

No. 768,558.

PATENTED AUG. 23, 1904.

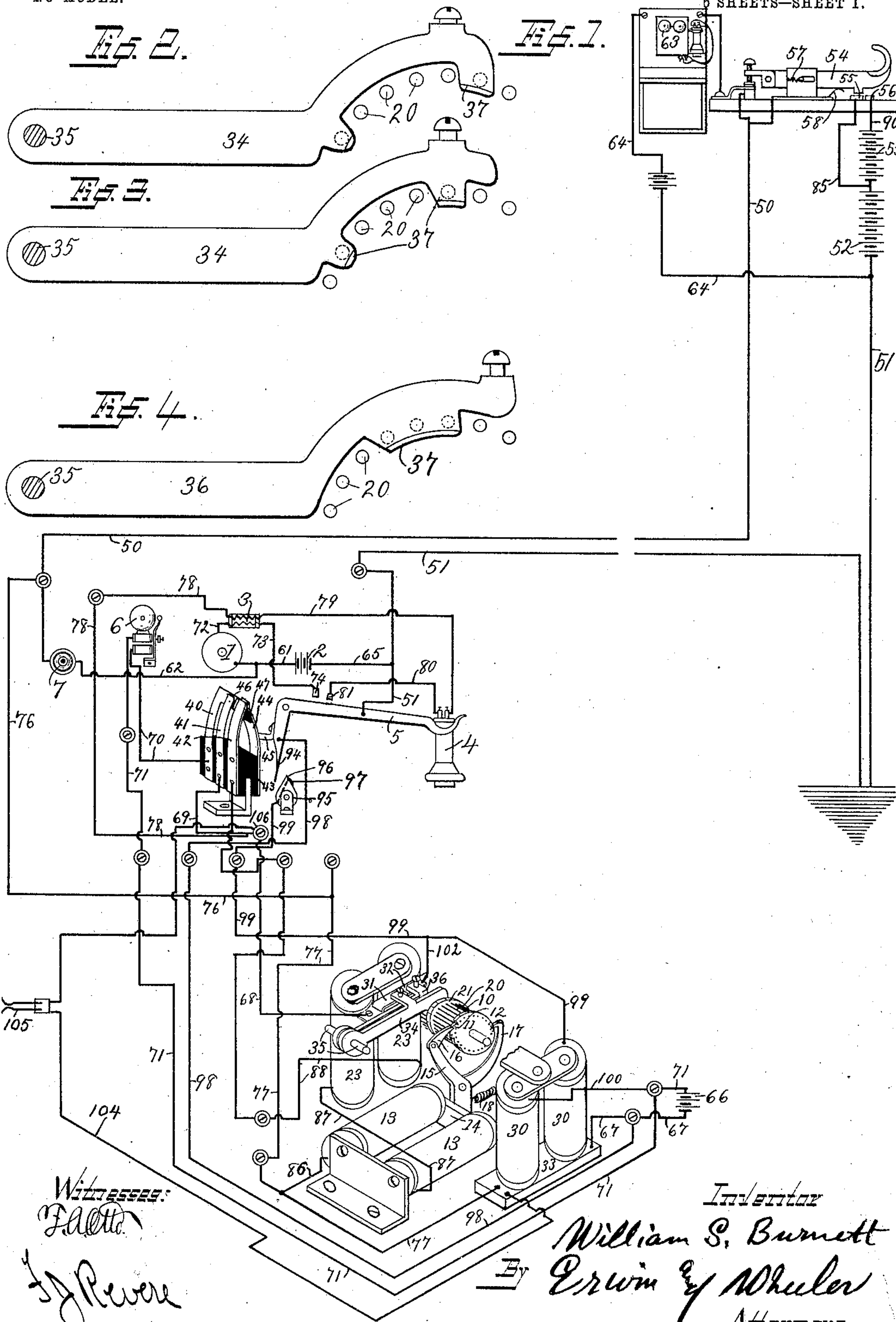
W. S. BURNETT.

ELECTRICAL SELECTING OR INDIVIDUALIZING INSTRUMENT.

APPLICATION FILED AUG. 26, 1901.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

F. A. R. R.
J. R. R.

Inventor

William S. Burnett

By *Erwin & Wheeler*

Attorneys.

No. 768,558.

PATENTED AUG. 23. 1904.

W. S. BURNETT.

ELECTRICAL SELECTING OR INDIVIDUALIZING INSTRUMENT.

APPLICATION FILED AUG. 26, 1901.

NO MODEL.

5 SHEETS—SHEET 2.

Fig. 5.

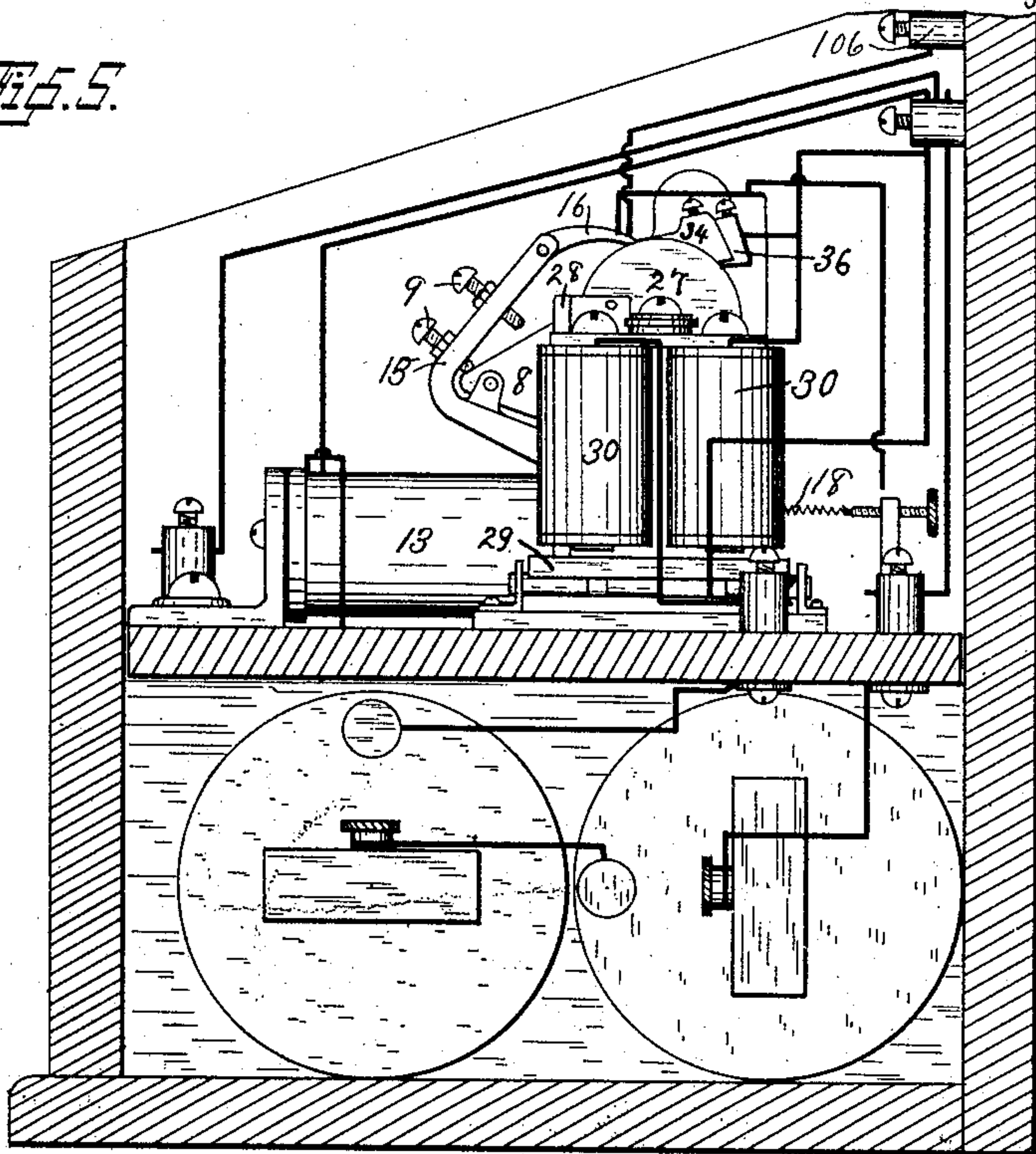
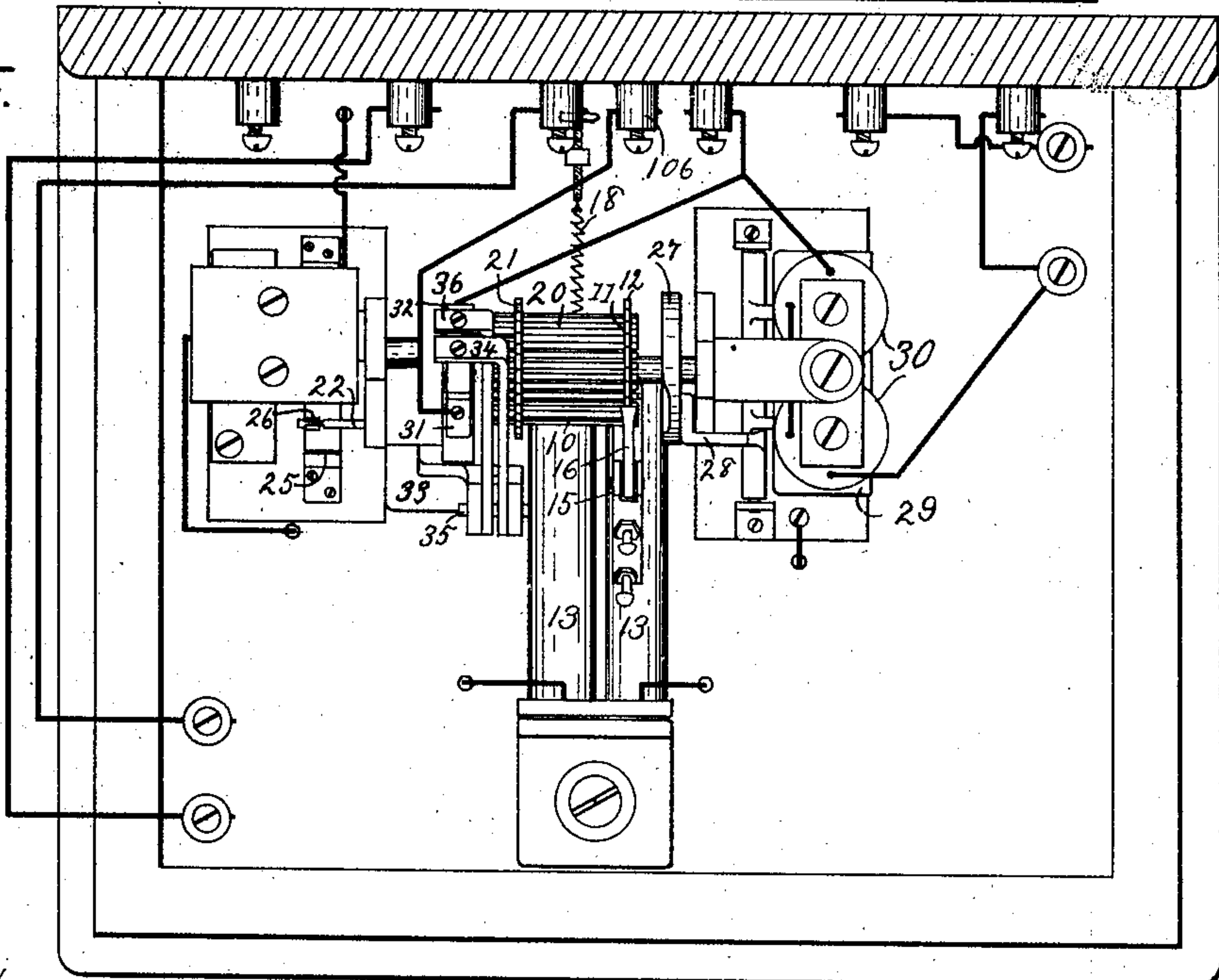


