

No. 623,117

Patented Apr. 11, 1899.

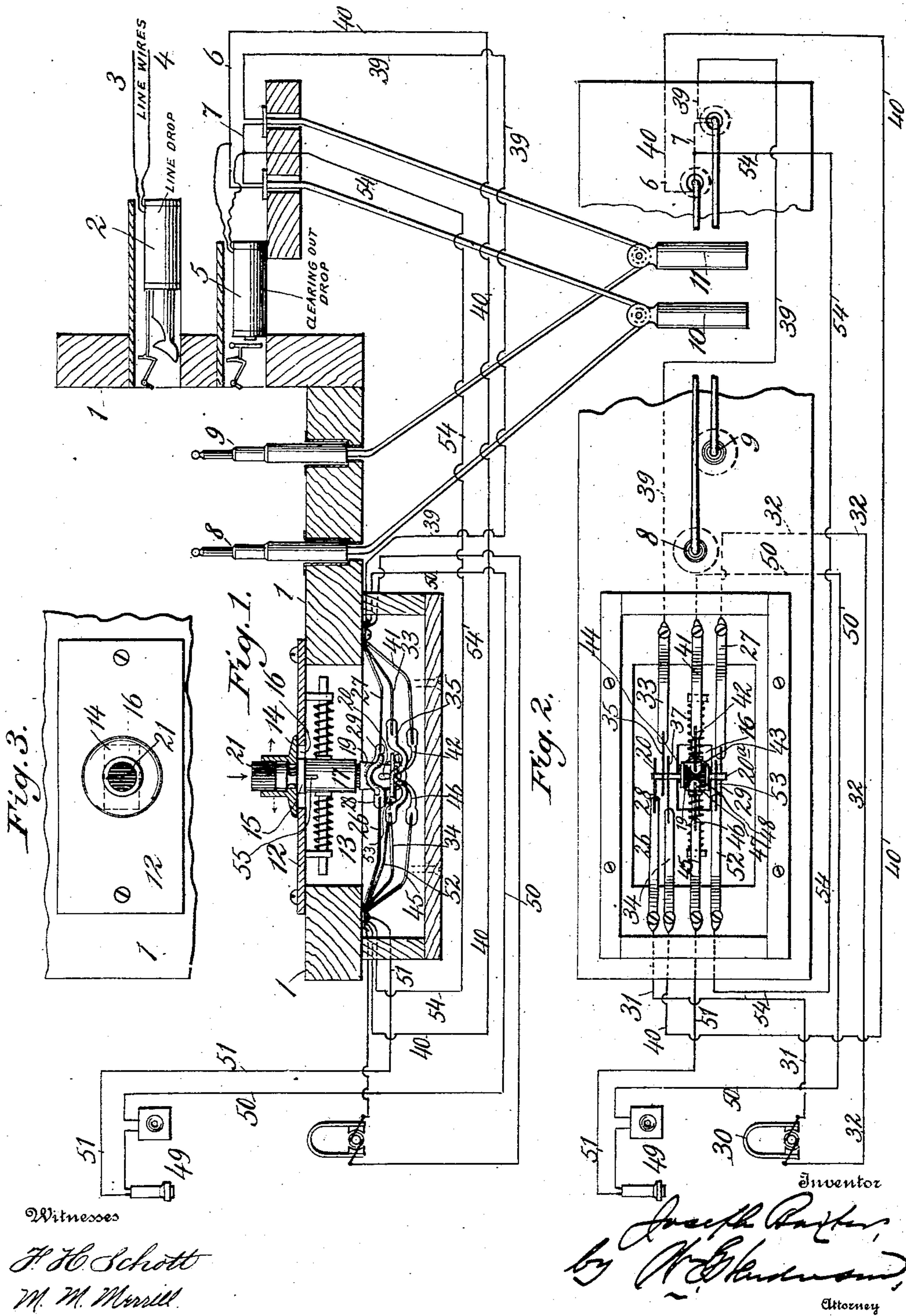
J. BAXTER.

LISTENING KEY OR CIRCUIT CHANGER FOR OPERATORS' KEYBOARDS.

(Application filed Apr. 25, 1898.)

(No Model.)

