

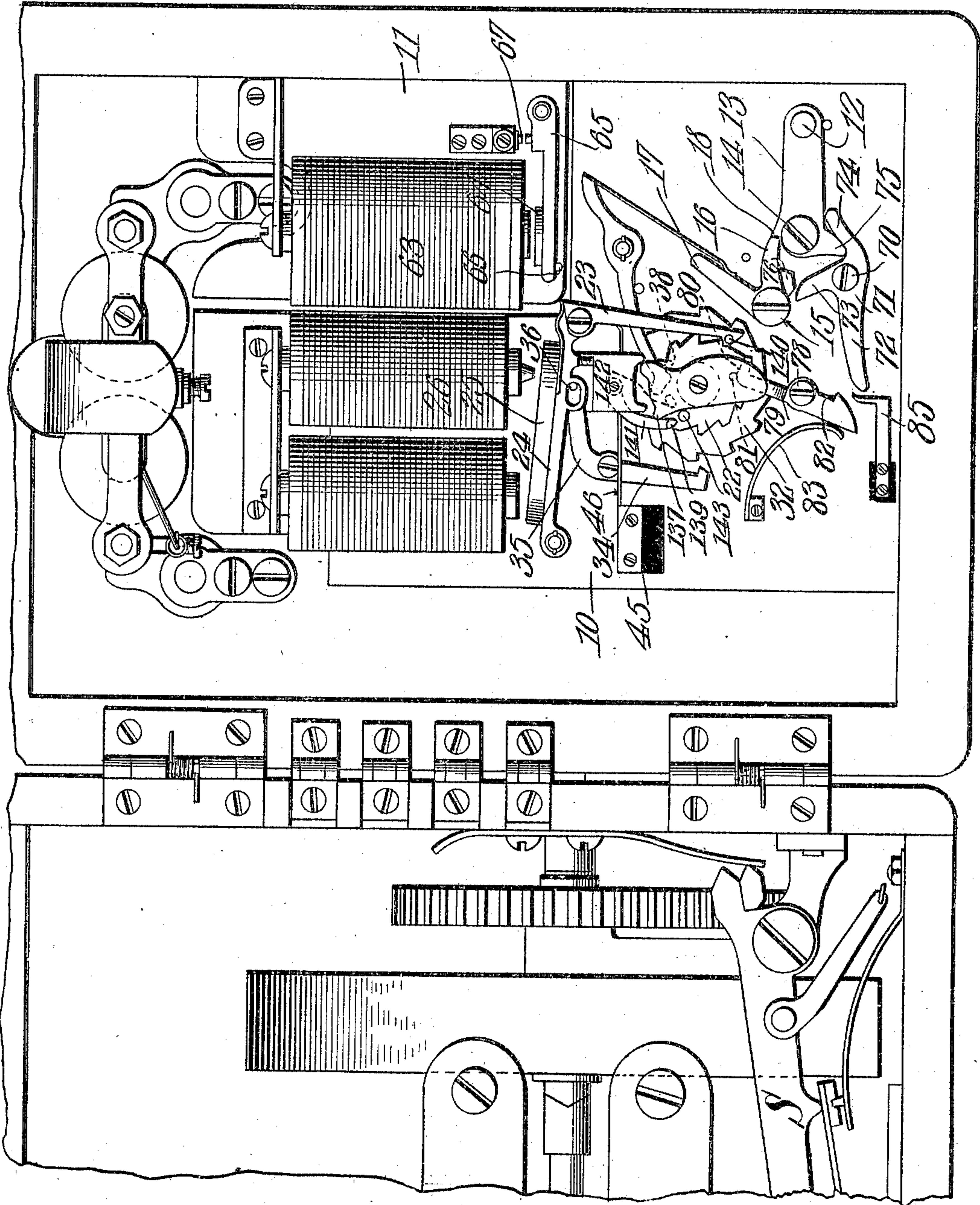
R. C. M. HASTINGS & T. MATHENY.
TELEPHONY.

APPLICATION FILED OCT. 28, 1908.

951,527.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 1.