Fig. 6.



Witnesses:
Edw. J. Revere

Inventor
William S. Burnett
By *Erwin & Wheeler*
Attorneys.

No. 768,558.

PATENTED AUG. 23, 1904.

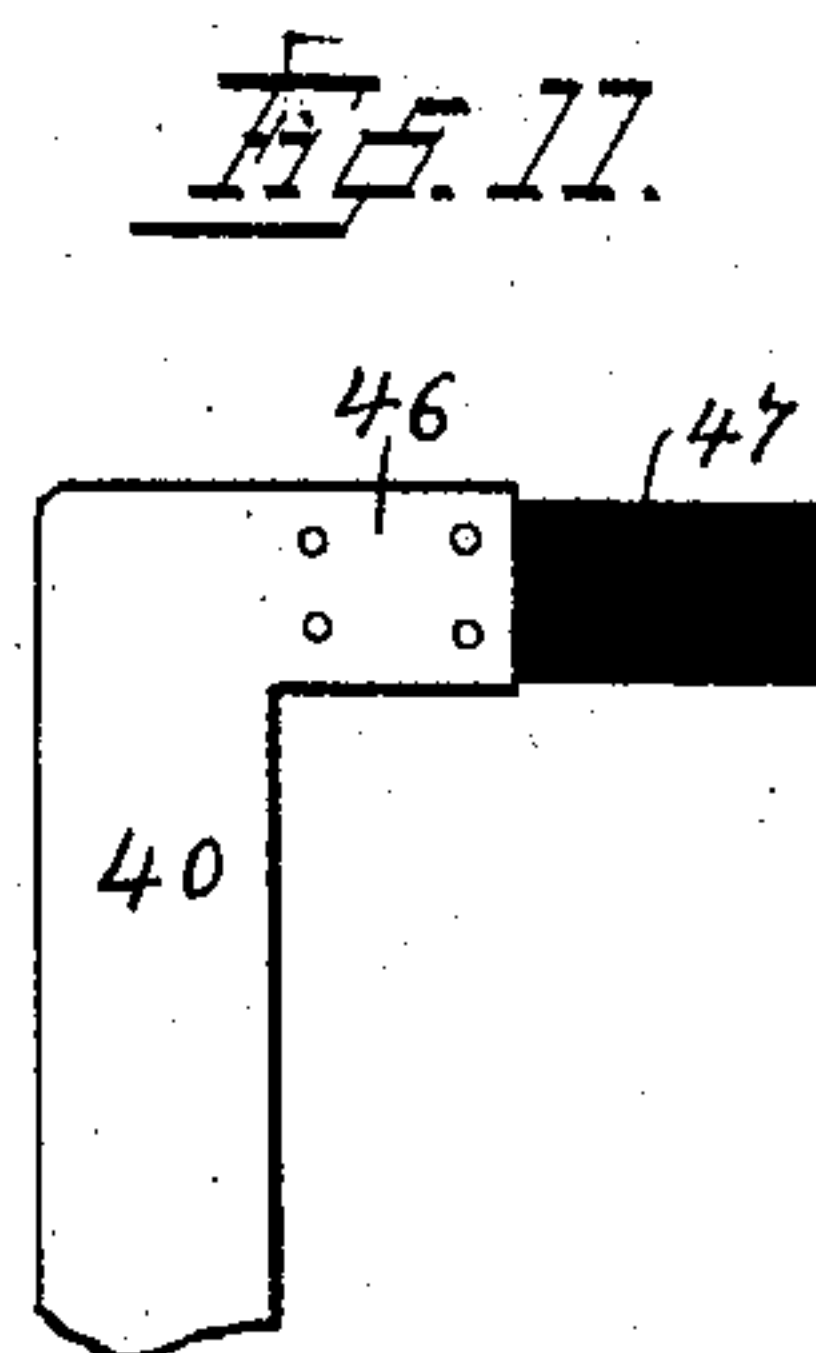