3 Sheets—Sheet 1.



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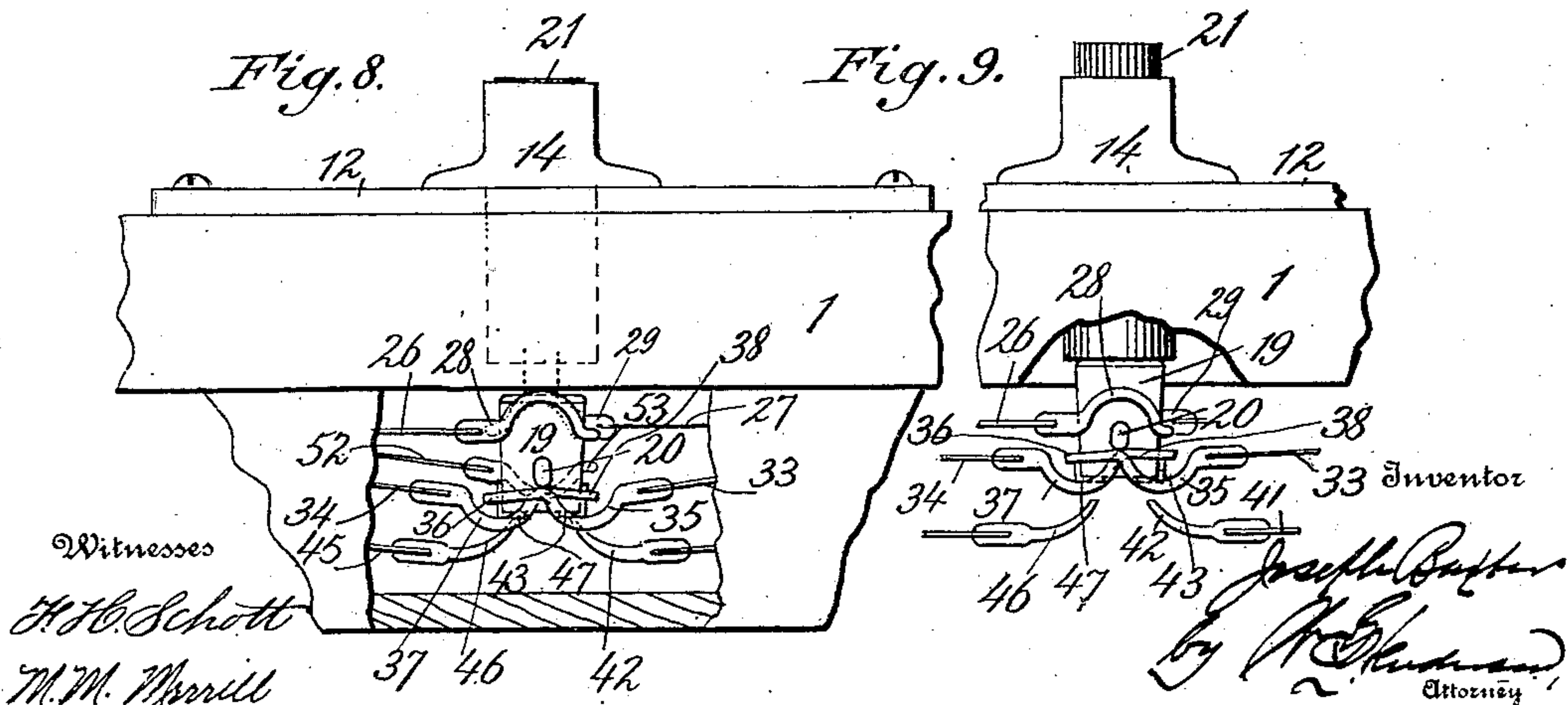
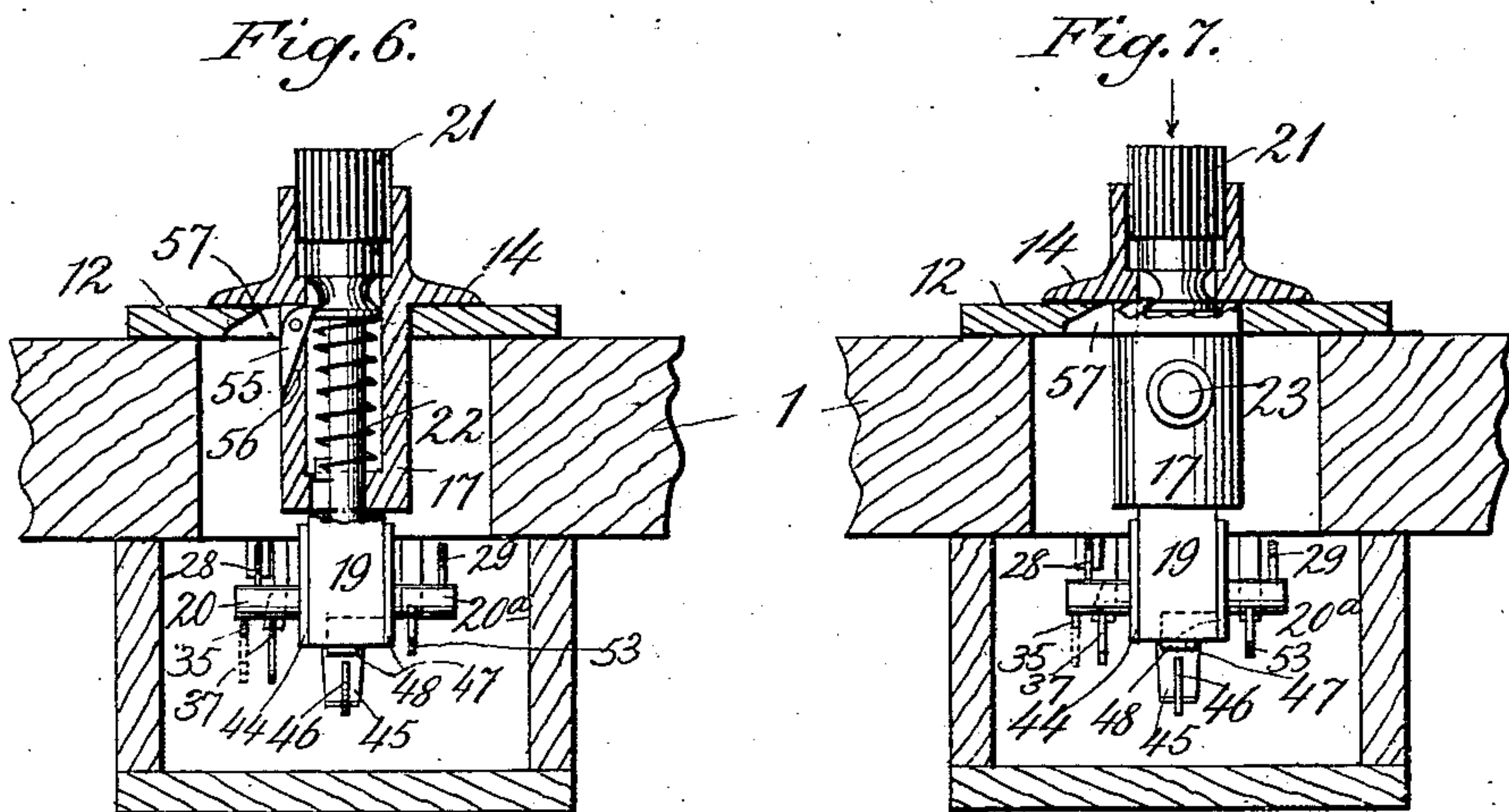
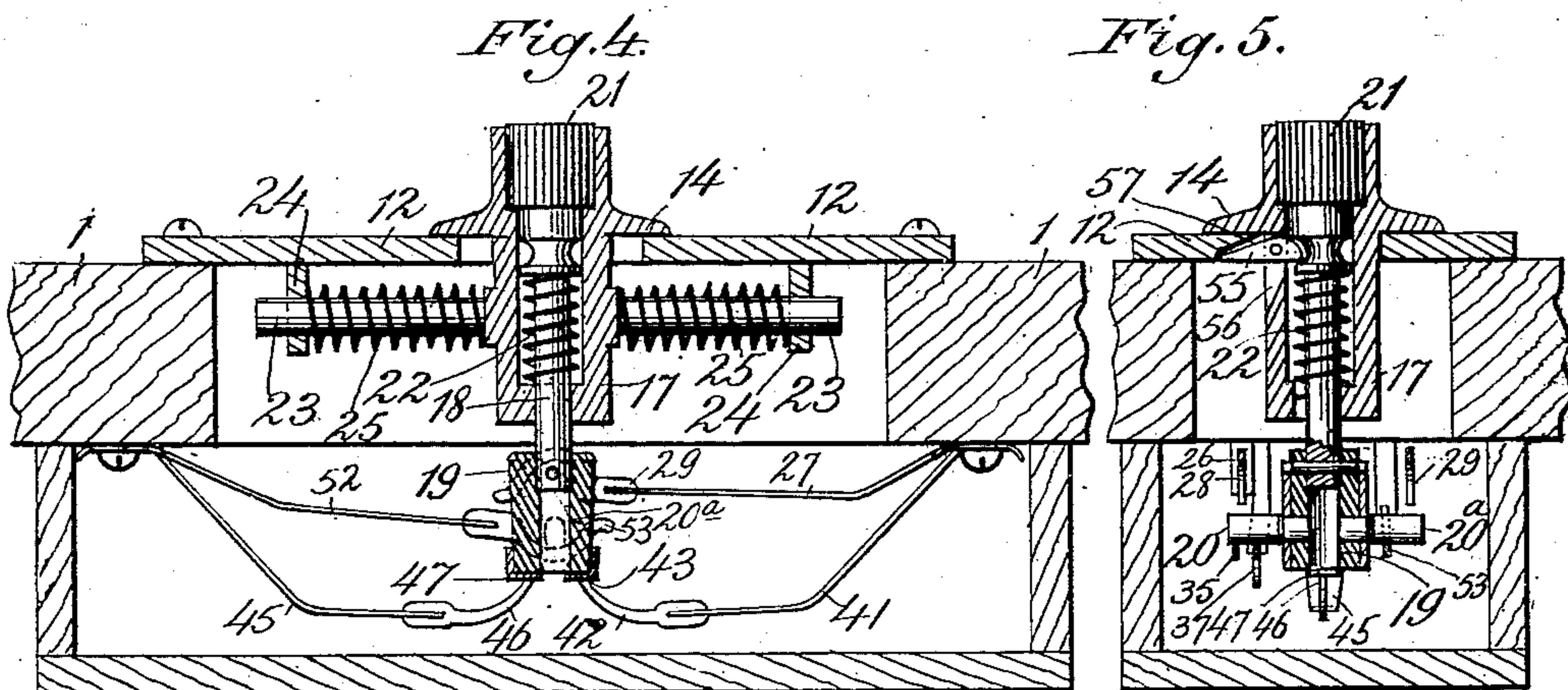
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3 Sheets—Sheet 2.



