous uses.

My present invention is designed more especially as an improvement on a machine of this class for which United States Letters Patent were granted to W. Ludeke, No. 275,506, dated April 10, 1883, my invention being calculated to simplify and cheapen the cost of construction of a machine of this nature, to provide a machine adapted for a greater range of work—such, for example, as for overseaming knitted underwear—to construct various parts of the machine of materials that are cheap and easily obtainable, and to construct the parts so that the least work will be required to finish and adjust them.

My invention consists of the construction, combination, and arrangement of devices and appliances hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in vertical section, showing parts of my invention. Fig. 2 is a view in section on the line 2 2, Fig. 1. Fig. 3 is a view in section on the line 3 3, Fig. 1. Fig. 4 is a partial plan view showing parts in section. Fig. 5 is a view in section on the line 5 5, Fig. 4. Fig. 6 is a detail view of the cam for lifting the looper-bar. Fig. 7 is a detail view of the looper mechanism. Fig. 8 is a detail view of the cam C³. Fig. 9 is a view in section on the line 9 9, Fig. 3. Fig. 10 is a detail view of the friction-cap for engaging the bar carrying the outside feed-disk. Fig. 11 is an end view of the same. Fig. 12 is a detail view illustrating an adjustable cam or

eccentric, showing a modification. Fig. 13 is a detail view, partly in vertical section and partly in elevation, showing the spring-tension device to regulate the pressure in the feed-disks. Fig. 14 is a detail view in elevation, showing one of the adjustable caps in which the levers D⁶ and D⁸ are fulcrumed. Fig. 15 is a view in section on the line 15 15, Fig. 2. Fig. 16 is a detail view of the cam E².

I carry out my invention as follows:

In the drawings, A represents any suitable case adapted to be supported upon a table A', said case being provided with a base-plate A², beneath which is located the mechanism for rotating the feed-disks. The case is also provided with a top plate A³, carrying suitable tension devices and thread-holding devices.

B is a driving-shaft having its bearings in said case and provided with a driving device, as a pulley b, whereby motion may be given to said shaft in any customary manner.

C denotes a horizontally-reciprocating needle-bar, said needle-bar carrying a yoke C', provided with arms C², engaged astride an eccentric C³ upon the driving-shaft and by which reciprocation is given to said needle-bar. Said eccentric is preferably provided with peripheral flanges c⁴ to hold said arms in place. The needle-bar and the mechanism for driving the same are essentially the same as that shown in said Ludeke patent, and I therefore make no claim for this feature of the device herewith shown and described.

D is a looper-bar.

E denotes a slide made reciprocatory in guide-recesses of the case, as shown in Fig. 4, for example, at a, said slide being provided with a downwardly-projecting arm E', having a cam-roll e to engage in a cam-groove e' of a cam-disk E², mounted upon the driving-shaft.

Upon the looper-bar D is a bracket-arm D', sleeved upon an oscillatory arm D². The slide E is provided with a cap E³, secured thereto in any proper manner, as by screws e², in which the adjacent end of the arm D² has a ball-and-socket-joint engagement, said cap being provided with a socket (indicated at e³) and said arm with a spherical or ball end d. By means of this engagement of the

looper-bar with said slide the looper-bar is obviously reciprocated in the direction of the movement of the slide, while the ball-and-socket joint permits the looper-bar to oscillate and also to rise and fall.

F and F' denote the feeding-disks.

F² is the shaft carrying the inner disk F, said disk being journaled in a bracket F⁴ and also in the case of the machine, as indicated at f.

F³ is the arm carrying the outer disk F'.

A⁴ is a spool-holding spindle, and A⁵ a spool-holding receptacle.

G is any suitable tension device to govern the feed of the thread G' to the needle C⁴.

D³ is a looper carried by the looper-bar, which may be of any suitable construction.

H denotes the article to be sewed engaged between the feed-disks. The arm F³ is provided with a radial needle-guide f' of any suitable construction.

The looper-bar D is provided with a bearing D⁴, having a vertical reciprocation in the adjacent portion of the case A, said bearing having engagement with an arm D⁵, connected with an oscillatory lever D⁶, fulcrumed to the case at one end, as indicated at d', and provided with a cam-roll d², projecting into a cam-groove i in a cam-disk I. By this means vertical movement is given to the looper-bar.