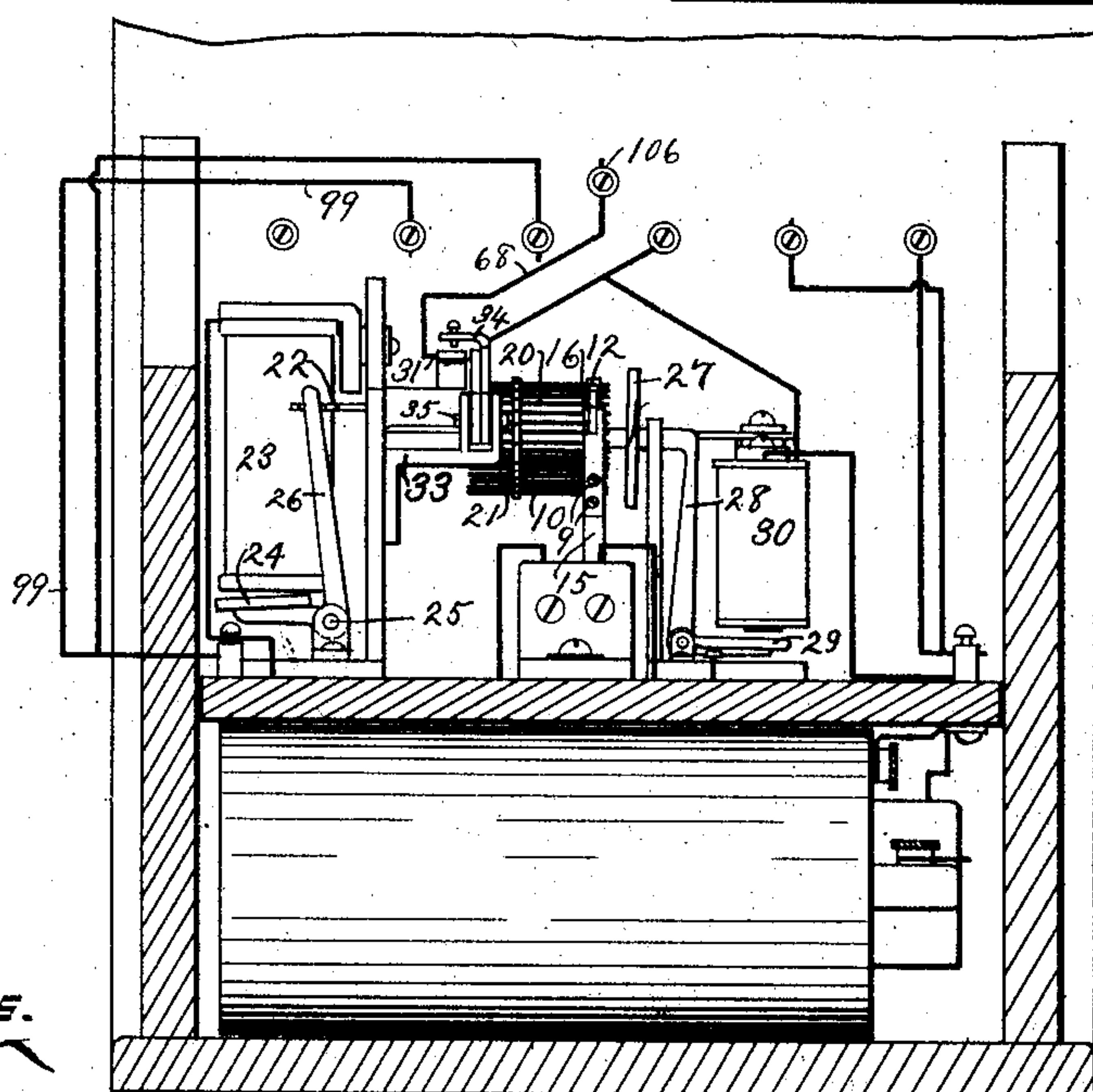
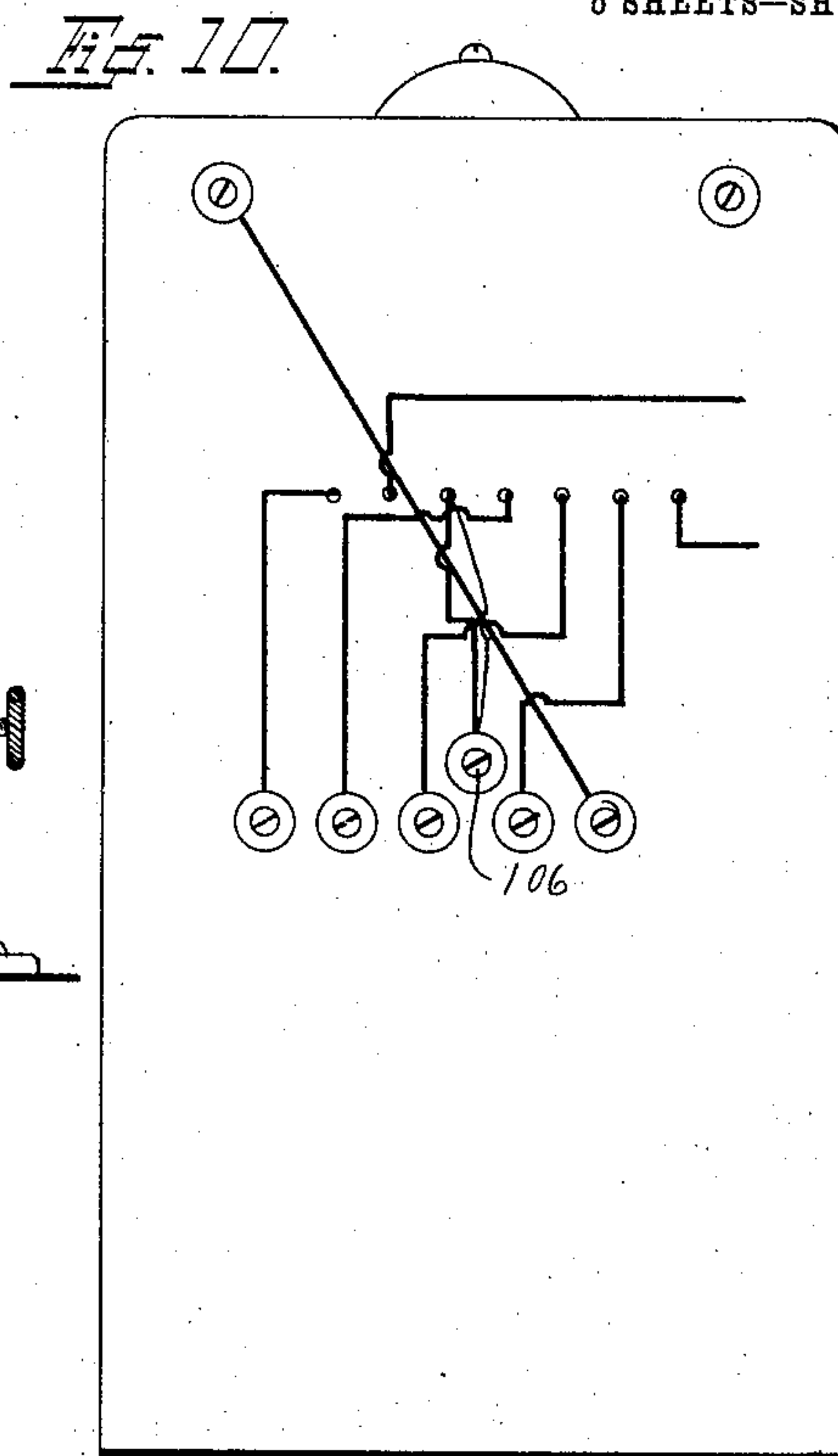
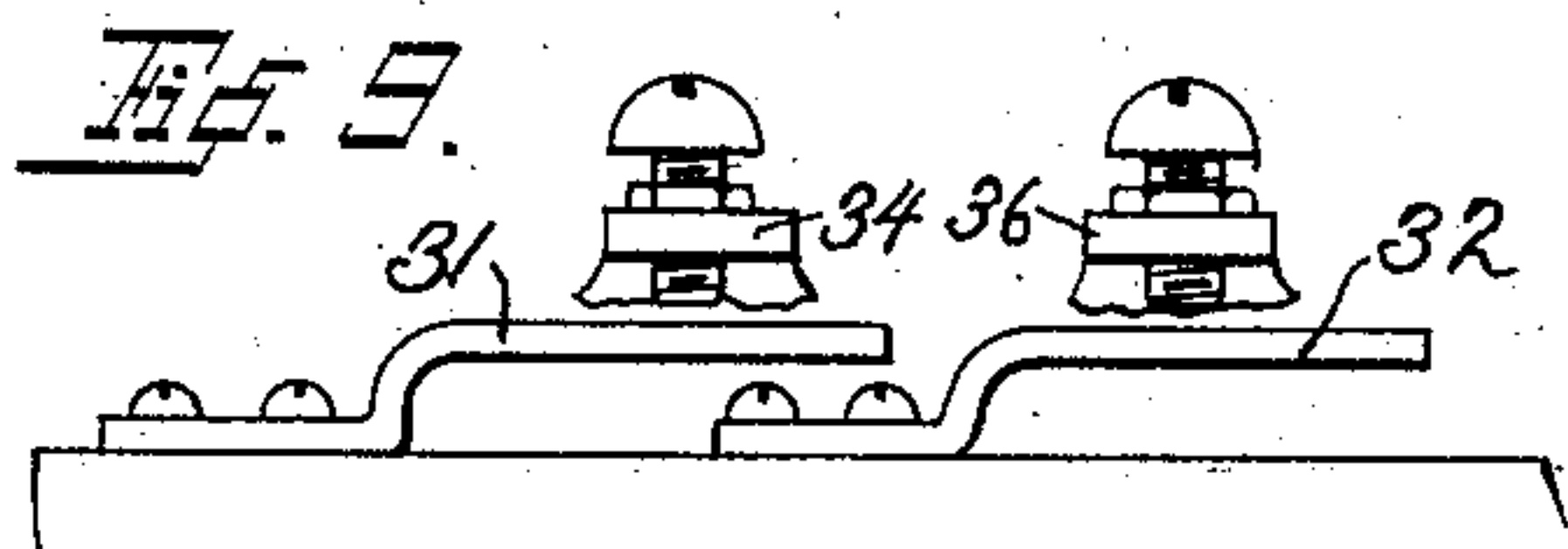
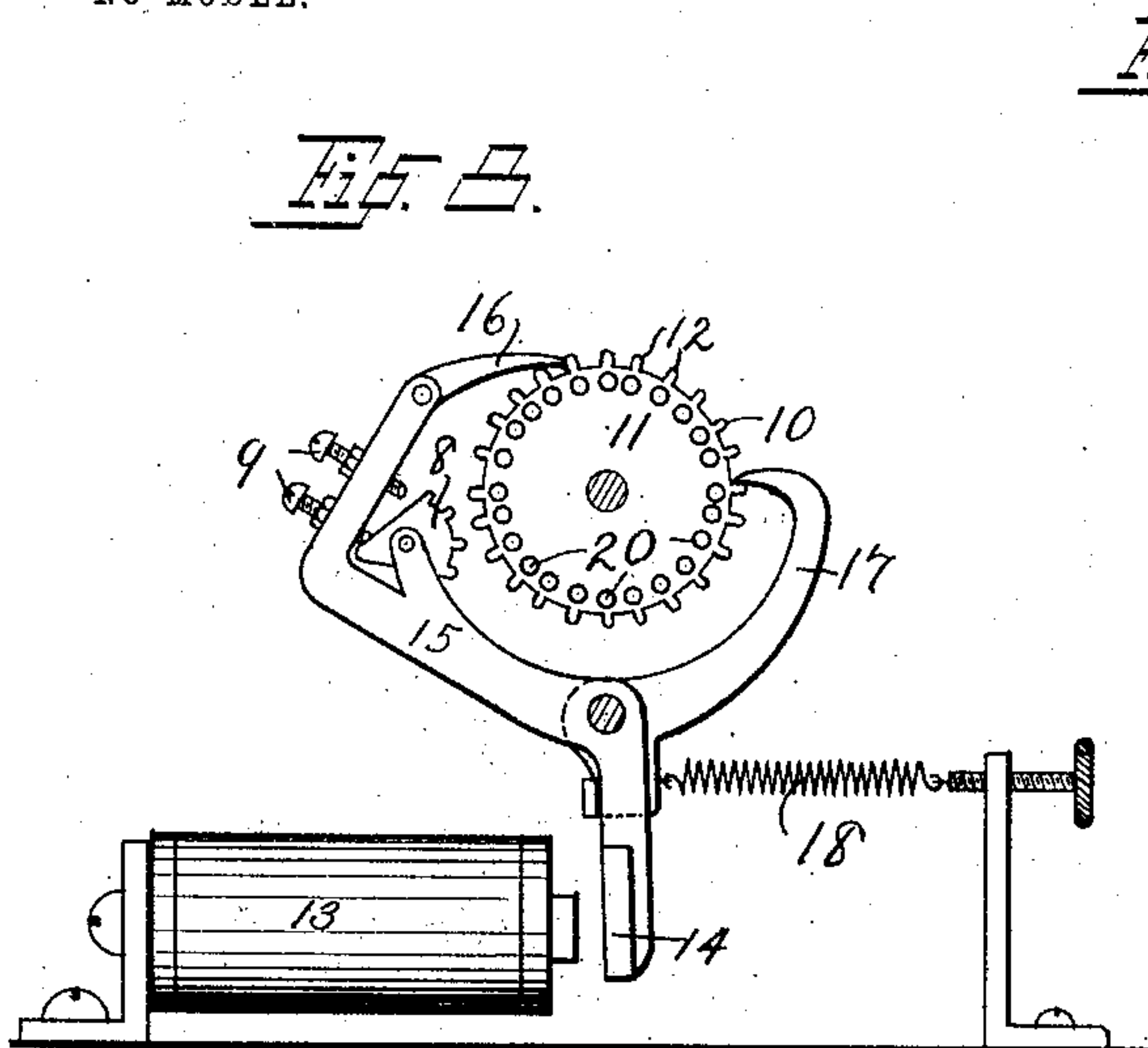
W. S. BURNETT.