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3 Sheets—Sheet 3.

Fig. 10.

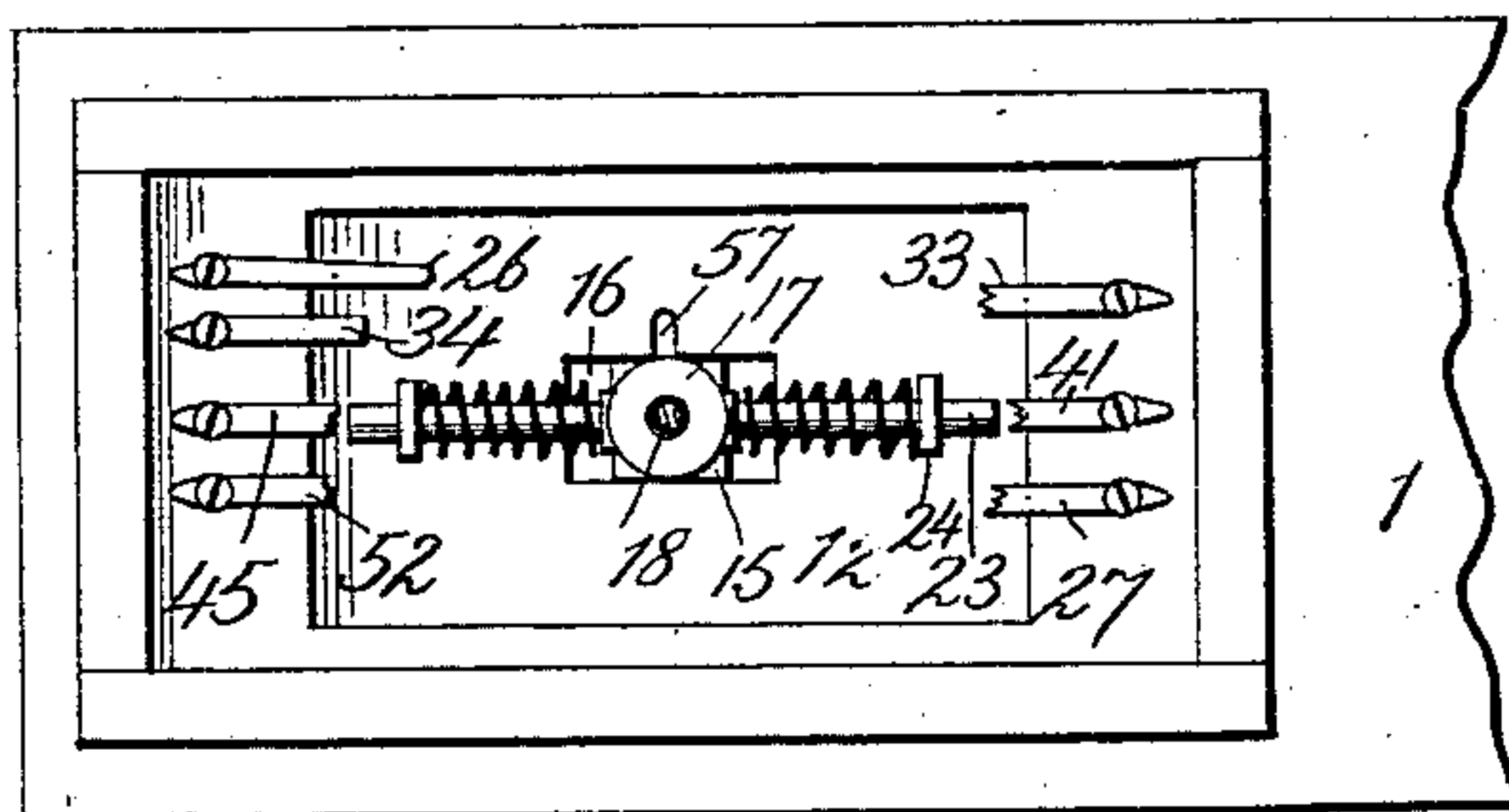


Fig. 11.