D⁸ is a lever fulcrumed to the case, as at d⁴, the opposite end being connected with a lever-arm D⁹, said lever being provided with a cam-roll d⁵, projecting into a cam-groove j in a cam-disk J. The lever-arm D⁹ is connected with an arm D¹⁰, terminating or carrying a ball d⁶, through which the looper-bar D passes, the ball d⁶ having a socketed engagement in a portion of the case, as indicated at d⁷. In this manner a ball-and-socket or universal joint is provided to give a rocking movement to the looper-bar. The ball d⁶ may be held in place by a cap K, engaged upon the case A, as by screws k. The arm D⁹ is held in engagement with the arm D¹⁰ in any suitable manner, as by a set-screw d¹⁷, the opposite end entering a corresponding groove d⁸ in the end of the arm D⁹. The looper-bar D is keyed in the ball d⁶ by a key d⁹, preventing the looper-bar from rocking or rotating except when actuated by the arm D¹⁰. By the combined operations of the slide E, giving to the looper-bar a horizontally-reciprocatory movement, and the action of the lever D⁶, giving the looper-bar a vertical reciprocatory movement, and the action of the lever D⁸, giving the looper-bar a rocking movement, a sextuple movement is given to the looper-bar to give the required movements to the looper D³. The looper being in the position shown in Fig. 1 will hold the loop in position for the needle to pass therethrough, as shown in full lines in Fig. 7. The looper is then first rocked sufficiently to clear the needle, as indicated in dotted lines in Fig. 7, then lifted, then given a backward horizontal movement to disengage the foot of the looper from the

loop, then given a forward horizontal movement toward the disk F', and is then depressed or moved downward into position to pick up the thread to form the next loop. As the needle-bar draws back, the thread being held by a tension device C⁵ on the needle-bar, a loop is formed back of the eye of the needle. The looper D³ is then given a rocking movement to engage the foot of the looper into the loop. The looper is then lifted and carried back over the seam and depressed into position (shown in Fig. 1) ready for the needle to pass through the next loop thus formed. These successive actions of the looper and of the needle form the successive stitches. The requisite forward and backward movements of the looper-bar will of course be effected by the shape of the cam-groove e' in the cam-disk E². The eye of the needle is arranged vertically to be threaded from the under side.

The feed-disk F' is moved toward and away from the disk F by giving to the arm F³ a reciprocatory movement. This is accomplished by means of a bell-crank L, fulcrumed, as at l, to the case of the machine, one end being engaged by a rod L', which may be simply hooked over the end of said bell-crank, as indicated in the drawings at L², the adjacent portion of the bell-crank being provided with suitable lugs to hold the hook end of the rod in position. The lower end of the rod L' is suitably connected with a hand-lever L³, as shown at l², fulcrumed upon the case, as indicated at l³. By means of this hand-lever the horizontal movement of the arm F³ is easily controlled by the operator. To give suitable tension upon the feed-disk F' to hold the said disk in compressed engagement with the disk F, I provide a tension-spring L⁴ upon a rod L⁵, said rod being engaged with the bell-crank L, as indicated at l⁴. A hand-screw L⁶ is provided to give the proper tension to the spring L⁴, said hand-screw being preferably located on the front of the table and underneath within easy reach of the operator, so that it can be reached by the operator without leaving her seat. This hand-screw may be threaded through a portion of the case, as shown.

To provide for adjustment in case of any possible wear, adjusting-screws f² are provided, carried by brackets A⁸, forming a part of the case, in which brackets the arm F³ reciprocates. These screws f² are provided with friction-rings f³ about the head of the screws, said rings bearing against the under edge of the arm F³. While the adjusting-screws have been used for this purpose, it is believed that the employment of the friction-rings f³ is novel. The reciprocation of the arm F³ would have a tendency to actuate the screws f²; but the provision of the rings f³ will relieve this difficulty. The opposite end of the bell-crank L is provided with an anti-friction-roller l⁵, engaging a shoulder F⁵ of the arm F³. Additional anti-friction-rollers F⁶ are located above the arm F³, said rollers being journaled in a cap or bracket A⁷, en-

gaged upon the case A. The bearing D^4 is preferably provided with a cap d^{10} .