ELECTRICAL SELECTING OR INDIVIDUALIZING INSTRUMENT.

APPLICATION FILED AUG. 26, 1901.

NO MODEL.

5 SHEETS—SHEET 3.



Witnesses.

F. A. L. L. O.

Inventor

William S. Burnett

By Erwin & Wheeler
Attorneys.

No. 768,558.

PATENTED AUG. 23, 1904.

W. S. BURNETT.

ELECTRICAL SELECTING OR INDIVIDUALIZING INSTRUMENT.

APPLICATION FILED AUG. 26, 1901.

NO MODEL.

5 SHEETS—SHEET 4.

Fig. 12.

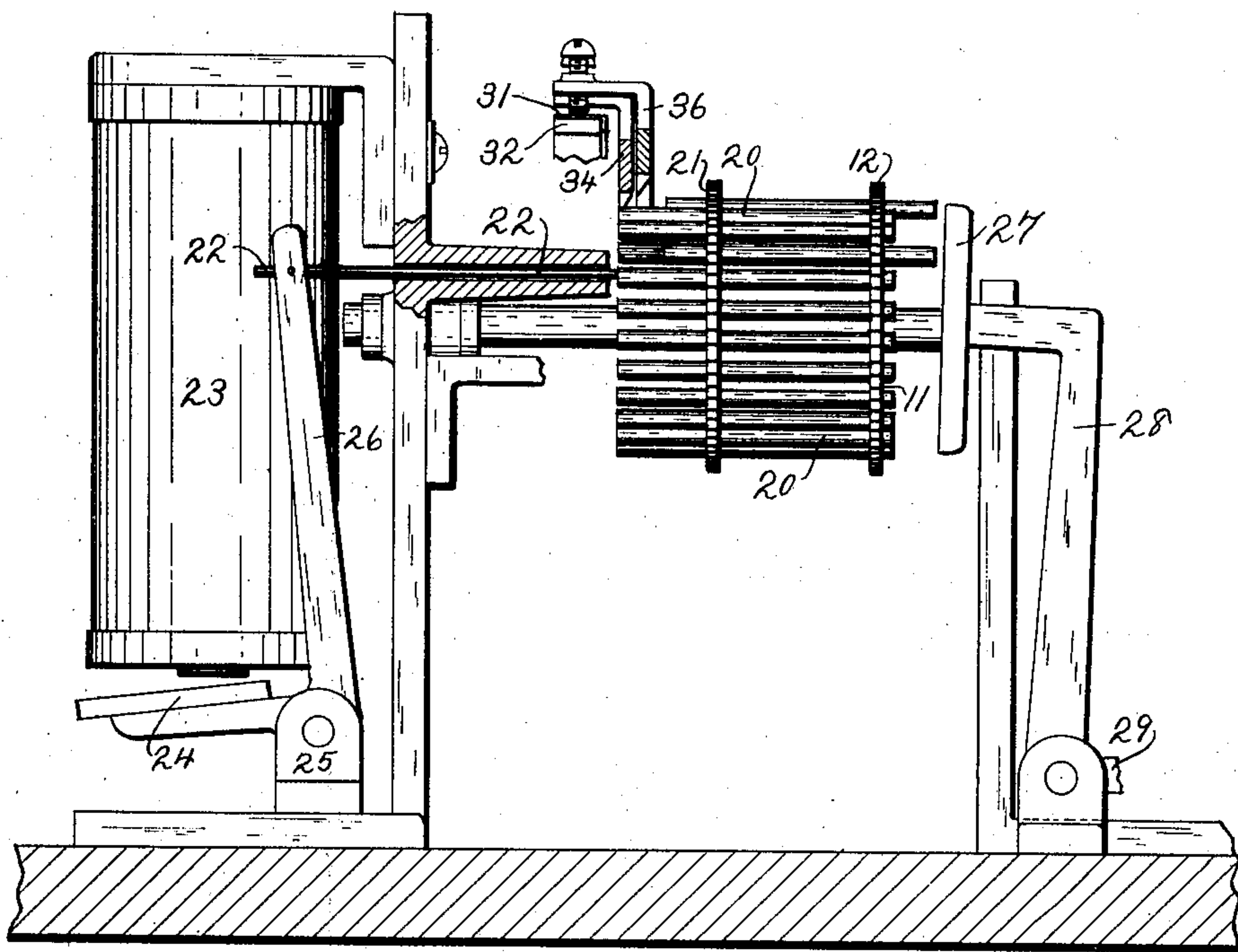


Fig. 13.