Witnesses
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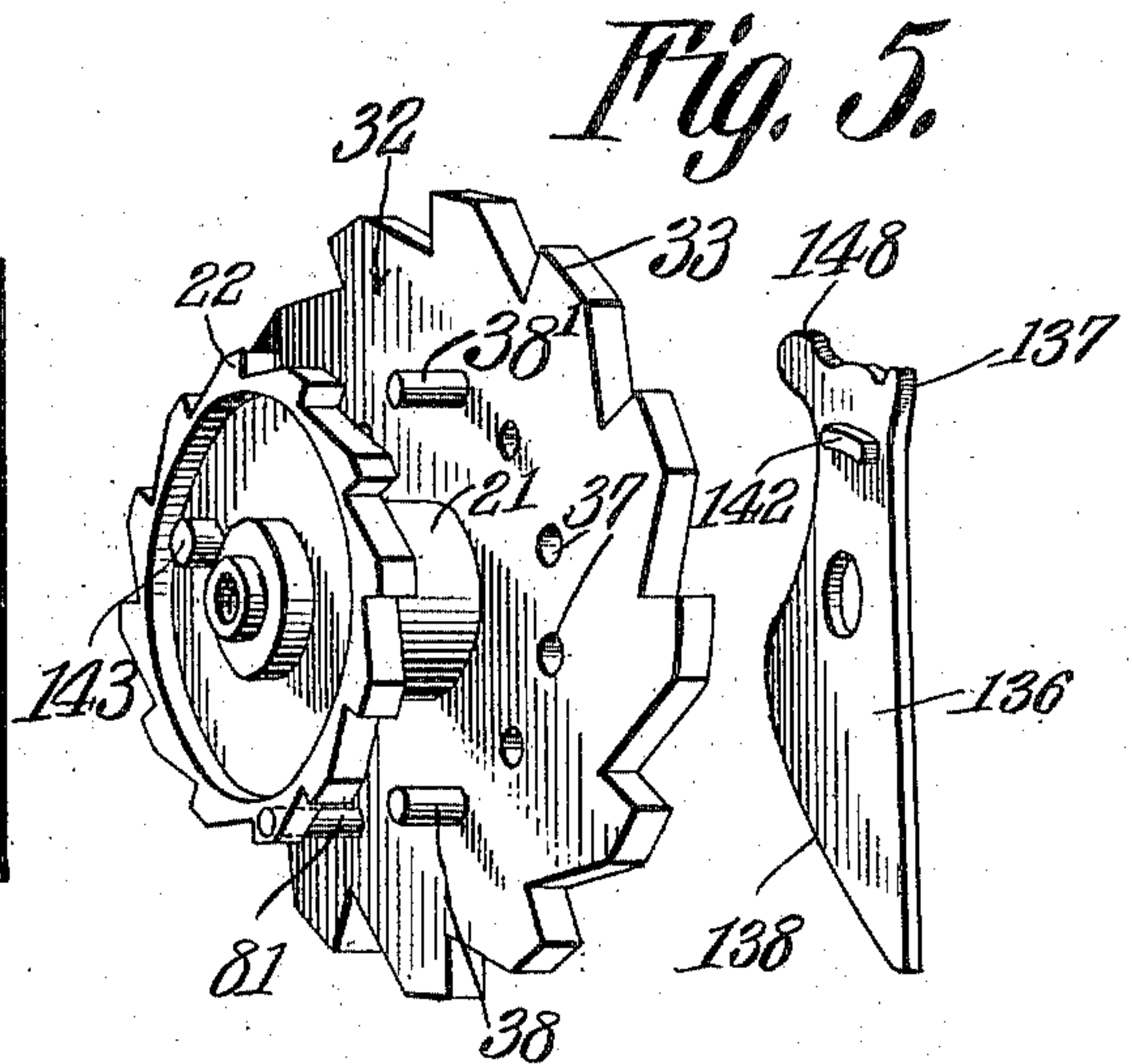
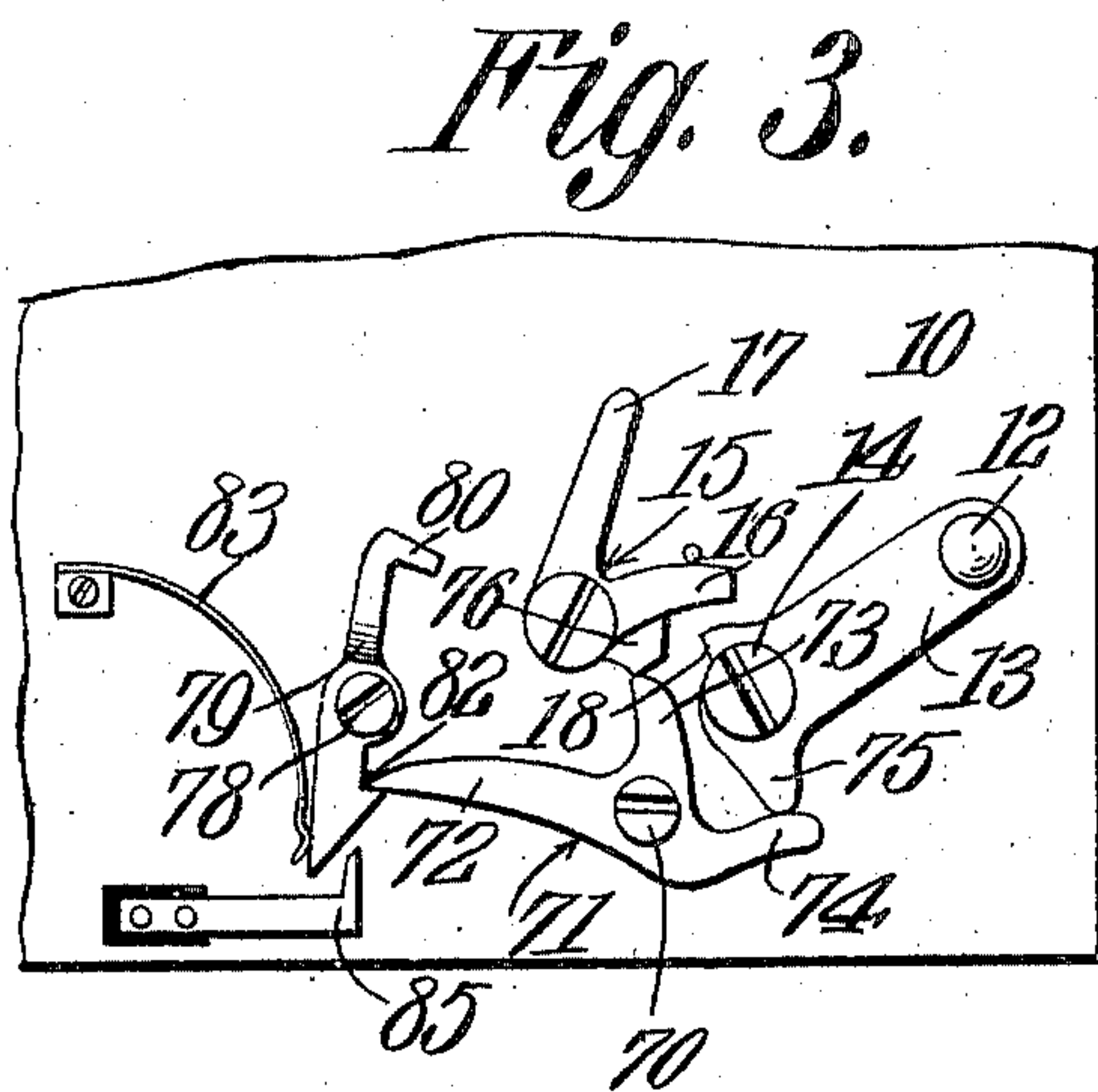