To actuate the shaft F^2 , carrying the inner feed-roller, and give to said roller the proper movement, I provide a disk F^7 , formed with an annular recess or groove f^3 , said disk being engaged upon the lower end of said shaft. Within the recess f^3 project disks M M' , preferably egg-shaped and journaled eccentrically upon a lever M^2 , whereby when said lever is moved in a proper direction the disks M and M' will engage in frictional contact with the disk F^7 , thereby causing the rotation of the shaft and the corresponding feed-roll. An opposite movement of the lever M^2 will obviously release the friction-disks M and M' . An additional friction-disk M^3 is provided, preferably egg-shaped, having frictional contact with the periphery of the driving-disk F^7 and eccentrically journaled upon the case A to operate when moved in a proper direction to bind upon the periphery of the disk F^7 and prevent its backward movement when the disks M and M' are released. To actuate the lever M^2 , I provide a driving-shaft with an eccentric N . A lever N' is fulcrumed intermediate its ends, as shown at n , and engages the eccentric N at one extremity, the opposite extremity engaging a lever M^4 , having a jointed engagement with the lever M^2 , as indicated at m . The disk F^7 is keyed to the shaft F^2 , as indicated at f^5 . The cap A^7 is also preferably provided with an antifric-tion-roller F^8 , bearing upon the adjacent face of the arm F^3 . The cap A^7 is provided with adjusting-screws f^6 . The cap A^7 is held in engagement with the case by means of screws a' , the cap being preferably formed with elongated orifices f^7 to permit the vertical adjustment of the cap A^7 , as may be required. Springs m' are provided to bear against the friction-disks M and M' and M^3 .

To regulate the length of the stitch, I provide an adjusting-screw P , having a threaded engagement, with an interiorly-threaded yoke P' , engaging with the lever N' , as indicated at n' . Said yoke is provided with a spring-chamber outside the threaded portion thereof and with a spring P^2 therewithin to retract the lever N' when the friction-disks M and M' are released, and it will be observed that by the adjustment of the screw P the lever N' will be brought more or less into a vertical position, thereby regulating the movement of the levers M^4 and M^2 , thereby governing the rotation of the shaft F^2 and the corresponding rotation of the disk F . By this means the length of the stitches may readily be governed as desired. The adjusting-screw P is located at the front of the machine, so as to be easily reached by the operator. The spindle A^4 is preferably carried by the receptacle A^5 . By this means the spool may either be engaged upon the spindle or located in the receptacle, as may be desired.

The bearing D^4 is preferably made rectangular in cross-section, as indicated, for exam-

ple, in Fig. 4, and is vertically reciprocatory in the adjacent portion of the case A. It will be observed that all the wear comes upon the bearing, and the looper-bar is entirely relieved therefrom consequent in the up-and-down movement. Said bearing is preferably elongated also, as shown. It will be understood that the looper-bar has a reciprocatory and rocking movement in said bearing.

By means of the ball-and-socket-joint device to rock the looper-arm the combined movements of the looper-arm are permitted. The needle-bar is provided with hardened bushings Q to take the wear. The slide E is also provided with hardened friction-plates Q' . In various places, where any of the parts are journaled or fulcrumed, it is designed to provide the journals or fulcrum-pins with hardened bushings, (indicated, for example, at Q^2 .) The cap A^7 , it will be observed, is in the nature of an adjustable locking-cap holding the arm F^3 in permanent engagement in the slots in the case A in which it reciprocates.

In Fig. 12 I have shown a modification in the construction of the cams, the modification applying to any one of the cams or to either of the eccentrics upon the driving-shaft, the aim of this modified construction being to provide means for adjusting the cam or eccentric about the shaft in order to make the parts work in proper order in relation one to another. As shown in said Fig. 12, C^5 is the hub, which may be, for example, the hub of the eccentric C^3 . B is the main driving-shaft. C^6 is an eccentric provided with a hub C^7 , sleeved upon the hub C^5 . The hubs C^5 and C^6 are provided with registrable tangential orifices, (indicated at c^2), a shoulder c^3 of the hub C^5 projecting between said orifices. C^8 denotes adjusting-screws engaged in said orifices, whereby the eccentric C^6 may be adjusted circumferentially about the hub C^5 . This may be accomplished by loosening up one of said adjusting-screws and tightening the other, as may be required. The portions of said orifices formed in the hub C^5 , it will be observed, are of greater diameter than the outer ends of said orifices in the hub C^7 , permitting a slight adjustment of the cam C^6 about the sleeve C^5 . The amount of adjustment required will not be great to secure the desired results. C^9 denotes a locking-screw engaged in the hub C^7 and projecting into a groove c^4 in the hub C^5 to prevent a lateral movement of the eccentric upon the shaft. The arm D^5 preferably has a hooked engagement over the upper orifice of the bearing D^4 , the cap d^{10} being removably engaged over the hooked end of said arm D^5 , whereby the parts may readily be disengaged and put together.