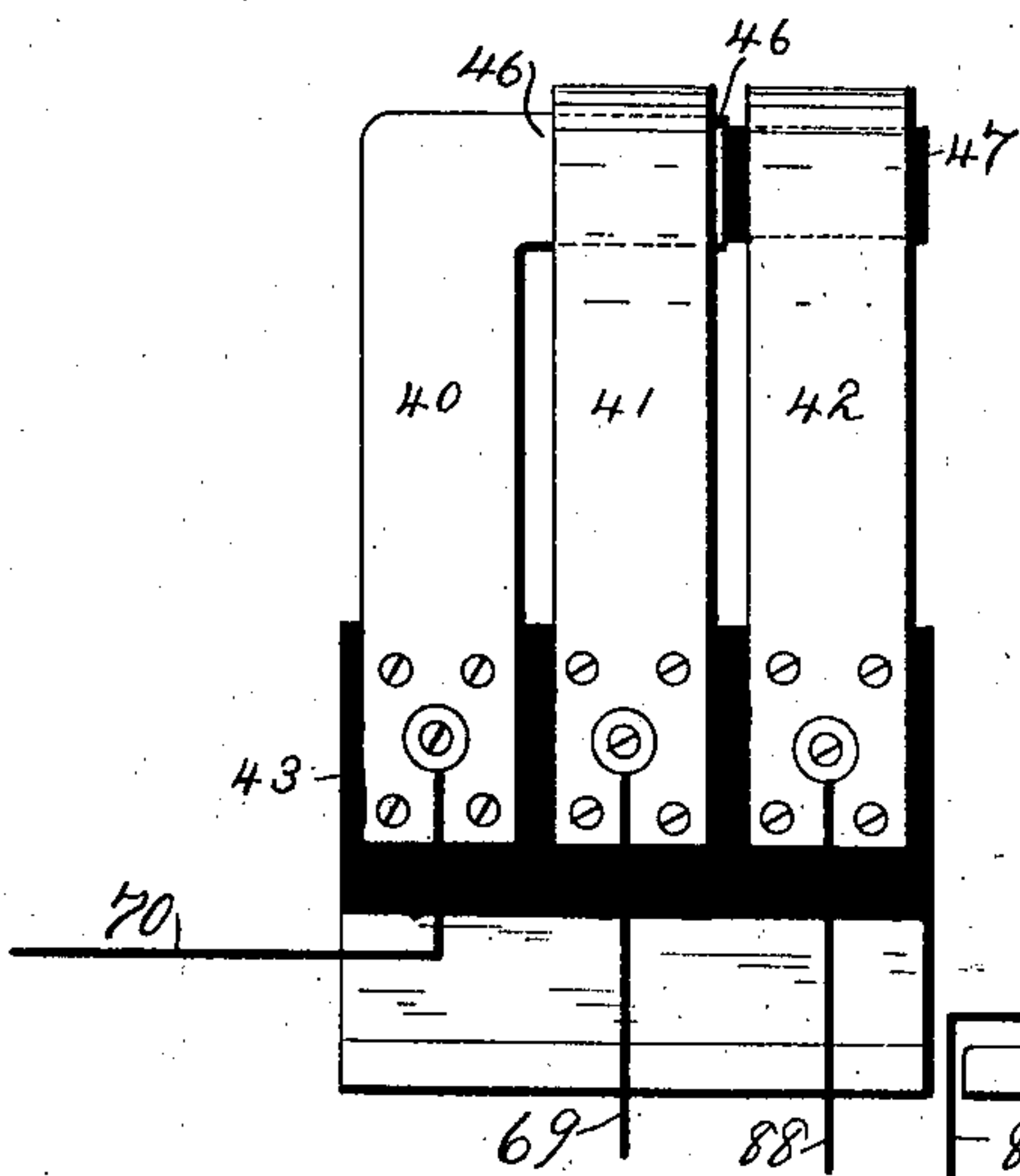


Fig. 14.

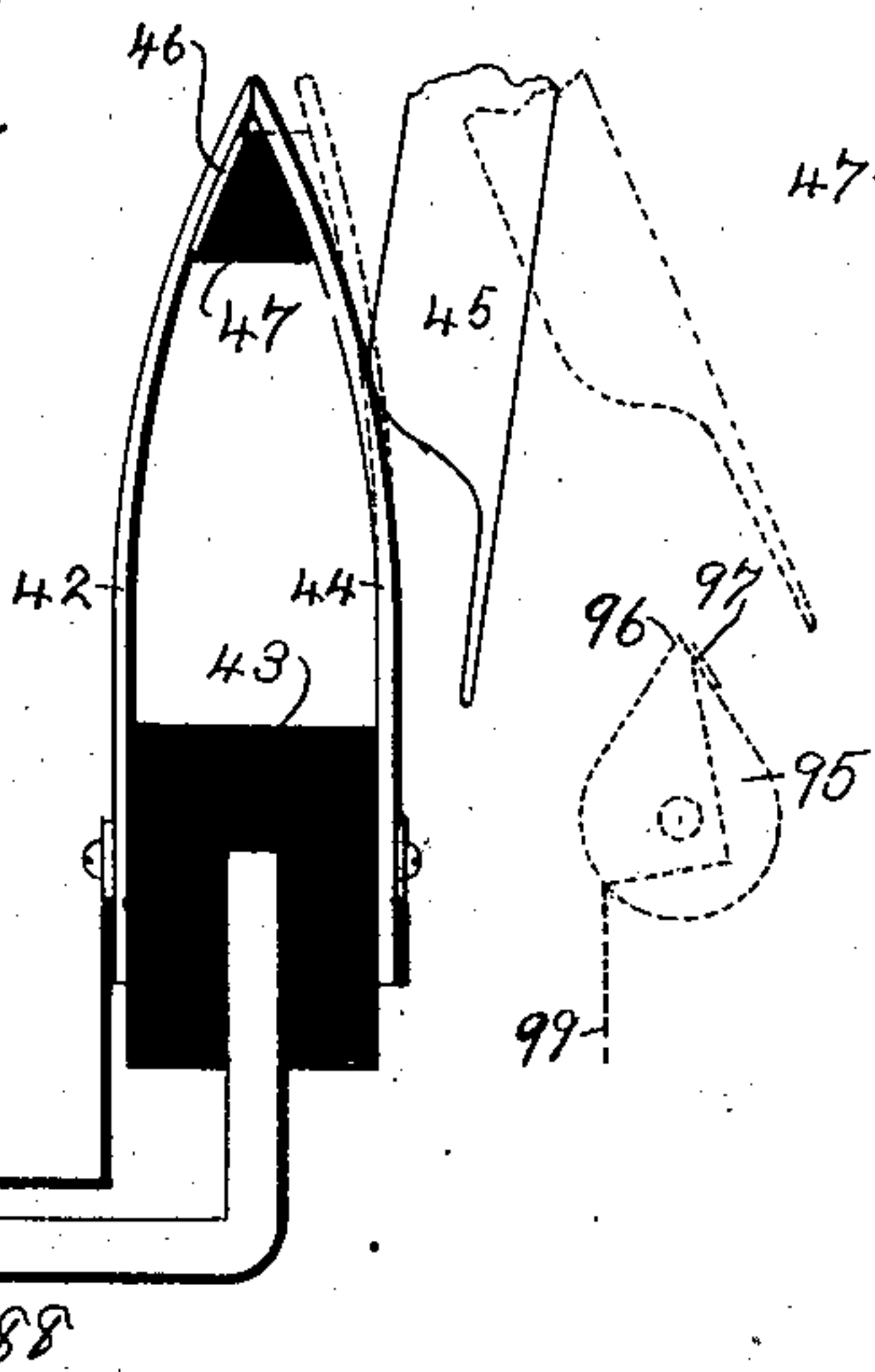
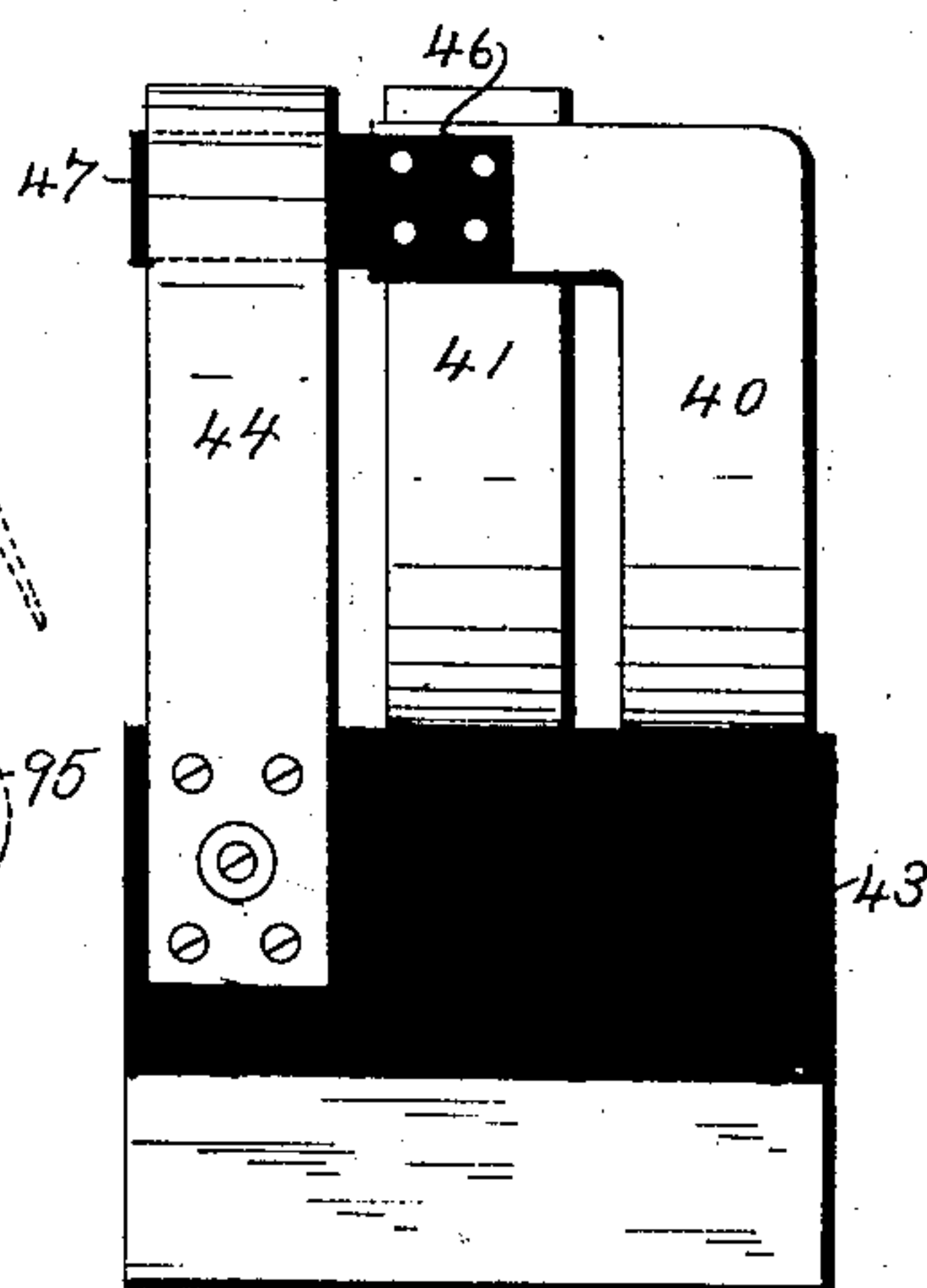


Fig. 15.