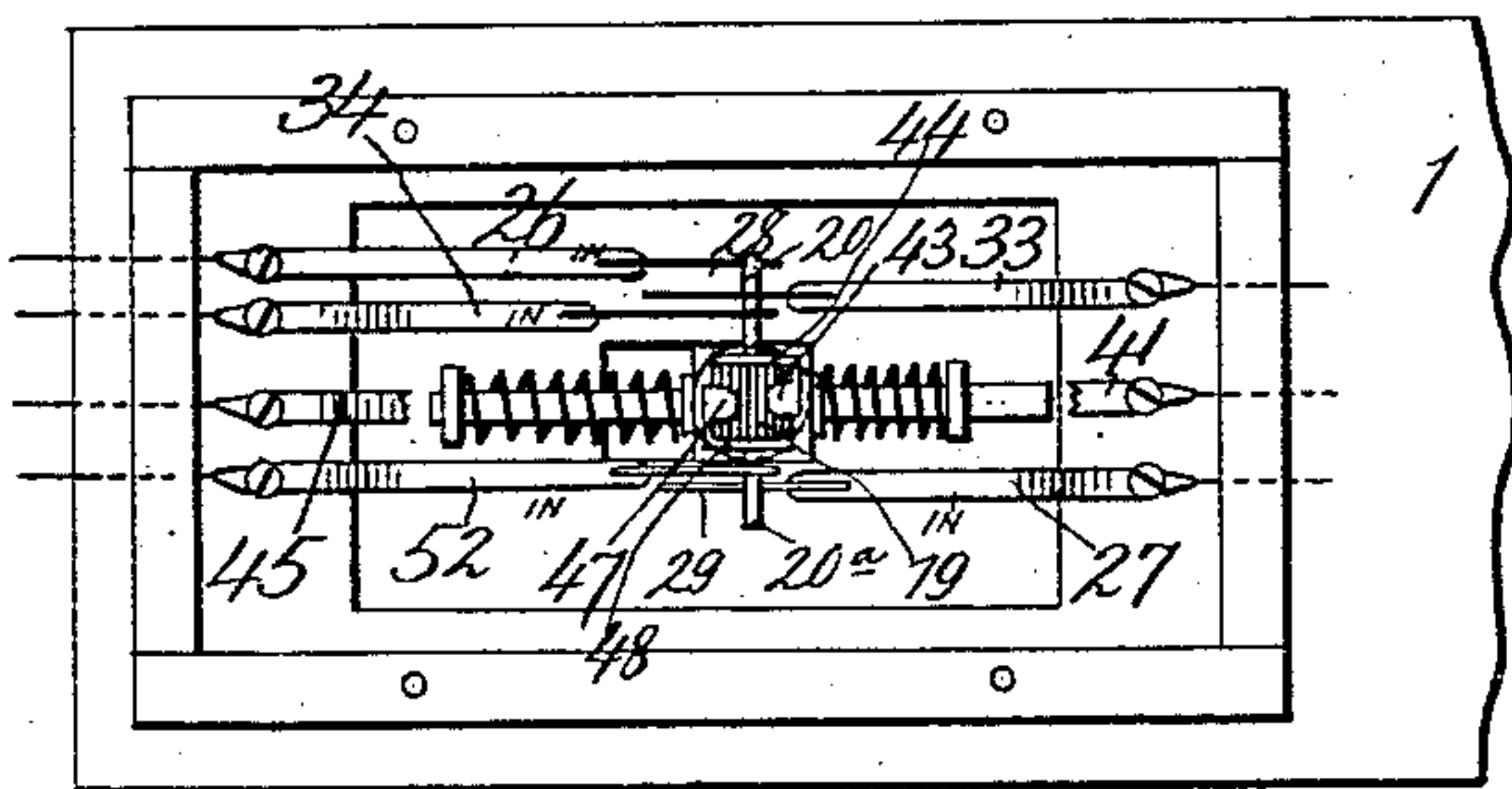


Fig. 12.

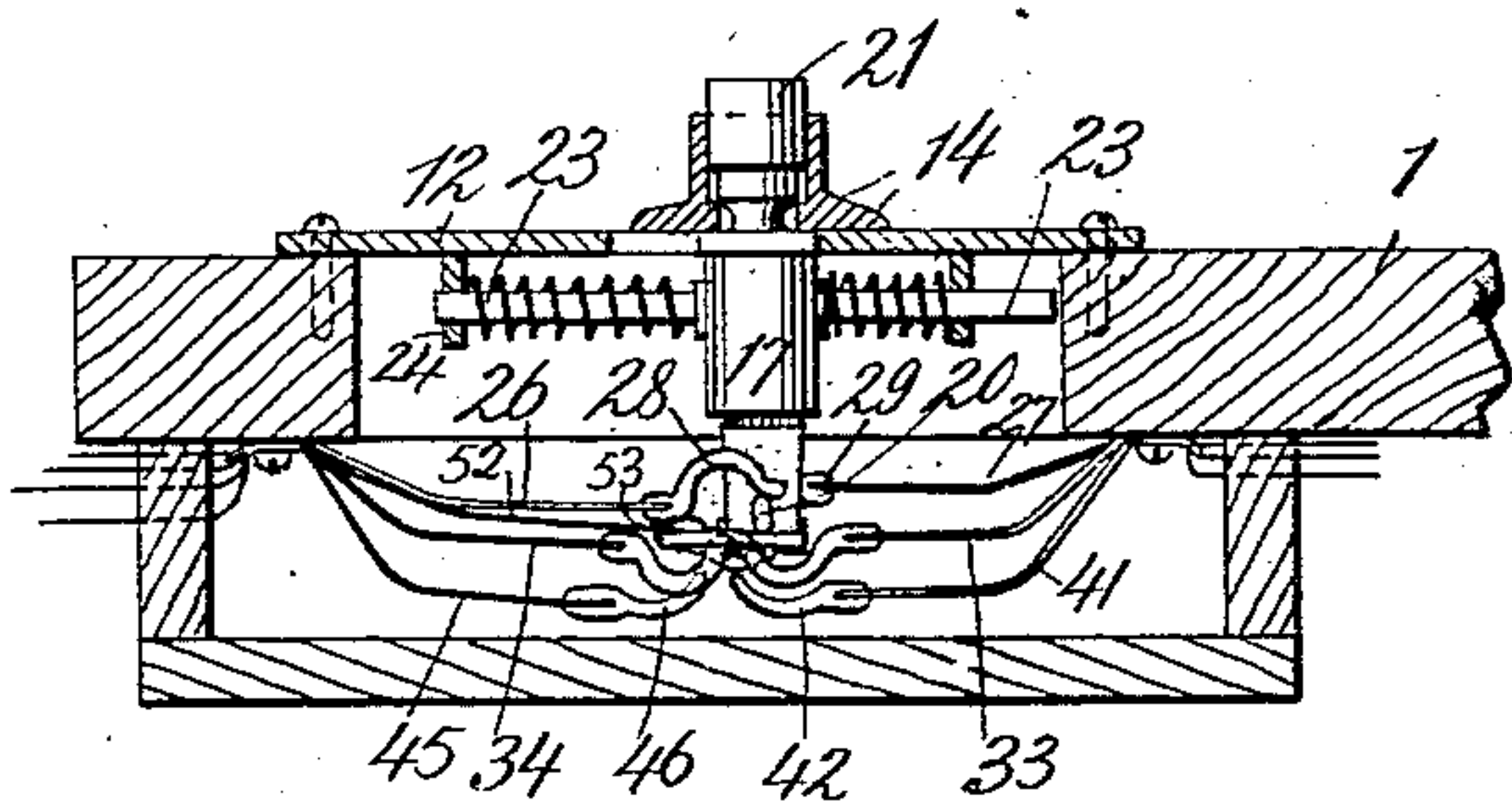


Fig. 13.