The base of the rod L^5 is sleeved into the upper end of the adjusting-screw L^6 , which may be made tubular for this purpose, the base of said rod working freely within the said screw. It will be perceived that the spring m' bears upon the friction-disks M , M' , and M^3 to hold said disks against the

driving-disk, so that the instant they are actuated they will perform their function. The receptacle A⁵, forming the spool-holder, is provided with a recess or slot (indicated at a⁵) through which the thread may pass and whereby it is guided in its movement.

The eccentric C³ is provided with a hub C⁵, upon which the cam-disks I and J are located. In order to get the parts of the machine to work synchronously or in proper relative order, it is necessary to make the said cams adjustable from said hub. When properly adjusted, said cams may be secured and will be in desired position in any suitable manner, as by a set-screw c⁶. The cams I and J may either be integral, as shown, or by dividing them, as shown in dotted lines in Fig. 9, they may be made separately adjustable in case it is desired to independently adjust the two cams upon the hub of the eccentric.

The levers D⁶ and D⁸ are preferably fulcrumed in similarly - constructed caps. S and S' may be vertically adjustable, as in Fig. 14, one of said caps being shown in said figure and illustrating the construction of both, and in which the cap is shown provided with elongated recesses S², in which the screws S³ are engaged, which connect the cap with the case A and whereby the corresponding cap may be vertically adjusted to compensate for any possible wear which may develop in the cam-rolls or cam-grooves, whereby said levers are actuated.

The arm D' is engaged upon a looper-bar D by a set-screw T, projecting into a groove t upon said bar, said groove extending partly about said bar.

It will be understood that when the outer disk is thrown open by actuation of the lever L³ said lever will be thrown past the center, as indicated in dotted lines in Fig. 13, so as to hold the disk in open position until said lever is thrown back into the position shown in full lines. This may be done by the knee or hand of the operator in a ready and convenient manner.

It will be perceived that there is special advantage in actuating the levers D⁶ and D⁸ by cam-grooves in the corresponding cam-disks, inasmuch as where rapid motion is required the action is positive both in lifting and in depressing said levers, as there is no opportunity for any vibration to prevent the accurate operation of the parts no matter how rapidly the machine may be in motion.

What I claim as my invention is—

1. In a sewing-machine, the combination with a pair of rotary feed-disks, a reciprocatory needle, a driving-shaft, a looper-arm, a slide, an oscillatory arm having a ball-and-socket-joint engagement with the slide, a bracket-arm upon the looper-arm sleeved upon said oscillatory slide, a cam upon the driving-shaft to horizontally reciprocate said slide and looper-arm, an oscillatory lever connected with the looper-arm, a cam upon the

driving-shaft to actuate said lever and thereby give to the looper-arm an upward-and-downward movement, an additional oscillatory lever connected with the looper-arm to rock said arm, and a cam upon the driving-shaft to actuate said last-named lever, substantially as set forth.

2. In a sewing-machine, the combination with a pair of rotary feed-disks, of a reciprocatory needle, a driving-shaft, a looper-arm, a slide connected with the looper-arm, a cam upon the driving-shaft to horizontally reciprocate said slide and looper-arm, an oscillatory lever connected with the looper-arm, a cam upon the driving-shaft to actuate said lever, and thereby give to the looper-arm an upward-and-downward movement, an additional oscillatory lever, an arm connected with said last-named lever at one end and having a ball-and-socket-joint connection at the opposite end with the looper-arm, and a cam upon the driving-shaft to actuate the last-named lever, substantially as set forth.

3. In a sewing-machine, the combination of a looper-arm, means to give to the looper-arm an upward-and-downward movement, means to give to the looper-arm a horizontally-reciprocatory movement, an oscillatory lever to rock said looper-arm, and lever-arms connecting said oscillatory lever and said looper-arm, said oscillatory lever provided with a ball-and-socket-joint connection with the looper-arm, substantially as set forth.

4. In a sewing-machine, the combination of a looper-arm, means to give to the looper-arm an upward-and-downward movement, means to give to the looper-arm a horizontally-reciprocatory movement, and means to rock said looper-arm, said latter means having an arm provided with a ball-joint, and a corresponding socket for said ball, said looper-arm sleeved through said ball and keyed therein, substantially as set forth.

5. In a sewing-machine, a looper-arm having a combined upward-and-downward movement, a horizontally-reciprocatory movement and a rocking movement, and a ball-and-socket joint through which one end of the looper-arm is sleeved and keyed, the ball-and-socket joint permitting the adjacent end of the looper-arm to reciprocate therethrough, to have a rocking movement and to permit the opposite end of the looper-arm to have an upward-and-downward movement, substantially as set forth.