WITNESSES:

F. A. O. R.
H. J. Taughner

INVENTOR.

William S. Burnett
BY *Erwin & Wheeler*
ATTORNEYS

No. 768,558.

PATENTED AUG. 23, 1904.

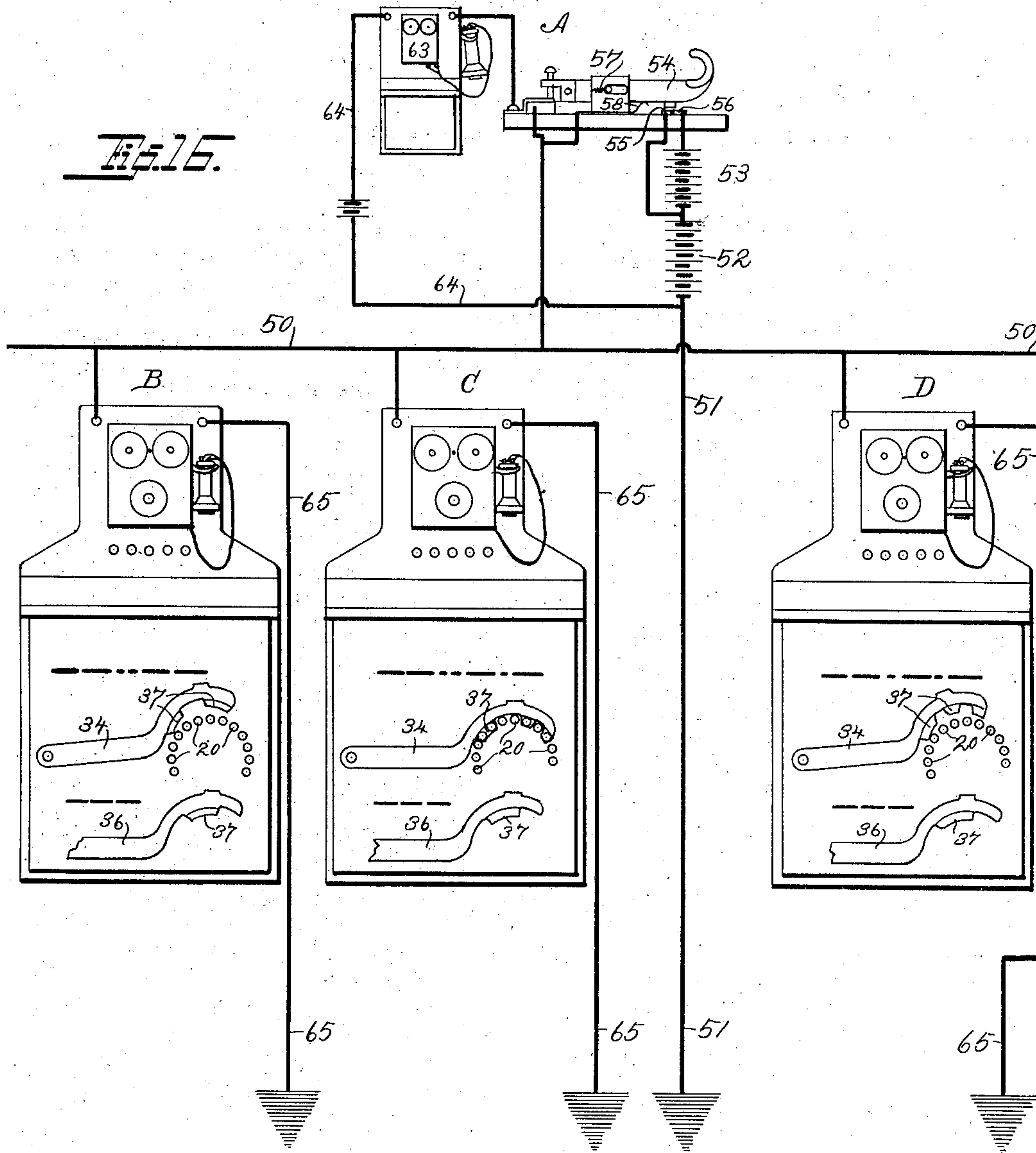
W. S. BURNETT.

ELECTRICAL SELECTING OR INDIVIDUALIZING INSTRUMENT.

APPLICATION FILED AUG. 26, 1901.

NO MODEL.

5 SHEETS—SHEET 5.



WITNESSES:

F. A. Otto
H. G. Taugher

INVENTOR

William S. Burnett
BY *Erwin & Wheeler*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM S. BURNETT, OF MILWAUKEE, WISCONSIN.

ELECTRICAL SELECTING OR INDIVIDUALIZING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 768,558, dated August 23, 1904.

Application filed August 26, 1901. Serial No. 73,281. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. BURNETT, a citizen of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Electrical Selecting or Individualizing Instruments, of which the following is a specification.

My invention relates to improvements in multiplex telesigs, and is in some respects a modification of the construction shown and described in a prior application, Serial No. 11,791, filed April 6, 1900, by myself and Wm. H. Goodall.

The object of the present invention is to provide means whereby a series of differentiating elements may be advanced step by step from a distant point through the medium of a series of electrical impulses and adjusted in the operative position by another series of impulses, either of different character or of the same character with different means of transmission; also, to provide means for utilizing electrical impulses originating at a given point to make and break the circuits of any one of a series of power-supply devices located at various stations at different points, each independently of the other, whereby operations may be performed at any desired station under the control of a central operator.

My invention also has for its object the provision of means whereby the differentiating elements of each station may be either restored to their normal positions automatically after the performance of the desired function or at the will of the operator at any time.

In the following description reference is had to the accompanying drawings, in which I have illustrated my invention as applied to a telephone, its adaptability for other signaling devices and for setting in operation or cutting out the power-supply devices at the various stations being apparent from such description.

The selecting instruments at the various stations are all operated in unison. These instruments and the switch-keys pertaining thereto are all exactly alike, with the exception that each selecting-key 34 has rider projections 37, which are different (either in shape or in position on the key) from those of

any other instrument. One of these keys 34 controls the call-bell and talking circuits at each station and is normally supported in circuit-breaking position by its riders, which rest upon a series of carrier-pins capable of adjustment in various permutations corresponding with the characteristics of the riders of any given key. The operation of the instruments effects an adjustment of the carrier-pins in each to such a position that the riders at the desired station will be unsupported, thus permitting the key 34 at that station to drop to circuit-closing position and sound the call-bell. The riders of the keys at all other stations being different, a like adjustment of the carrier-pins at such stations is ineffective to permit the depression of any other key but that at the single station to which the call pertains.

All the selecting instruments in the series are simultaneously operated and like pin adjustments made in each whenever any one of the stations is called; but as the rider projections of the keys 34 are different at each station the key at only one station at a time can move to circuit-closing position—viz., that key which has rider projections corresponding in position and form to the spaces formed by shifting the pins. The pins are shifted and the pin-carrier rotated by electromagnets energized from the station at which the call originates.