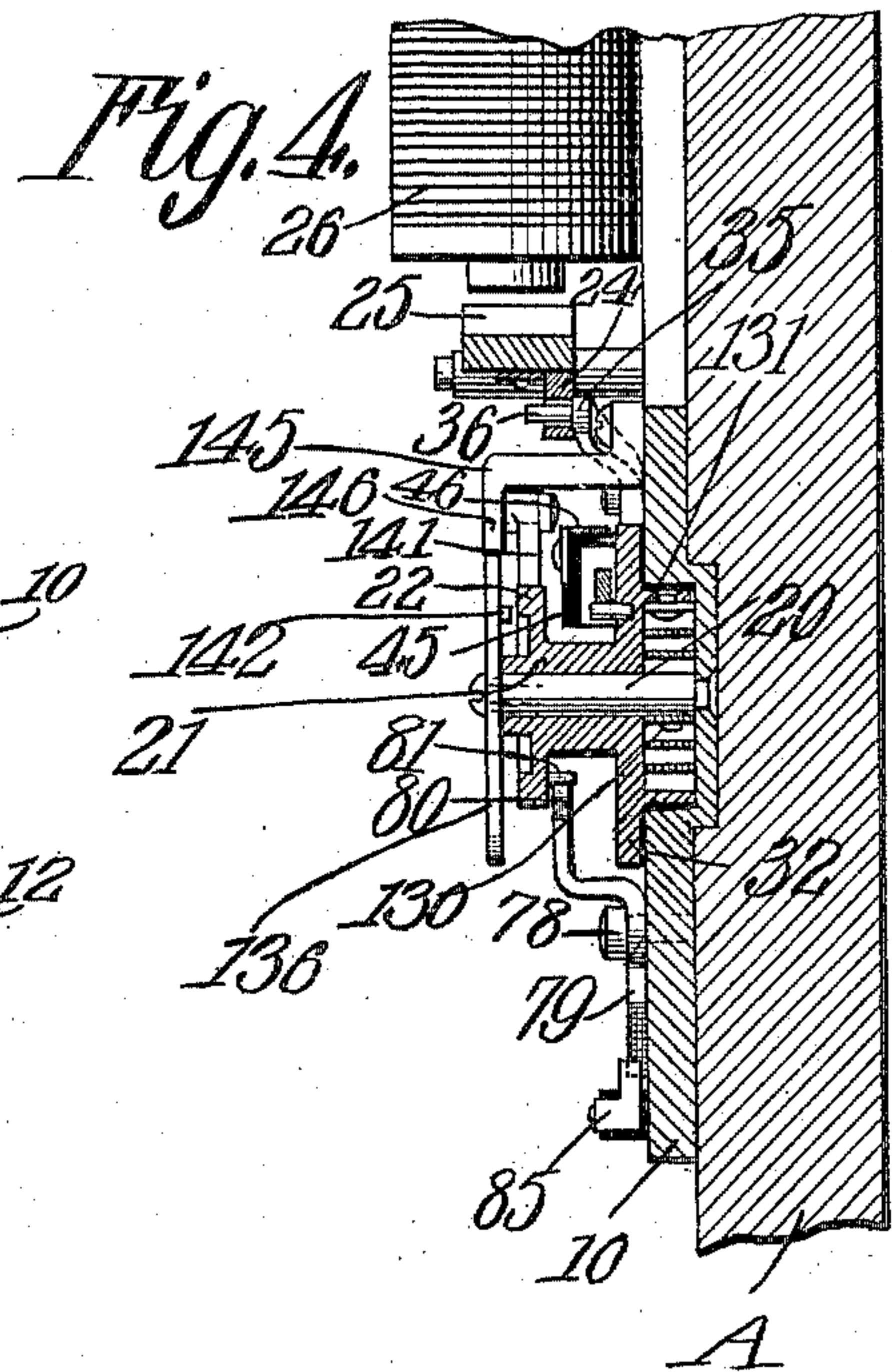
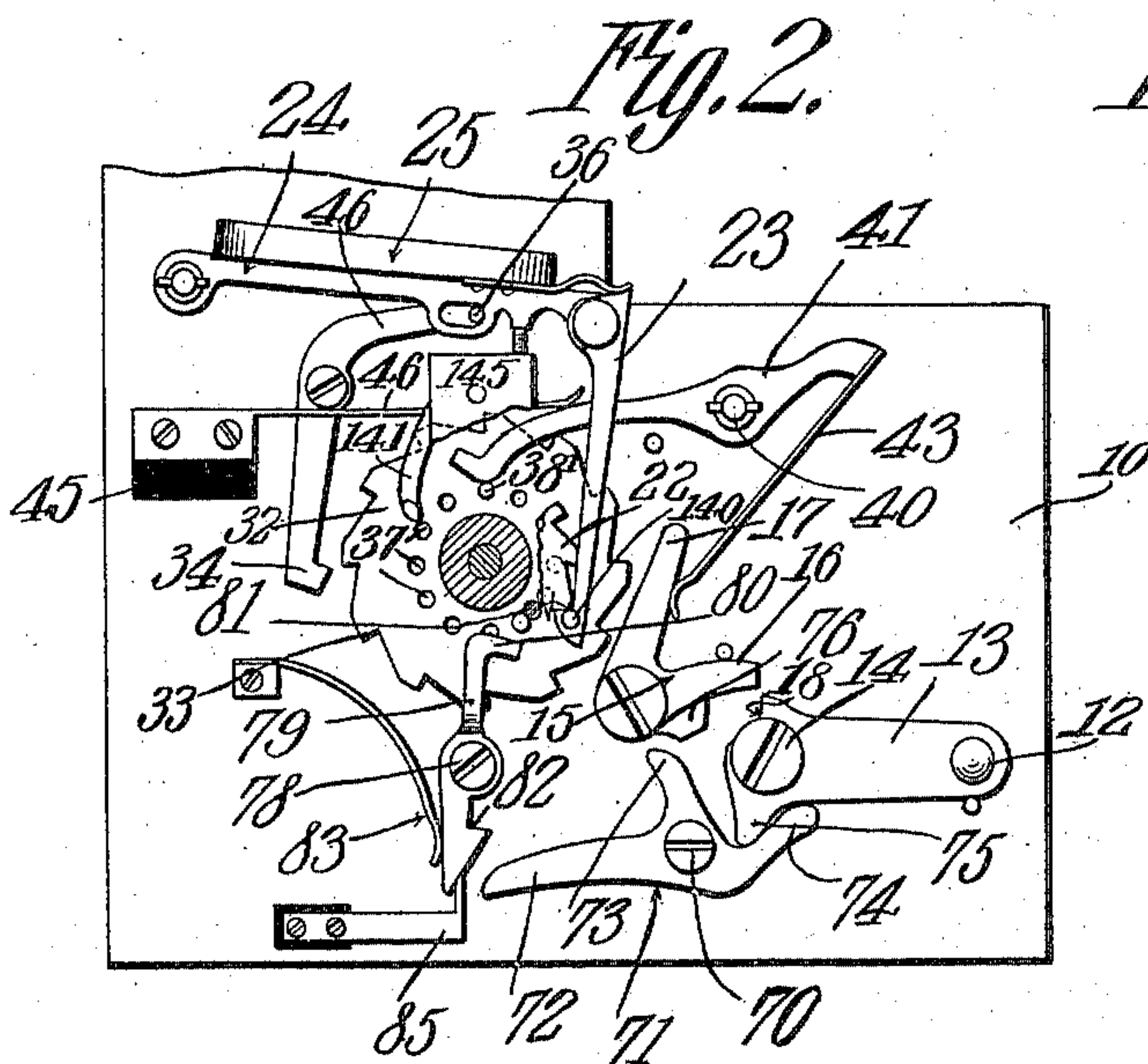
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Witnesses