6. In a sewing-machine, the combination of a looper-arm, means to give to the looper-arm a horizontally-reciprocatory movement, means to give to the looper-arm a rocking movement, a horizontal lever to give to said arm an upward-and-downward movement, a bearing through which said arm is sleeved, and in which said arm has a rocking engagement, and a vertical arm connecting said lever with said bearing, said bearing vertically reciprocatory in the case of the machine, and

arranged to take the wear of the upward-and-downward movement of the looper-arm, substantially as set forth.

7. In a sewing-machine, the combination of a looper-arm, means to give to said arm an upward-and-downward movement, means to give to said arm a rocking movement, and means to give to said arm a horizontally-reciprocatory movement, said latter means provided with a slide, a bracket-arm engaging the looper-arm, and an oscillatory arm engaging the bracket-arm, said oscillatory arm having a ball-and-socket connection with said slide, substantially as set forth.

8. In a sewing-machine, the combination with a horizontally-reciprocatory and rocking looper-arm, of a bearing vertically reciprocatory in the case of the machine through which the looper-arm is sleeved, a horizontal lever, a vertical arm connecting said lever with said bearing, a driving-shaft and a cam upon said shaft to actuate said lever to give an upward-and-downward movement to the looper-arm, substantially as set forth.

9. In a sewing-machine, the combination of a looper-arm having a horizontally-reciprocatory movement and a rocking movement, of a bearing through which the looper-arm is sleeved having a vertically-reciprocatory movement in the case of the machine, an arm having a hooked engagement with said bearing, and means to vertically reciprocate said arm, said bearing provided with a removable cap located over the hooked end of said arm, substantially as set forth.

10. In a sewing-machine, the combination of a pair of feeding-disks, a reciprocatory arm carrying one of said disks, a bell-crank engaged with said arm, a rod connected with said bell-crank, and a hand-lever fulcrumed to the case of the machine connected with said rod, said lever fulcrumed to one side of the connection of said rod therewith, for the purpose described.

11. In a sewing-machine, the combination of feeding-disks, a reciprocatory arm carrying one of said disks, a bell-crank engaged with said arm, a rod connected with said bell-crank, a hand-lever fulcrumed to the case of the machine connected with said rod to actuate said bell-crank, a rod engaged with said bell-crank, a tension-spring upon said rod exerting its tension upon the bell-crank, and an adjusting-screw to regulate the tension of the

spring to compress one of said disks against the other, said hand-lever fulcrumed to one side of the connection of the first-named rod therewith, substantially as set forth.

12. The combination of the feeding-disks, a main driving-shaft, a rotatable shaft carrying one of said disks, a driving-disk engaged upon the last-named shaft, an eccentric upon the main driving-shaft, a lever actuated by said eccentric to actuate the driving-disk, an interiorly-threaded yoke attached to said lever, and an adjusting-screw having a threaded engagement with said yoke to regulate the throw of the lever, and thereby to regulate the length of the stitch, and a spring projecting within the yoke to retract said lever, substantially as set forth.

13. The combination of the feeding-disks, a main driving-shaft, a rotatable shaft carrying one of said disks, a driving-disk engaged upon the last-named shaft, an eccentric upon the main driving-shaft, a lever actuated by said eccentric to actuate the driving-disk, an interiorly-threaded yoke attached to said lever provided with a spring-chamber outside the threaded portion thereof, and an adjusting-screw having a threaded engagement with said yoke to regulate the throw of the lever, and thereby to regulate the length of the stitch, said adjusting-screw provided with a spring extending into said spring-chamber to retract said lever, substantially as set forth.

14. In a sewing-machine, the combination of a pair of feeding-disks, a reciprocatory arm carrying one of said disks, and adjusting-screws provided with friction-rings to bear against said arm, for the purpose set forth.

15. In combination a driving-shaft, a hub upon the shaft, a driving device provided with a hub sleeved in the first-mentioned hub, said hubs constructed with registrable recesses and adjusting-screws engaged in said recesses, the inner hub constructed with a shoulder projecting between the adjacent ends of said screws, and means to prevent lateral movement of the driving device upon the inner hub, substantially as set forth.

In testimony whereof I sign this specification in the presence of two witnesses.

SOLON G. HOWE.

Witnesses:

N. S. WRIGHT,
MARY HICKEY.