In the drawings, Figure 1 is a diagrammatic view of my invention, showing the local apparatus in perspective. In this figure the parts are somewhat separated and distorted, so that one part will not obscure another. Figs. 2 and 3 are side views of the individualizing keys and pins. Fig. 4 is a similar view of the readjusting-key. Fig. 5 is an elevation of the local individualizing apparatus at the end opposite the individualizing-hammer, and Fig. 6 is a plan view of such apparatus. Fig. 7 is a front view of the same. Fig. 8 is a detail end view of the carrier and its controlling mechanism. Fig. 9 is a side view in detail of the electrodes of the individualizing mechanism. Fig. 10 is a rear view of a telephone apparatus equipped with my invention, showing the wiring; and Fig. 11 is a detail view of the

contact device 40, arm 46, and bar 47. Fig. 12 is an enlarged detail front view of the carrier and the pin-adjusting and readjusting mechanisms, showing also the circuit-closing keys and their riders, one of the keys being in circuit-closing position, with its riders fitting spaces between the shifted pins. Fig. 13 is an enlarged detail side view of the multiple circuit-breaker controlling the circuits of the local call-bell and selecting instruments. Fig. 14 is an end view of the same. Fig. 15 is a side view of the same, showing the opposite side from that shown in Fig. 13. Fig. 16 is a diagrammatic view illustrating a central station A and a series of local stations B, C, and D, and showing their selecting-keys, that of station C being in circuit-closing position. This view also shows the readjusting-keys 36. Series of dots and dashes indicate the character of the impulses required for the adjustment of the keys to circuit-closing position. Like parts are identified by the same reference characters throughout the several views. 1 is the transmitter of an ordinary telephone station; 2, the battery therefor; 3, the induction-coil; 4, the receiver; 5, the switch-lever; 6, the bell, and 7 a ringing-key or push-button for calling up the central office. The secondary circuit of the induction-coil at each station is completed through an individualizing instrument at such station. In this instrument 10 is a rotative carrier, one end disk, 11, of which is provided with ratchet-teeth 12. An electromagnet 13 is adapted when energized to attract an armature 14, the movement of which is communicated to the carrier through a lever 15, pawl 16, and the ratchet-teeth 12 to move the carrier one step or a distance equal to the space between two adjacent ratchet-teeth, such movement being limited by a stop-dog 8, Fig. 8, cooperating with the adjusting-screws 9. When the magnet is deenergized, the armature is retracted by gravity and withdraws the pawl 16 to a position for reengagement with the next succeeding ratchet-tooth. The carrier can thus be advanced or made to revolve step by step indefinitely. To prevent its accidental retraction with the backward movement of the pawl 16, I have provided a catch 17, which is held in position for reengagement with the teeth 12 by a spring 18.

It will be observed that the carrier is provided with a series of annularly-arranged pins or individualizing elements 20. These are slidably mounted in holes in the circular end disks 11 and 21 of the carrier and are adapted to be shifted laterally (from left to right in the construction as shown) by means of a pin-shifting rod 22, which is actuated through the medium of an electromagnet 23, its pivotally-supported armature 24, pivot bar or rod 25, and arm 26, the latter being secured to the pin-shifting rod 22. When the carrier is revolved step by step, as above explained, the pins 20

are brought successively into registry with the pin-shifting rod, and whenever the latter is actuated the pin in registry therewith will be shifted to the right.

The movement of the pins when shifted by the rod 22 is limited by a readjusting-disk 27, which corresponds in shape to the end of the carrier, so as to cover the ends of all the pins. This disk 27 is supported by a lever 28 from an armature 29 of a third electromagnet 30 in such a manner that the movement of the armature when the magnet-coils 30 are energized will be communicated through the lever to move the disk inwardly (toward the carrier) and push the pins back to their normal positions. The armatures of the rod 22 and readjuster drop by gravity to their normal positions when their respective magnets are deenergized.

31 and 32 are electrodes, supported by but insulated from the carrier-frame 33.

34 is a circuit-closing switch or key pivotally secured to the frame at 35 and adapted when depressed to contact with the electrode 31. 36 is a similar key adapted to contact with the electrode 32. Both these keys are provided with riders 37, adapted to rest upon the carrier-pins 20 when the latter are in normal position and to be supported by the latter in a raised position, with the keys out of contact with the electrodes.

The keys 34 are the selecting-keys, and their riders 37 are different at each station, either in position or size, (see Fig. 16,) so that the key 34 at each station requires a specific pin adjustment suited to the individual characteristics of its riders 37 in order to permit such riders to enter spaces formed by shifted pins, and thus permit the depression of the key to circuit-closing position. As the pin adjustments of all the carriers at the various stations are necessarily alike, (being effected simultaneously by the same impulses traversing the main line,) while the characteristics of the riders on each of the keys 34 are different from those of all other keys, it will be obvious that any specific pin adjustment will be effective to move but one key to circuit-closing position—viz., that key which has rider characteristics in correspondence with which the carrier-pins have been adjusted.

When the key 34 at any station is in circuit-closing position, it operates to close the ringing-circuit of the telephone at that station and connects up the talking-circuits. The talking-circuits are, however, also controlled through the medium of the switch-lever 5 of the telephone in the usual manner, whereby the removal of the receiver from the hook on lever 5 opens the ringing and closes the talking circuits, as in all ordinary telephones. When the key 34 at any station is in circuit-closing position, it may be lifted to normal circuit-breaking position in two ways—viz., first, the carrier may be advanced by an additional

impulse, energizing electromagnet 13, as above explained, thus causing unshifted pins to move under and lift the key-riders and key; second, the readjusting-disk 27 may be actuated through the medium of the magnet 30, armature 29, and lever 28 to push all the pins back to normal position, in which case the rider of any depressed key will be lifted by the readjusted pins pushing against the beveled side faces of the riders until the latter are forced upwardly to permit the pins to pass beneath them to normal position.

The magnets 30 are energized through the medium of a key 36 at each station, the riders for these keys being alike for all the stations, so that a common pin adjustment suited to the characteristics of these riders will energize the magnets 30 of all the stations. The readjusting movement of the pins not only lifts the keys 34, but also the keys 36, out of circuit-closing position, the latter breaking the circuits through magnets 30, which are thus automatically cut out of circuit.

Where my device is used in connection with telephones, I have provided, in connection with the telephone switch-lever 5, a multiple-circuit breaker, consisting of a series of contact devices 40, 41, and 42, located on one side of an insulating-block 43, and a fourth contact device 44, located on the opposite side of the block 43, in the path of an arm 45 of the switch-lever 5.

The device 40 is provided with a laterally-extending arm 46, adapted to contact with the device 41, and to this arm is attached a bar 47, of non-conducting material, which extends between the device 42 and 44. The contact devices 40 and 44 are arranged to yield, being preferably formed of elastic material, so that when the switch-lever 5 is depressed the device 44 will be pressed by the arm 45 into contact with the device 42, the bar 47 being also pressed backwardly with the arm 46 to bring the latter into contact with the device 41.

When the receiver is lifted from the lever 5, the resilience of contacts 40 and 41 causes them to separate, thus breaking the ringing-circuit of the local telephone, (hereinafter traced.) At the same time the contacts 44 and 42 are also permitted to separate, thus breaking the circuit of the magnets 13 and 23 (also hereinafter traced) and preventing further adjustments of the carrier or pins pending the return of the telephone receiver and lever 5 to normal position.

50 and 51 are the conductors of the main line.

52 and 53 are the batteries of a quadruplex system located at the central office or point from which the operations originate.

54 is a circuit-closing switch-lever for closing the circuit, either through the battery 52 or through both batteries 52 and 53 in series,

according as the lever 54 is brought into contact with the electrodes 55 or 56, respectively. The lever is retracted by a spring 57 and held normally out of contact with the electrodes by a spring 58. The secondary circuit of the central-office telephone may also be closed by means of this switch, as illustrated in Fig. 1.

The call-circuit of the local station is completed through the medium of a push-button 7, closing the circuit of the battery 2 through the conductors 61 and 62, the push-button, conductor 50, the central-office switch 54, and bells 63, conductors 64, 51, and 65.

The ringing or call-receiving circuit of the local station is completed by closing the circuit of the battery 66 through the individualizing device by means of the conductor 67, the frame of the individualizing device, switch-key 34, electrode 31, conductors 68 and 69, contact devices 41 and 40, conductor 70, the bell, and conductor 71. The circuit of the transmitter-battery 2 is also completed through the medium of the conductor 61, the transmitter, the conductor 72, the induction-coil, conductor 73, contact 74, the telephone switch-lever 5, and the conductors 51 and 65.

The circuit of the receiver is completed by closing the circuit of the line-wires 50 and 51 through the conductors 76 and 77, frame of the individualizing device, the key 34, electrode 31, conductors 68 and 78, the secondary of the induction-coil, conductor 79, the receiver, conductor 80, contact 81, and switch-lever 5, the latter being electrically connected with the line-wire 51.

To operate the individualizing device, the circuit of the battery 52 is closed through the electromagnets 13 and 23 by means of the conductor 85, electrode 55, lever 54, conductors 50, 76, 77, and 86, electromagnet 13, conductor 87, electromagnet 23, conductor 88, contacts 42 and 44, the switch-lever 5, and conductor 51. The circuit of the series battery 52 and 53 is closed through the same conductors, except that the conductor 90 and electrode 56 is substituted for the conductor 85 and electrode 55 of the single-battery circuit. It will of course be understood that the electromagnets 13 and 23 are so wound that one of them will not be energized by the current of the single battery 52, while both of them will be energized by the series battery 52 and 53.