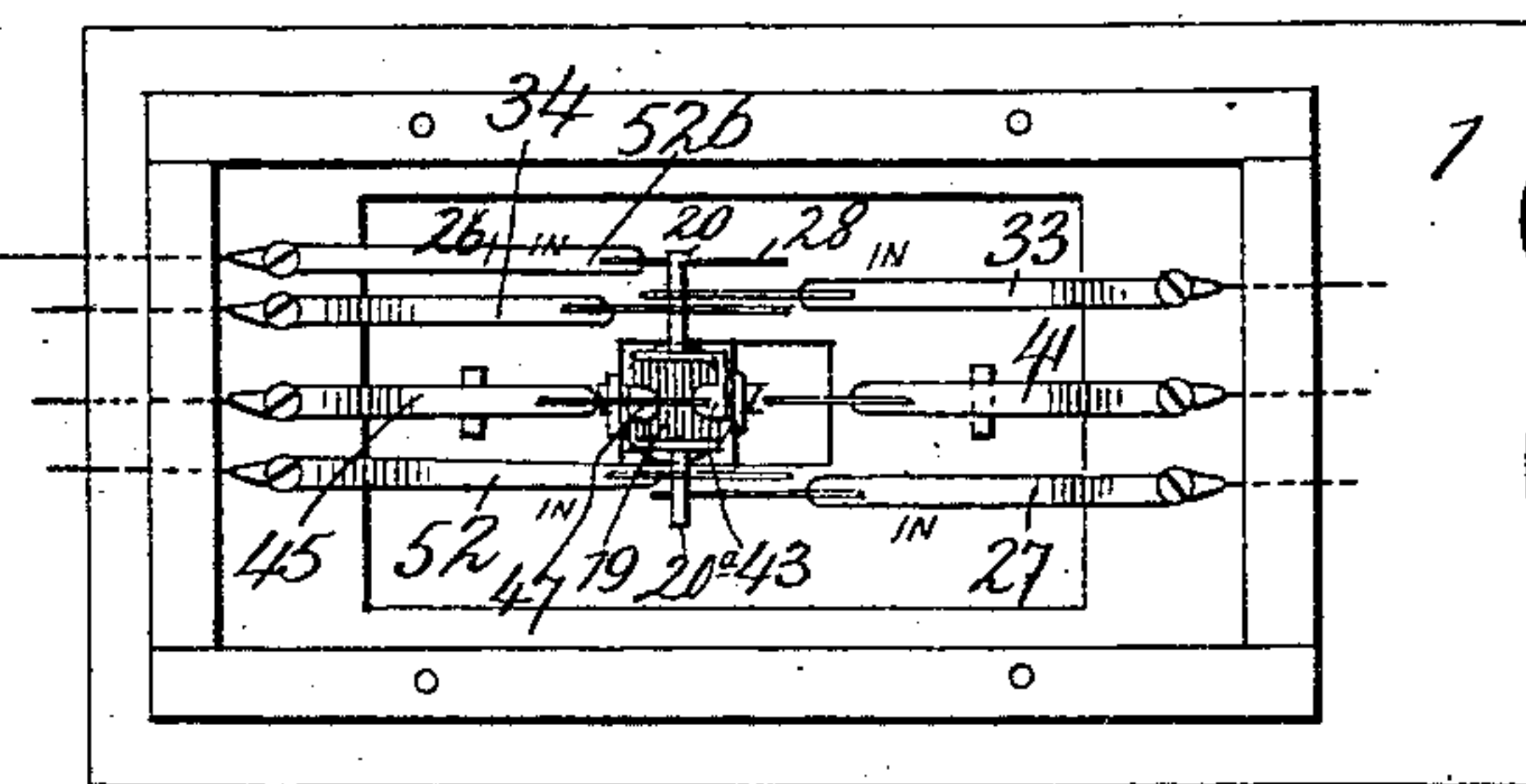
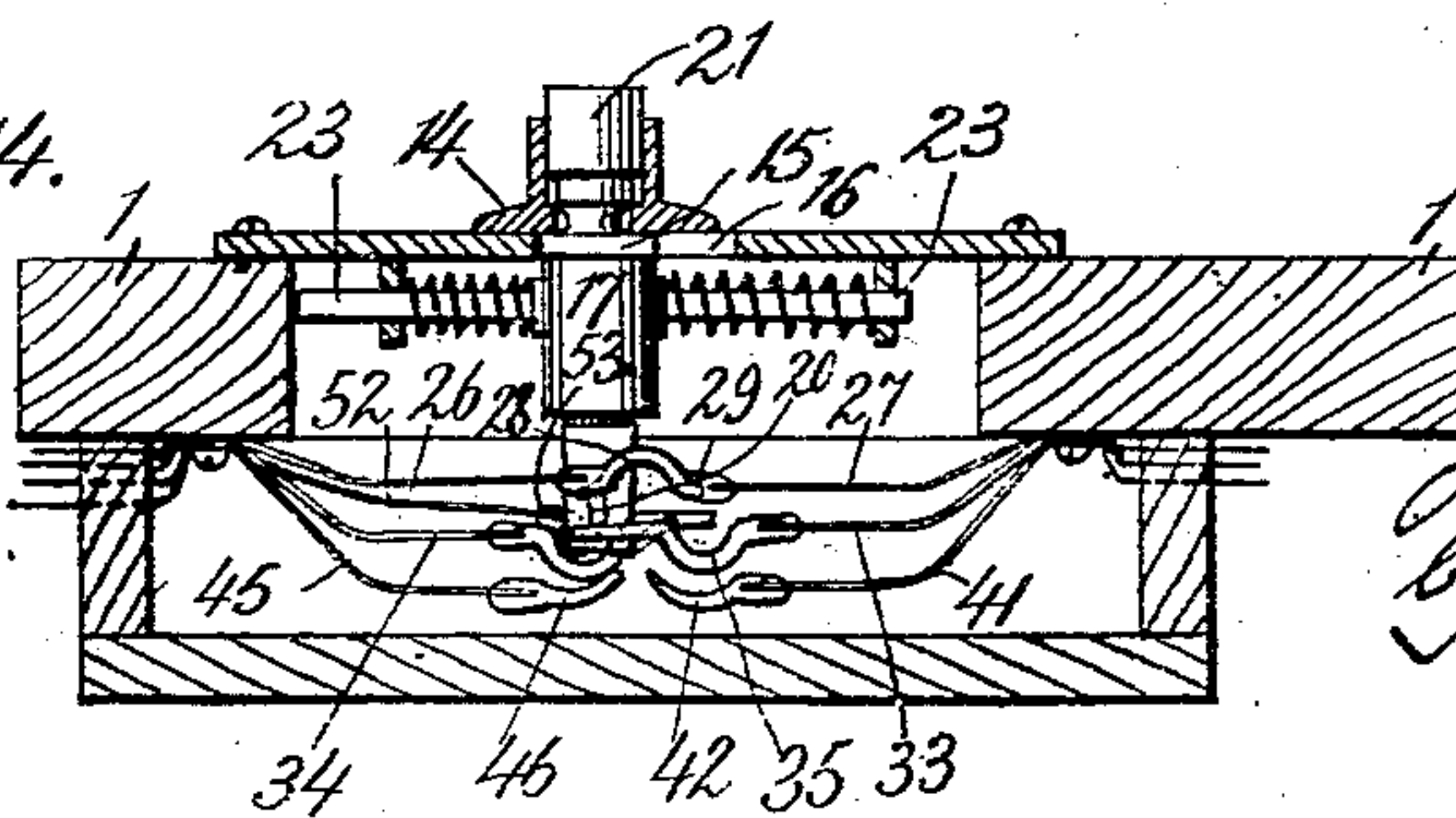