E. J. [Signature]
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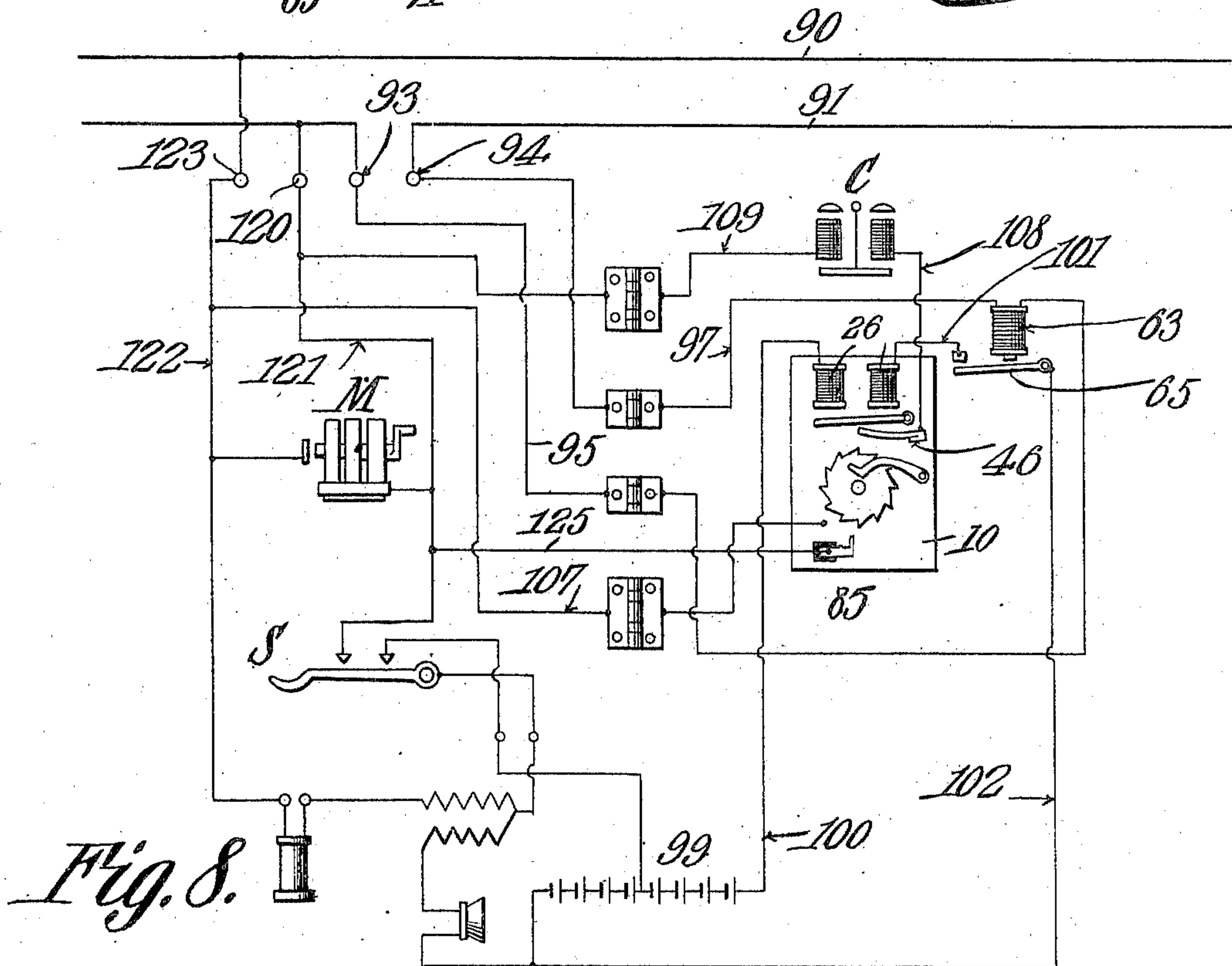
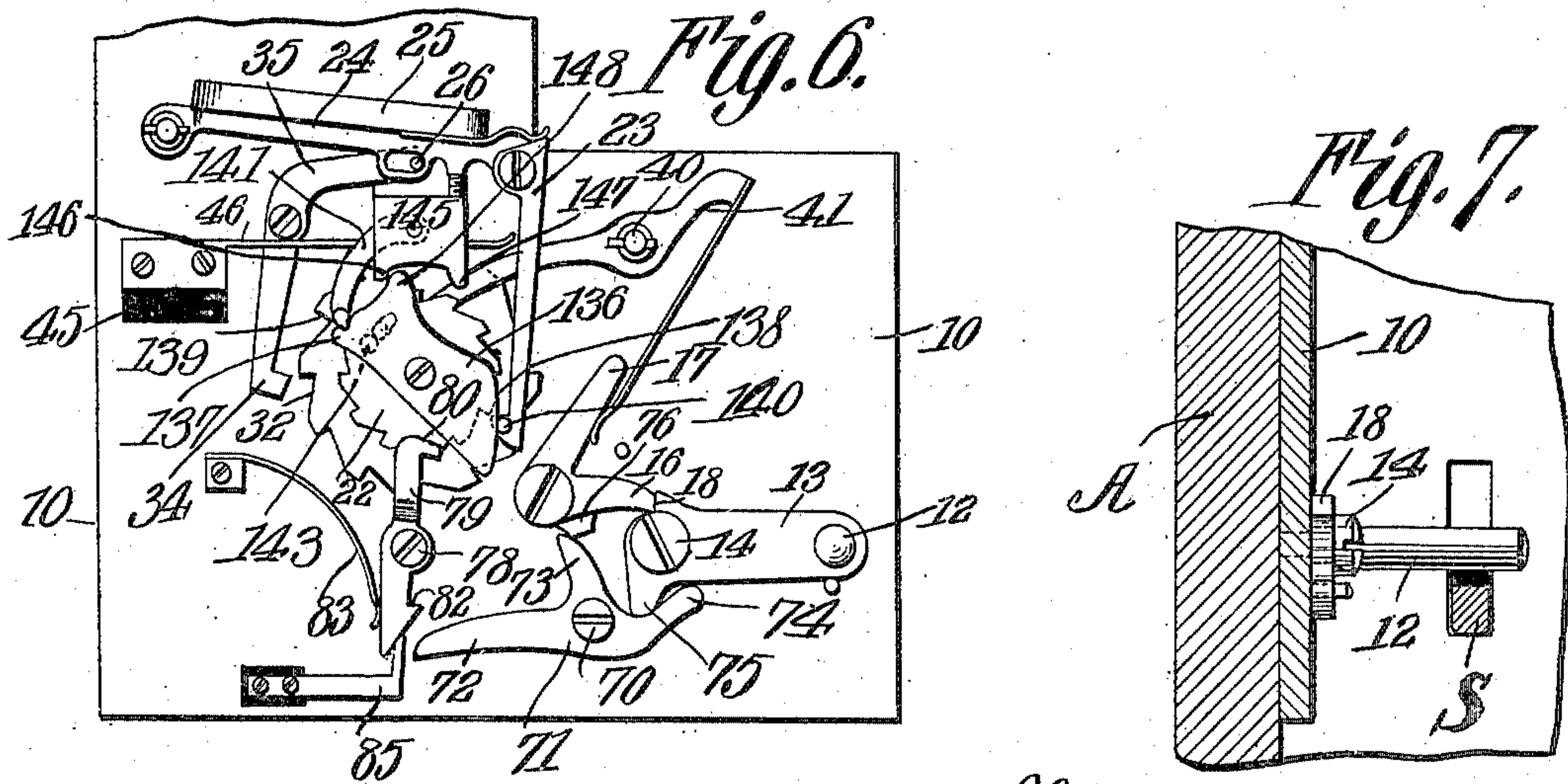
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3 SHEETS—SHEET 3.