It will be observed that the lever 5 is provided with a depending contact-arm 45, which is adapted (when the lever is raised to close the talking-circuits of the telephone) to engage and actuate an oscillatory insulation-cam 95, the latter swinging to permit the arm 45 to pass and then dropping to its normal position with the point 96 projecting vertically. When the lever is again depressed, the arm 45 again actuates the cam and passes it in the opposite direction, but in so doing engages an electrode 97, carried by the cam, when a circuit

of the battery 66 is closed through the conductors 67 and 98, the arm 45, cam 95, conductor 99, electromagnet 30 and conductors 100 and 71, thus energizing the magnet 30 and operating the readjuster to restore all the pins to their normal positions. The riders 37 of the keys 34 and 36 are slightly beveled, so that when the pins are struck by the readjuster they will lift the riders and pass under them to raise the keys.

When the central operator desires to restore all the devices to their normal positions, the pins are adjusted to permit the depression of the keys 36, which, being alike for all stations, will simultaneously drop at all the stations on the line. A circuit of the battery 66 at each station is then closed through the conductor 67, the frame of the device, key 36, electrode 32, conductors 102 and 99, the electromagnet 30 and conductors 100 and 71, the magnet 30 being thus energized at each station to simultaneously readjust all the pins to their normal positions and raise all the keys.

In order that each user may switch his own instrument into and out of circuit without adjusting the carrier-pins, I have provided a bridging-wire 104, which is connected with the frame of the individualizing device and the binding-post 106, whereby a short circuit of the line is established through the conductors 50, 76, 77, the frame of the selecting instrument, conductor 104, key 105, post 106, conductor 78, induction-coil, conductor 79, telephone-receiver, conductor 80, contact 81, and switch-lever 5, the latter being electrically connected with the line-wire 51.

Briefly reviewing the operation of the device and assuming that the user desires to call the central station, the ringing-key 7 is pressed to switch the battery 2 into circuit with the line to operate the central-office signal. The bridging-wire 104 is then connected, by means of the key 105, with the binding-post 106, whereupon the user's telephone on the mechanism is short-circuited and the individualizing instrument cut out. The user may then call for the desired connection in the usual manner.

Assuming that the party with whom communication is desired has a telephone provided with a similar individualizing instrument, the central operator will then actuate the key 54 into and out of contact with the electrode 55 to send the desired number of impulses from the battery 52 over the line-wires to adjust the carrier 10 by energizing electromagnet 13 with contacts at the proper intervals of the key 54 on the electrode 56, whereby the stronger impulses of the series battery 52 and 53 are sent over the line to actuate the pin-adjusting rod 22 through the medium of the magnets 23, the particular pins being thus selected and actuated which correspond in position with the riders 37 of the key pertaining to the station which it is desired to call.

These pins having been actuated to remove them from their position of key-support, the carrier is again actuated step by step until the key 34 of the selected station drops into the spaces between the remaining pins, whereupon the circuit of the battery 66 at that station is closed through the bell of such station. As above stated, the carrier-pins at all the stations are similarly adjusted in calling any one of them; but only that station will be called in which the riders of keys 34 fit the spaces between the shifted pins. The keys 34 are each preferably provided with a plurality of riders, thus allowing a large number of permutations to be effected with comparatively few pin-adjusting impulses by varying the order of adjustments. The bell continues to ring until the person called removes the receiver 4 from the hook 5, when the latter rises in the usual manner and permits the separation of the contact devices 40 and 41, thus breaking the circuit of the bell, the talking-circuits being simultaneously switched in by the contacts made by the lever 5, as in ordinary telephones, with this exception, that the circuit of the receiver is closed through the individualizing instrument. When the user again hangs up the receiver, the weight of the latter upon the lever 5 depresses said lever, causing the arm 45 to contact with the electrode 97, whereby the circuit of the battery 66 is closed, as above explained, through the electromagnet 30, thus actuating the readjusting device and restoring all the pins to their normal positions.

While I have described my invention as applied to a telephone system, it is obvious that the same may, if desired, be utilized for the performance of a great variety of operations at a point distant from a central office, as the same mechanism which closes the circuit of the local batteries of a telephone may obviously be used for closing any other electrical circuit, whereby any desired operation may be performed the functions of which may be exercised by electrical apparatus or devices. Having thus described my invention, what I claim as new, and wish to secure by Letters Patent, is—

1. The combination with an electrical station; of a series of individualizing elements mounted in a suitable support at said station; electrically-operated mechanism for advancing said elements collectively; electrically-operated mechanism for adjusting the elements individually; means for transmitting electrical impulses to said mechanisms from a distant point; and means for operating one of said mechanisms independently of the other.
2. The combination with an electrical station; of a series of individualizing elements at said station; electrically-operated mechanism for advancing said elements collectively; mechanism of similar character for adjusting the elements individually; means for transmitting electrical impulses to said mechanisms

from a distant point; means for utilizing certain of such impulses in one of said mechanisms independently of other; and a readjusting device adapted to restore all said elements to their normal positions.

3. The combination with an electrical station; of a series of individualizing elements at said station; electrically-operated mechanism for advancing said elements collectively; mechanism of similar character for adjusting the elements individually; means for transmitting electrical impulses to said mechanisms from a distant point; means for utilizing certain of such impulses in one of said mechanisms independently of other; and a readjusting device, subject to the control of the operator either at the local station or said distant point, adapted to restore all said elements to their normal positions.

4. The combination with an electrical station; of a series of individualizing elements at said station; electrically-operated mechanism for advancing said elements collectively, step by step; mechanism of similar character for adjusting the elements individually; means for transmitting electrical impulses to said mechanisms from a distant point; means for utilizing certain of such impulses in one of said mechanisms independently of other; and a readjusting device adapted to restore all said elements to their normal positions.

5. The combination with an electrical station; of a series of individualizing elements mounted in a suitable support at said station; electrically-operated mechanism for advancing said elements collectively; electrically-operated mechanism for adjusting the elements individually; means for transmitting electrical impulses to said mechanisms from a distant point; and means for operating one of said mechanisms independently of the other, together with a circuit-closing key provided with characteristic members adapted to be held with the key out of circuit-closing position, when the individualizing elements are in their normal positions.

6. The combination with an electrical station; of a series of individualizing elements mounted in a suitable support at said station; electrically-operated mechanism for advancing said elements collectively; electrically-operated mechanism for adjusting the elements individually; means for transmitting electrical impulses to said mechanisms from a distant point; and means for operating one of said mechanisms independently of the other, together with a plurality of circuit-closing keys, one of which is provided with characteristics differing from the keys of any other in the same circuit and adapted, when in circuit-closing position, to produce individual operations or results at that station, and another being similar to the corresponding keys of every other station and adapted when in circuit-closing position, to produce re-

sults common to all the stations; said keys being held out of circuit-closing position by the individualizing elements engaging, when in normal position, the characteristic portions of the keys.

7. The combination with an electrical circuit having a plurality of stations; of circuit-closing keys at each station, one of which is provided with characteristics different from the keys of any other station in the same circuit, and another of which is similar to the corresponding keys of every other station; an individualizing instrument at each station adapted to hold said keys out of circuit-closing position; and means for adjusting the individualizing instrument at one station, from another station, in correspondence with the characteristics of any key whereby such key is permitted to drop into circuit-closing position.

8. The combination with an electrical station; an individualizing device for said station; means for controlling such device from a distant station; a source of electrical supply having a normally open circuit adapted to be closed by said individualizing device; a call-signal, included in said circuit; other electrically-controlled mechanism such as a telephone arranged to be normally out of said circuit and a device controlled by the user at said first-mentioned station, for cutting out said call-signal and switching other electrically-controlled mechanism into and out of said circuit.

9. The combination with an electrical station; an individualizing device for said station; means for controlling such device from a distant station; a source of electrical supply having a normally open circuit adapted to be closed by said individualizing device; a call-signal included in said circuit; other electrically-controlled mechanism such as a telephone arranged to be normally out of said circuit and a device controlled by the user at said first-mentioned station, for cutting out said call-signal and switching other electrically-controlled mechanism into and out of said circuit, together with means controlled by either the user or the central operator for restoring said individualizing device to its normal position.

10. The combination with an electrical station; an individualizing device for said station; means for controlling such device from a distant station; a source of electrical supply having a normally open circuit adapted to be closed by said individualizing device; a call-signal included in said circuit; other electrically-controlled mechanism such as a telephone arranged to be normally out of said circuit and a device controlled by the user at said first-mentioned station, for cutting out said call-signal and switching other electrically-controlled mechanism into and out of said circuit, together with means for restoring the individualizing device to its normal position.

tion with the electrical supply-circuit open, as soon as the desired functions of the auxiliary mechanism are performed.

11. The combination with an electrical station; an individualizing device for said station; means for controlling such device from a distant station; a source of electrical supply having a normally open circuit adapted to be closed by said individualizing device; a call-signal included in said circuit; other electrically-controlled mechanism such as a telephone arranged to be normally out of said circuit and a device controlled by the user at said first-mentioned station, for cutting said

call-signal and switching other electrically-controlled mechanism into and out of said circuit, together with means whereby the manual act of the user in switching out said last-mentioned mechanism will operate to restore the individualizing device to its normal or open-circuit position. 15 20

In testimony whereof I affix my signature in the presence of two witnesses.

WILLIAM S. BURNETT.

Witnesses:

JAS. B. ERWIN,
LEVERETT C. WHEELER.