Fig. 14.



Witnesses

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UNITED STATES PATENT OFFICE.

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LISTENING-KEY OR CIRCUIT-CHANGER FOR OPERATORS' KEYBOARDS.

SPECIFICATION forming part of Letters Patent No. 623,117, dated April 11, 1899.

Application filed April 25, 1898. Serial No. 678,709. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BAXTER, a citizen of the United States, residing at Fort Wayne, in the county of Allen and State of Indiana, have invented certain new and useful Improvements in Listening-Keys or Circuit-Changers for Operators' Keyboards; and I do 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, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to a ringing and listening key or circuit-changer for operators' keyboards, and is particularly well adapted for use in connection with telephone-exchanges.

It has for its object to produce a simple and efficient device of the character mentioned, and the essential features thereof and mode of operation will be hereinafter particularly set forth and then sought to be clearly defined by the claims, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a longitudinal section through the switchboard; Fig. 2, an inverted plan view of the same; Fig. 3, a top plan view of the slide and push-button; Fig. 4, an enlarged longitudinal vertical section of the circuit-changer; Fig. 5, a transverse section of the same, showing the latch in its locking position when push-button is depressed; Fig. 6, a transverse section, showing latch in its unlocking position; Fig. 7, a transverse section with plug in full lines; Fig. 8, a side elevation, partly broken away, with push-button depressed; Fig. 9, an end of Fig. 8, partly broken away, with push-button raised; Fig. 10, a bottom plan view with springs broken away and cross-head omitted, showing the slide in its central position; Fig. 11, a bottom plan view showing slide and cross-head moved to the right; Fig. 12, a vertical section of Fig. 11 with the springs in side view; Fig. 13, a bottom plan view showing slide and cross-head moved to the left; Fig. 14, a vertical section of Fig. 13, showing springs in side view.

In the drawings the numeral 1 designates a switchboard, 2 the line-drop, from which lead

the line-wires 3 and 4, and 5 the clearing-out drop, which is connected, as illustrated, with the conductors 6 and 7 of the connecting-plug 8 and answering-plug 9, all of which parts so far generally described being of ordinary construction, the cords of the connecting and answering plugs being provided, as usual, with the weights 10 and 11.

My invention is embodied in the features which I will now describe.

The numeral 12 designates a plate set over a recess 13, formed in the switchboard 1. This plate is provided with what for convenience I will designate a "slide" 14, the under face of which may be formed with a stud or shoulder 15, which may work in a slot 16, formed in the plate 12, so as to guide the slide in its back-and-forth movement. From the under side of the slide extends a plug 17, through which extends a stem 18, carrying at its lower end a block 19 of non-conducting material, from which extend, on opposite sides thereof, contact-pins 20 and 20^a, the block and contact-pins constituting what for convenience I will designate as a "cross-head." The stem 18 has a longitudinal movement in the plug 17 and is provided at its upper end with a push-button 21, the stem and the cross-head, which it carries, being held normally in a raised position by means of a suitable spring—for instance, by a coiled spring 22—fitting around the stem 18 and in a recess formed in the plug 17, thus permitting the stem and cross-head to be depressed when necessary and to be returned to their normal raised position by the springs specified. The slide 14 is held in its normal central position by means of a suitable spring or springs so arranged that when the slide is moved in either direction from its normal position it will be against the tension of the spring or springs, so that as soon as the pressure on the slide is released said spring or springs will restore the slide to its normal position. The preferred construction for such part of the invention consists in extending from opposite sides of the plug, beneath the slide, pins 23, which will pass through perforated ears 24, serving as guides for the pins and slide, a suitable spring or springs, preferably coiled springs 25, being employed for holding the slide in its normal position. As the slide is moved the spring

on the side toward which the slide is moved is compressed, and when pressure is taken from off the slide the recoil of that spring will return the slide to its normal position and hold it therein. The slide and depressible cross-head constitute a slidable and depressible circuit-changer. For coaction with the slidable and depressible circuit-changer are employed a number of spring-influenced contact-points arranged as I shall now describe.