Ruben C. M. Hastings and
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UNITED STATES PATENT OFFICE.

RUBEN C. M. HASTINGS AND THURSTON MATHENY, OF ATHENS, OHIO.

TELEPHONY.

951,527.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed October 28, 1908. Serial No. 459,960.

To all whom it may concern:

Be it known that we, RUBEN C. M. HASTINGS and THURSTON MATHENY, citizens of the United States, residing at Athens, in the county of Athens and State of Ohio, have invented new and useful Improvements in Telephony, of which the following is a specification.

This invention relates to telephony, and more especially to lock out and selective systems for use on party lines.

The present invention is in the nature of an improvement on the apparatus shown in an application for Letters-Patent of the United States filed by us on June 15, 1907, under Serial No. 379,201.

The principal object of the invention is to improve and simplify certain portions of the lock out mechanism with a view of securing more positive operation of the parts.

A further object of the invention is to provide a means for automatically restoring the parts to initial position after the completion of a conversation.

A still further object of the invention is to provide means for rendering the signaling system inoperative at all stations except those of connected subscribers, so that it will be impossible for any station to send a signal over the line while the line is in use.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is an elevation of a portion of a telephone switch box showing the door in open position and illustrating a selecting and lock out mechanism constructed and arranged in accordance with the invention, the parts being shown in the initial position, when no telephones on the line are in use. Fig. 2 is an elevation, partly in section, showing the principal parts of the selecting mechanism immediately after the first step of the selecting mechanism, all of the receiver hook switches being unlocked, and all of the calling circuits being inoperative. Fig. 3

shows the position assumed by certain of the parts when the receiver at a calling or called station is removed from the hook. Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 1. Fig. 5 is a detail perspective view of portions of the selecting mechanism, detached. Fig. 6 is an elevation of a portion of the mechanism shown in Fig. 1, showing more particularly the operation of the automatic unlocking devices to permit the parts to reassume initial position. Fig. 7 is a transverse sectional view through a portion of the switch box, showing the receiver hook locking pin. Fig. 8 is a diagram of the wiring of one of the stations along the line.

Similar characters of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

Practically all of the mechanism at each local or subscriber's station is arranged on the inner face of the door A of the switch box and is mounted on two base plates and 11 secured to said door.

The switch hook S is of any ordinary construction and is arranged to be engaged by a pin 12 projecting from a lever 13 that is pivoted on a screw 14 projecting from the plate 10. This lever may be locked in the depressed position by a bell crank lever 15 having two arms 16 and 17, the arm 16 being arranged to engage against a shoulder or lug 18 projecting from the lever at a point adjacent the fulcrum of the latter, and when this locking lever is in place it becomes impossible to raise the switch hook S and until the hook is raised it is, of course, impossible to connect the telephone in the talking circuit, so that it becomes impossible for any of the disconnected subscribers to overhear a conversation on the line.

To the plate 10 is secured a stationary shaft 20 carrying a hub 21 at the opposite ends of which are two ratchet wheels 22 and 32. The wheel 22 is provided with ratchet teeth of a number corresponding to the number of subscribers on the line, usually ten. The teeth of this ratchet wheel are engaged by a pawl 23 that is hung from a lever 24 carrying an armature 25 that is disposed within the field of force of an electro-magnet 26 carried by the plate 10, and each time the electro-magnet is energized the ratchet wheel will be advanced to the extent of a single tooth. The movement of the

ratchet wheel may be indicated by a suitable pointer disposed outside the switch box.

The ratchet wheel or disk 32 is provided with peripheral teeth 33 of a number equal 5 to the number of teeth on the ratchet wheel 22 and facing opposite those of said ratchet wheel. These teeth 33 are arranged to be engaged by a locking pawl 34 pivoted on a stud 35 and carrying a small pin 36 that 10 enters a slot in the armature lever 24, the construction being such that during the downward movement of the armature lever the pawl 34 will be undisturbed until the movement is nearly completed, and then the 15 upper wall of the slot in the armature lever will engage the pin 36 and move the locking pawl to release position, so that as the armature lever again moves upward and the pawl 23 advances ratchet wheel 22 a single step, 20 the locking pawl 34 will not interfere with the movement, but will be moved inward to engage the next tooth and thus prevent excessive movement of the disk and ratchet wheel through acquired momentum. The 25 disk 32 is provided with an annular series of openings 37 of a number equal to the number of teeth, and arranged to receive two pins 38 and 38', the pin 38' being stationary and occupying the same position in 30 all of the telephones along the line, that is to say, one step in advance of the vertical plane of the axis of the shaft 20 while the pin 38 may be adjusted into any one of the openings 37. These pins 38 are disposed at 35 different points, respectively, in the different telephones, and in positions corresponding to the number by which the sub-station is known, that is to say, the pin 38 of the station known as No. 1 would be located one 40 step from the pin 38', while the pin 38 of station No. 5 would be located five steps from the pin 38'.

Mounted on a stud 40 that projects from the plate 10 is a lever 41, one arm of which 45 is arranged to be engaged by the pins 38 and 38' as the disk revolves, the lever normally resting in the position shown in Fig. 1, and when the disk is moved to the extent of a single step, the pin 38' will 50 be moved beneath the lever, and the latter will be raised and will remain in elevated position until after the calling subscriber has communicated with the central station operator. When the lever is elevated, its 55 outer and shorter arm operates through a spring strip 43 on the arm 17 of the bell crank lever 15 and moves the arm 16 of the bell crank lever from engagement with the receiver hook locking lever 13, so that 60 the receiver hook may be raised from the position shown in Fig. 1 to the position shown in Fig. 2.

On the plate 10 is a block 45 formed of insulating material, and carrying a spring 65 contact 46 which is engaged by the lever

41 when the latter is elevated by the pin 38, this being for the purpose of closing the circuit through the call bell, as will hereinafter appear.

Secured to the plate 11 is a small electro- 70 magnet 63, below which is arranged an armature 64 carried by a lever 65 that normally rests against the stop pin 66. Mounted on an insulated block on the plate 11 is a contact 67 which is engaged by the ar- 75 mature lever 65 when the armature is raised for the purpose of closing the circuit through the electro-magnet 26.

Arranged in a plane below the plane of the pivot screw 14 is a pivot pin 70, on 80 which is mounted a lever 71 having three arms, 72, 73, and 74, the latter arm being arranged to be engaged by a cam lug 75 projecting from the lower side of the locking lever 13 at a point near the fulcrum of 85 the latter. The arm 73 is disposed in the path of movement of a cam lug 76 that is carried by the bell crank lever 15, this cam lug serving simply as a means for insuring return movement of the lever 71 to its nor- 90 mal position in case said lever fails to swing down by gravity. It also permits the holding of the locking lever from engagement with the lever 13 when the parts are in the position shown in Fig. 3. 95

Beneath the shaft 20 the plate 10 is provided with a stud 78, on which is pivoted a lever 79, the upper arm of which is provided with a tongue 80 that is disposed in 100 the path of movement of a pin 81 carried by the ratchet wheel 22, and under normal conditions the pin 81 is in engagement with this tongue for the purpose of holding the lever in the position shown in Fig. 1. The 105 lower end of the lever is tapered and is provided with a shoulder 82 on which may rest the arm 72 of the lever 71. The lower end of the lever 79 is urged to the right by a spring 83 which tends to force the lower 110 end of the lever into engagement with a contact 85 that is connected in the circuit of the magnetic generator in such manner as to control the circuit. When the lever engages the contact 85, the magneto circuit 115 is closed, or is short circuited in such manner that when the magneto is operated no current will be sent out over the line, and when the lever is moved away from the contact 85, the short circuit is open and the 120 magneto generator is free to send the current over the line. This arrangement may, of course, be readily altered by reversing the positions of the lever and contact so that in the normal position the magneto short circuit will be broken and when the 125 lever is moved over the magneto short circuit will be closed.