The numerals 26 and 27 designate two spring metallic plates secured to the switchboard and arranged on opposite sides of the cross-head, the plate 26 being formed with the contact-point 28 and the plate 27 with the contact-point 29, the contact-point 28 lying above the cross-head pin 20 and the contact-pin 29 lying over the cross-head pin 20^a, both of said contact-points being curved or arched, so as to be normally out of contact with the cross-head pins, the opposite ends, however, of each contact-point being in the line of travel of the cross-head pins when they are moved in either direction, so that the pins will make contact with the contact-points in whichever direction the pins may be moved or shifted horizontally. Both of the plates 26 and 27 are connected with the generator 30 by the conductors 31 and 32. Spring metallic plates 33 and 34 are secured to the switchboard, the plate 33 carrying a contact-point 35, which is curved or arched and provided with an extension 36, which extends beneath the cross-head pin 20 and is normally in contact therewith, and the plate 34 is provided with a contact-point 37, which is curved or arched and has an extension 38, which lies below the cross-head pin 20 and is normally in contact therewith, said contact-points extending in opposite directions across the cross-head pin, so that when the cross-head is moved horizontally in one direction it will break contact with one of said contact-points and maintain contact with the other, this being so in whichever direction the cross-head may be moved, the movement in one direction breaking contact with one of the points and maintaining it with the other and in the opposite direction breaking contact with said other point and maintaining contact with its mate. The plate 33 is connected to the cord of the answering-plug 9 by the conductor 39, and the plate 34 is connected to the cord of the connecting-plug 8 by the conductor 40. A spring metallic plate 41 is attached to the switchboard and provided with a contact-point 42, which lies below the cross-head block 19 and normally out of contact therewith, but adapted to contact with a metallic plate or other conductor 43 on the cross-head and electrically connected with the cross-head pin 20—as, for instance, by a connecting-plate 44. A spring metallic plate 45 is secured to the switchboard opposite to the plate 41 and is provided with a contact-point 46, extending below the cross-head block 19 and normally out of contact therewith, but

adapted to contact with a metallic plate or other conductor 47, connected to the cross-head block and electrically connected with the cross-head pin 20^a by a metallic plate 48 or other conductor. The plate 41 is connected with the operator's telephone 49 by means of the conductor 50, and the plate 45 is connected with the same phone by means of the conductor 51. A spring metallic plate 52 is secured to the switchboard and is provided at its free end with a contact-point 53, which extends beneath the cross-head pin 20^a. The contact-point is curved or arched, so that normally it will be out of contact with the cross-head pin, but will make contact with said pin in whichever direction the cross-head may be moved horizontally. This plate 52 is connected by the conductor 54 with the cords of both the connecting and the answering plugs, as illustrated.

The plug 17 has pivotally connected to it, next to the slot in the plate 12 in which the slide 14 works, a latch 55, which normally hangs flush with the outside of the plug 17 by fitting in a recess 56, made in the plug, and when the latch is in said recess the slide is free to be moved back and forth; but when the slide is in its normal position and the cross-head is depressed by pressure upon the button, so as to make contact with certain of the contact-points of the plates already described, the latch is thrown outward and upwardly and at such time enters a slot 57 in the plate 12, and this will prevent the slide from being moved horizontally while the cross-head is depressed and will thus prevent contact between the cross-head and contact-points of certain of the plates not desired. When the slide is moved horizontally in either direction, so as to bring the cross-head pins in contact with the contact-points of the desired plates, at which time the cross-head should not be permitted to be depressed to make connection with the points with which it contacts when depressed, the said latch will bear against the side or edge of the slot in which the plate moves, and consequently cannot be thrown outward, and it will thus prevent the cross-head being depressed, as the latch must be thrown outward in order to let the pin carrying the cross-head to be moved downward in order to depress the cross-head. It will thus be observed that this latch serves under one condition to lock the slide in place, so that it cannot be moved horizontally when not desired, and will also lock the cross-head in place, so as to prevent it from being depressed when the slide has been moved out of its normal position, at which time the cross-head should not be depressed.

The operation of the device is substantially as follows: When a subscriber calls "central," the operator places the answering-plug in the socket corresponding to the subscriber's number calling and depresses the cross-head by pressure upon its push-button, so as to bring the contact-plates 43 and 47 of the cross-

head into contact with the contact-points 42 and 46 and the cross-head pin 20^a into contact with the contact-point 53 of the listening and ringing spring-plate 52. This connects the operator's telephone with the calling subscriber, and the operator calls for the number of the subscriber with whom the calling subscriber desires to talk. The operator after getting that number releases pressure from on the push-button, whereupon the spring 22 restores the cross-head to its normal position. Thereupon the operator places the connecting-plug 8 in the socket corresponding to the number of the phone with which the subscriber desires to be connected. The operator then moves the slide 14 away from her, which moves the cross-head pin 20 opposite to the arched portion of the contact-point 35 to the plate 33, which breaks contact between the extension 36 of the contact-pin 35 and the cross-head pin 20 and makes contact between that pin and the contact-point 28 of plate 26 and at the same time brings the cross-head pin 20^a into connection with the contact-point 29 of the plate 27 and the contact-point 53 of the plate 52, which causes the bell of the connecting subscriber to ring. The operator then releases the slide, which is then moved to its normal position by its influencing-spring, and the cross-head pin 20 is thus again brought into contact with the extension 36 and the cross-head pin 20^a moved from out of contact with the contact-points 29 and 53, and the two subscribers are thus connected, so that they may carry on their conversation. If the calling subscriber should leave his phone and the connecting subscriber should wish to speak to him again or to continue the conversation, the operator upon being advised of the fact will move the slide 14 in the opposite direction or toward her, which will make connection between the cross-head pin 20^a and the contact-points 29 and 53 and at the same time break connection between the extension 38 of the contact-point 37 and the cross-head pin 20 and bring that pin into contact with the contact-point 28 of the plate 26, and thus cause the calling-subscriber's bell to ring, so as to bring him back to the phone, whereupon the operator releases the slide, which by its influencing-spring is moved back to its normal position and so as to bring the cross-head pin 20 out of contact with the contact-point 28 and again into contact with the extension of the contact-point 35 and break connection between the cross-head pin 20^a and the contact-points 29 and 53, and the two subscribers are then again connected, so as to continue the conversation. It will be observed that in thus calling back to the phone the calling subscriber the bell of that subscriber alone is rung without ringing on the bell of the connecting subscriber who desires the conversation continued and also that the same is true in case the calling subscriber should desire to bring back to the phone the

connecting subscriber for the purpose of continuing the conversation. It will also be observed that when the operator depresses the cross-head of the circuit-changer it is impossible for her to accidentally move it in either direction horizontally, because the latch 55 is thrown out when the plug is depressed, so as to engage in the slot 57, and thus effectually prevent any horizontal movement of the slide and the cross-head carried by it. It is also to be observed that when the slide is moved in either direction the latch 55 is brought directly opposite to the wall of the slot in which the slide moves, which will hold the latch in its normal position and prevent the possibility of the plug being accidentally depressed, as it cannot be depressed unless the latch is permitted to be thrown out by pressure upon the push-button at the top of the circuit-changer. In this way the evil consequences of permitting the circuit-changer to be depressed or to be moved horizontally under the conditions mentioned are effectually guarded against.