Referring now to Fig. 8, it will be seen that the talking circuit of each telephone is bridged between the lines 90 and 91. The 130

talking circuit is arranged as usual and does not require detailed description. The selecting circuit is connected to either the wire 90 or the wire 91 as the case may be, the wire being cut and attached to binding posts 93 and 94. From the binding post 93 extends a wire 95 to the relay magnet 63, and wire 97 back to binding post 94. If now the opposite ends of the wire 91 be grounded and a current sent over the line, all of the relay magnets 63 in the stations of line 91 will be energized and being energized will attract the armatures 64 raising levers 65 into engagement with contacts 67, whereupon the circuits of all of the electro magnets 26 will be closed with the local battery.

Each electro-magnet 26 is arranged in a local circuit which includes batteries 99, part of which may be employed on the primary of the talking circuit.

From the battery leads a wire 100 to the electro-magnet 26, and from thence the current flows to wire 101, contact 67, armature lever 65 and wire 102 back to the battery, so that each time the relay magnet 63 is energized, the electro-magnet 26 will be energized from its local battery and the selecting mechanism will be advanced a single step. By opening and closing the circuit a proper number of times, the selecting pin 38 of any desired station may be brought under the lever 41 for the purpose of raising the latter into engagement with the contact spring 46 and when this occurs, a circuit will be closed through the call bell C, the circuit extending from wire 90, binding post 123, wire 107, to plate 10, the selecting mechanism 38, the lever 41, contact spring 46, wire 108, call bell C, wire 109, back to line wire 91, thus bridging the call bell C in the main line, so that the call may be sent and received in the usual manner.

The magneto generator M is arranged in a circuit which may be traced from the wire 91 to binding post 120, wire 121, to the magneto M, wire 122 to binding post 123, and line wire 90 so that by operating the magneto a current may be sent out along the line. In the present instance, however, it will be seen that the wire 122 is connected by the wire 107 to the plate 10. An additional wire 125 is then run from the wire 121 to the contact 85, so that if the lever 79 which is electrically connected to the base plate is in engagement with the contact 85, the magneto generator will be short circuited in a path offering little or no resistance, so that if the magneto is then operated no current will be sent out along the line, and the bells of the different stations or at the central station will not be operated. On the other hand when the lever 79 is moved from engagement with the contact 85, as shown in Fig. 1 this short circuit is broken and the magneto is left free to send

out a current over the main line in the ordinary way.

In the operation of the parts as thus far described, it is to be assumed that the mechanism at each of the sub-stations is normally in the position shown in Fig. 1 when the line is idle. In this position the receiver hook lever 13 is locked. It will be noted that the pin 81 is in engagement with the tongue 80 of lever 79 holding said lever out of engagement with the contact 85, so that the magneto circuit is in proper condition to permit the sending of a call. The pins 38' at the several stations are arranged one step in the rear of the levers 41. The subscriber wishing to make a call turns his magneto generator to call central, and the central station operator sends a current along the line energizing all of the relay magnets 63 and thus closing the local circuits of all the electromagnets 26. The armature 25 will be attracted at each of the local stations and will raise the armature lever 24, causing the pawl 23 to move upward and the several ratchet wheels 22 will be turned to the extent of a single tooth, thereby moving the pins 38' into engagement with the levers 41 and moving the locking levers 16 to the release position shown in Fig. 2, so that the receiver hook at every telephone along the line will be unlocked. At the same time the pins 81 of all of the stations will be moved from engagement with the tongues 80 of the levers 79 and the springs 83 will then force said levers into engagement with the contacts 85, thus short circuiting every one of the magneto generators. The subscriber making the call then removes his receiver from the hook and the cam 75 of lever 13 operates lever 70 causing the arm 72 of said lever to move up to the position shown in Fig. 3. This thrusts the lever 79 to the left out of engagement with the contact 85 thereby breaking the short circuit of the magneto and placing the magneto circuit of the calling subscriber only in operative condition, the remaining magneto circuits on the line being held short circuited. This will positively prevent any subscriber except the one making the original call from sending any signal along the line until the parts have been again restored to the initial position after the finishing of the conversation. It will further be noted that while the parts are in the position shown in Fig. 3, the arm 73 of the lever 70 is in engagement with the cam lug 76 of the locking lever and positively holds the latter out of engagement with the lever 13.

Having ascertained from the calling subscriber the number of the station with which he desires to be connected the central station operator energizes the line the requisite number of times, say five times to call station No. 5, and the relay magnet is therefore energized five separate times and effects a

corresponding number of closures of the local circuit of the electromagnets 26 in all of the stations. At the end of the fifth closing of the circuit the pin 38 of sub-station No. 5 will be under its lever 41, while the corresponding pins of the other stations will be to one or other side of their levers and not in operative engagement therewith. The raising of the lever 41 of station No. 5 will move the lever into engagement with the spring 46, thereby establishing the calling circuit of station No. 5, so that when the line is energized the call sent out will reach only station No. 5, all of the remaining stations being cut off. The subscriber of station No. 5 now removes his receiver from the hook and lever 15 being in the release position, the lever 13 is allowed to rise and its cam lug 75 engages with the arms 74 of lever 71 moving the arm 72 of said lever upward into engagement with the lever 79 until the arm is above the shoulder 82. This forces the lever 79 out of engagement with the contact 85 to thus open the short circuit of the magneto generator and allow station No. 5 to send a return call or signal if necessary. After the completion of the conversation it becomes necessary to restore the parts to initial or zero position and this is accomplished by releasing the ratchet wheel 22 and disk 32 and allowing them to move back to the original position under the influence of springs which have been placed under stress by the turning of the disks during the selecting operation. The shaft 20 is rigidly secured to the plate 10 and to this shaft is fastened the inner end of a spring 130, the outer end of which is secured to an annular flange or lug 131 formed on the rear face of the disk 32. This spring is in the form of a spiral band and is placed under stress when the ratchet wheels or disks are turned during the selecting operation, so that if the disks are released the spring in expanding will tend to rotate the disks in the opposite direction and restore them to initial position. Mounted loosely on the outer end of the shaft 20 is a tripping plate 136, the center of gravity of which is in a plane below the horizontal plane of shaft 20. The plate is provided with a shouldered cam lug 137, and a cam face 138, which are designed, respectively, for engagement with a pair of pins 139 and 140. The pin 139 is mounted on a locking pawl 141 that is pivoted on a fixed stud and is arranged to engage with the teeth of the ratchet wheel 22 for the purpose of preventing backward movement of the latter under the influence of the spring, while the pin 140 projects from the operating pawl 23. Projecting inwardly from the plate 136 is a pin 142 that is arranged to be engaged by a pin 143 that projects outwardly from the ratchet wheel 22. These pins 143 are all arranged in the same