Attention is directed to the fact that under the circuit-changer constituting this invention the several movements of the circuit-changer to connect the calling subscriber and operator, to disconnect the same, to ring up the connecting subscriber, and then to connect the two subscribers are all effected by the movement of the slide and the push-button, which practically constitute one member, whereas heretofore it has been the practice to employ a number of buttons or their equivalents to effect changes in the circuits.

I have illustrated and described with particularity the preferred details of construction of the several parts and also the arrangement of the several parts; but it is obvious that changes in such details can be made without departing from the essential features of my invention. It is also obvious that this device can be used for metallic and common return and ground circuits and is not confined to either.

Having described my invention and set forth its merits, what I claim is—

1. In a ringing and listening key for operators' keyboards, a slide, a movable member carried by said slide and provided with electrical conductors, and electrical contact-points located in the line of movement of said member and connected with electrical conductors, said parts being so relatively arranged that in the movement of the slide one circuit is made and in the movement of the member carried by it another circuit is made, substantially as and for the purposes described.

2. In a ringing and listening key, a slidable and depressible circuit-changer in combination with contact-points connected with electrical conductors, said points and the circuit-changer being so arranged in relation to each other that one circuit is made in the sliding

movement of the changer and a different circuit made in the depressible movement of the changer, substantially as and for the purposes described.

5 3. In an operator's keyboard, the combination with suitable contact-points, and suitable conductors for connecting two subscribers and one subscriber with the operator, of a circuit-changer having a slide carrying a but-
10 ton for moving the changer in one direction to connect the calling subscriber and operator and in another direction to ring up the connecting subscriber, the circuit-changer then being movable into position to connect
15 the two subscribers, substantially as and for the purposes described.

4. In an operator's keyboard, the combination with suitable contact-points and suitable conductors for connecting two subscribers, of
20 a circuit-changer constructed to be moved by a slide and a button, in one direction to connect the calling subscriber and operator, in another direction to ring up the connecting subscriber, the circuit-changer being then
25 movable into position to connect the two subscribers, and then movable into position to ring up either subscriber, substantially as and for the purposes described.

5. In an operator's keyboard, the combination with suitable contact-points and suitable conductors for connecting two subscribers, of
30 a circuit-changer constructed to be moved by a slide and a button, in one direction to connect the calling subscriber and operator, and
35 in another direction to ring up the connecting subscriber, and means for automatically moving the circuit-changer to disconnect the calling subscriber and operator and to connect the two subscribers, substantially as and
40 for the purposes described.

6. In an operator's keyboard, the combination with suitable contact-points and suitable conductors for connecting two subscribers, of a circuit-changer constructed to be moved
45 in one direction to connect the calling subscriber and operator, and into another direction to ring up one of the subscribers, and means for automatically disconnecting the calling subscriber and operator and to connect
50 the two subscribers, substantially as and for the purposes described.

7. In an operator's keyboard, the combination with suitable contact-points and suitable conductors for connecting two subscribers, of
55 a depressible and slidable circuit-changer adapted to be depressed to connect the calling subscriber and operator, and to slide to ring up the other subscriber, and then to slide to connect the two subscribers, substantially
60 as and for the purposes described.

8. In an operator's keyboard, the combination with suitable contact-points and suitable conductors for connecting two subscribers, of a depressible and slidable circuit-changer
65 adapted to be depressed to connect the calling subscriber and operator and to be raised to disconnect the same, then to slide to ring

up the other subscriber and back into position to connect the two subscribers, substantially as described. 70

9. In an operator's keyboard, the combination with suitable contact-points and suitable conductors for connecting two subscribers, of a circuit-changer depressible to adapt it to connect and disconnect the calling subscriber
75 and operator, and slidable in opposite directions from a central point to adapt it to ring up the other subscriber and then connect the two subscribers and afterward to ring up either subscriber, substantially as described. 80

10. In an operator's keyboard, the combination with suitable contacts and suitable conductors for connecting two subscribers, of a depressible and slidable circuit-changer adapted to be depressed to connect the call-
85 ing subscriber and operator and to slide to ring up one subscriber and connect the two subscribers, means for automatically disconnecting the calling subscriber and operator, and means for automatically restoring the circuit-changer to connect the two subscribers
90 after either one has been rung up, substantially as described.

11. In an operator's keyboard, a slidable and depressible circuit-changer, and a pivoted
95 projectable latch thrown into operative position to lock the circuit-changer against side-wise movement when the circuit-changer is depressed, substantially as described.

12. In an operator's keyboard, a slidable and depressible circuit-changer, adapted to make
100 a circuit when moved endwise and another circuit in its sidewise movement, and means for locking the circuit-changer against endwise movement to make one circuit when moved
105 sidewise to make the other circuit, substantially as described.

13. In an operator's keyboard, a slidable and depressible circuit-changer, adapted to make
110 one circuit when moved endwise and another circuit in its sidewise movement, and means for locking the changer against sidewise movement when it has made one circuit and against endwise movement when it has made the other circuit, substantially as described. 115

14. In an operator's keyboard, a slidable and depressible circuit-changer, and a latch carried by the circuit-changer, said latch adapted when the changer is depressed to lock it
120 against sidewise movement and when the changer is moved sidewise to lock it against end movement, substantially as described.

15. In a ringing and listening key, the combination with the conductors and their contact-points lying in the path of the circuit-
125 changer, of the circuit-changer consisting of the slide and its depressible pin carrying the cross-head having conductors and lateral conducting-pins adapted to contact with the conductor-contacts, and a spring for restoring
130 the slide to its normal position, substantially as described.

16. In a ringing and listening key, the circuit-changer consisting of the slide, the de-

pressible spring-influenced pin carried by the slide and having the cross-head with its contacts at its lower end, and a spring for restoring and maintaining the slide in its normal position when moved sidewise, substantially as described.

17. In a ringing and listening key, the circuit-changer consisting of the slide having the depending plug provided with lateral extending pins, the springs encircling said pins and serving to restore the slide to its normal position and maintain it therein, and the spring-influenced depressible pin passing through said plug and provided at its lower end with a contact-point cross-head, substantially as described.

18. In a ringing and listening key, the combination of the slidable and depressible circuit-changer having the cross-head with its contacts, the operator's telephone, springs

having contact-points below the cross-head, the answering and connecting plug springs having contact-points normally to contact with one of the contacts of the cross-head and at times to be out of contact therewith, and the generator-springs and listening and ringing spring, each formed with arched contact-points adapted normally to be out of circuit with certain contact-points of the circuit-changer and to be brought into circuit therewith in certain movements of said changer substantially as and for the purposes described.

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

JOSEPH BAXTER.

Witnesses:

WILLIAM J. VESEY,
ALLEN J. VESEY.