position in the several telephones, and after the completion of a conversation between any two subscribers, the operator energizes the line a sufficient number of times to bring all of these pins 143 simultaneously into engagement with the pins 142 of the releasing plates, thereby turning said plates until the cams 137 and 138 engage with the pins 139 and 140 moving said pins outward, and thereby carrying the pawls 141 and 23 out of engagement with the ratchet wheel 22, so that the spring 130 is free to turn the shafts and ratchet devices back to the initial position shown in Fig. 2. To permit this operation the pin engaging end of the lever 41 is rounded and the pin engaging tongue 80 is also slightly rounded, so that the pins may ride against these parts without danger of being caught and held in inoperative positions. The movement given the releasing plate is sufficient to carry the cam lug 137 beyond the pin 139 so that the releasing plate will be temporarily locked and held in releasing position until the ratchet wheels have returned to zero position under the influence of the spring. During the return movement the ratchet wheels acquire some momentum and this force is utilized in releasing the plate. As ratchet wheel 22 nears its zero position the pin 143 on said ratchet wheel will strike the pin 142 of the plate with sufficient force to cause the cam lug 137 to slide from under the pin 139 and as the lower portion of the releasing plate is much heavier than the upper end thereof, and is free to turn back to its initial position by gravity, the parts then come to rest with the pin 142 engaging pin 143. In order to prevent excessive play of the releasing plate a bracket 145 is employed. This bracket has two stop lugs 146 and 147, which are arranged to be engaged by a lug 148 projecting from the releasing plate and the engagement of lug 148 with the lug 147 stops the parts in zero position and prevents further movement under the influence of the spring.

The mechanism located at the central station and the mechanism employed in grounding or otherwise connecting the ends of the line wires 90 and 91 may be of ordinary type and being well known in the art do not require detailed description.

What is claimed is:—

1. In telephony, a selecting mechanism at each telephone, a magneto calling circuit normally held operative by the selecting mechanism and movable to render the magneto circuit inoperative at the first operation of the selecting mechanism, and a receiver hook locking device operable to render the magneto circuits of connected subscribers operative after movement of the selecting mechanism.

2. In telephony, a step by step selecting mechanism arranged at each telephone, a

receiver hook locking lever, means operable from the selecting mechanism for releasing each lever at the first movement of said mechanism, an intermediate lever with which the locking lever engages on the removal of the receiver from the hook, a magneto calling circuit having one movable terminal normally held by the selecting mechanism in position to render the circuit operative and movable at the first step of the selecting mechanism to render the circuit inoperative, said intermediate lever engaging the movable terminal and moving the same to render the circuit operative at the stations of connected subscribers.

3. In telephony, a selecting mechanism at each telephone station, a pin carried thereby, a lever controlling the magneto circuit and normally engaged by said pin and held in position to render the circuit operative, a receiver hook locking lever under the control of the selecting mechanism, a cam on said lever, and an intermediate lever arranged to be engaged by said cam when the locking lever is released, said intermediate lever being movable to engage the circuit controlling lever and move the same to position to render the magneto circuit operative.

4. In telephony, a step by step mechanism including a ratchet wheel and an operating pawl therefor, a cam plate, means on the ratchet wheel for engaging and moving the cam plate, a lug carried by the pawl and with which said cam plate engages to force the pawl to inoperative position, and a spring connected to the ratchet wheel and placed under stress during the selecting movement, said spring serving to restore the parts to initial position when the pawl is disengaged.

5. In telephony, a selecting device including a ratchet wheel and a pawl for operating the same, a locking pawl engaging said ratchet wheel, a spring connected to the ratchet wheel and placed under stress during the selecting movement, said spring tending to restore the parts to initial position, a cam plate for moving both pawls to release position, and means on the ratchet wheel for engaging and moving said cam plate.

6. In telephony, a selecting mechanism including a ratchet wheel and an operating

pawl therefor, a spring tending to return the ratchet wheel to initial position, a locking pawl also engaging the ratchet wheel, a loosely fulcrumed cam plate, a pair of lugs projecting from the pawls and with which the cam plate engages to move said pawls to release position, and a locking shoulder carried by said cam plate and serving by engagement with the lug of the locking pawl to hold the cam plate in releasing position until the ratchet wheel returns to initial position.

7. In telephony, a selecting mechanism including a ratchet wheel, and an operating pawl therefor, a spring tending to return the ratchet wheel to initial position, a locking pawl also engaging the ratchet wheel, a loosely fulcrumed cam plate having its center of gravity below the fulcrum, lugs projecting from the pawls and with which the cam plate engages to move said pawls to release position, a locking shoulder carried by said cam plate and serving by engagement with the locking pawl to hold the cam plate in releasing position until the ratchet wheel returns to initial position, and interengaging means for the ratchet wheel and cam plate for moving the latter first into engagement with the lugs and then from engagement with said lugs.

8. In telephony, a selecting mechanism including a ratchet wheel, and an operating pawl therefor, a locking pawl also engaging the ratchet wheel, lugs projecting from said pawls, a cam plate arranged to engage with said lugs and move the pawls to release position, a shoulder carried by the cam plate and arranged to interlock with the lug of the locking pawl, means for limiting the swinging movement of the cam plate, and a spring for restoring the ratchet wheel to initial position when the pawls are moved from engagement therewith.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

RUBEN C. M. HASTINGS.

THURSTON MATHENY.

Witnesses:

C. P. Wood,

WM. C. FAIRES.