

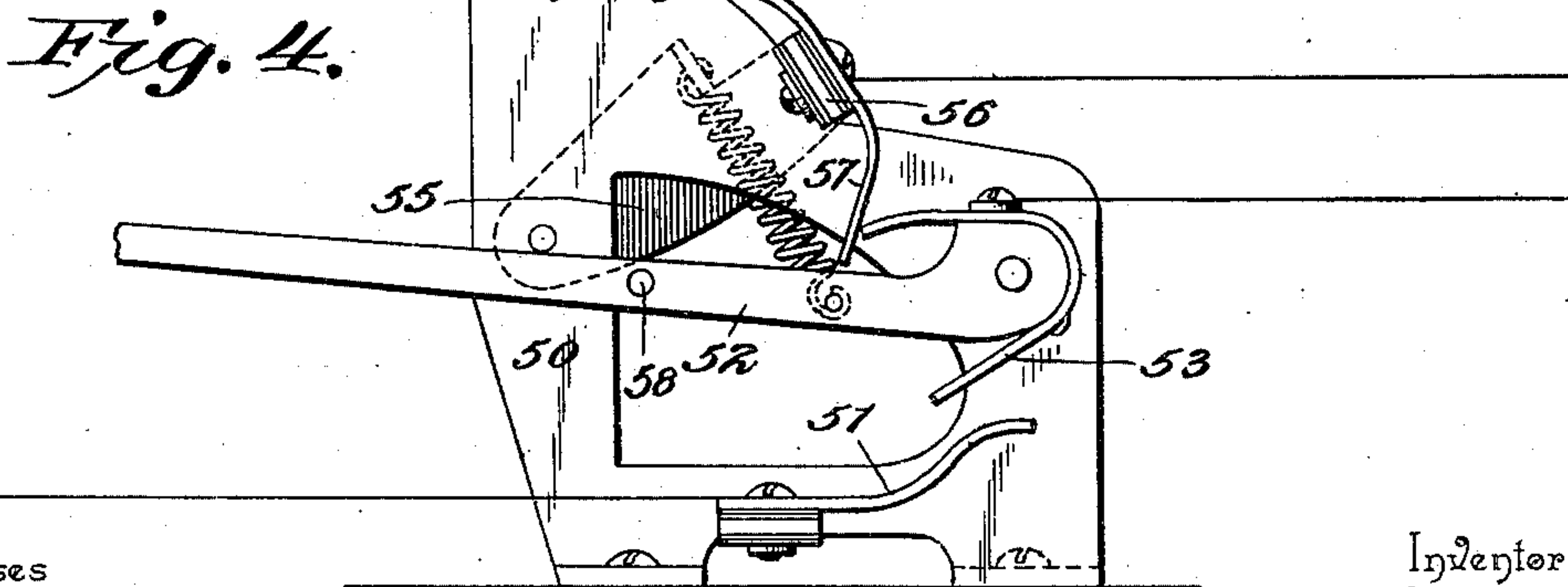
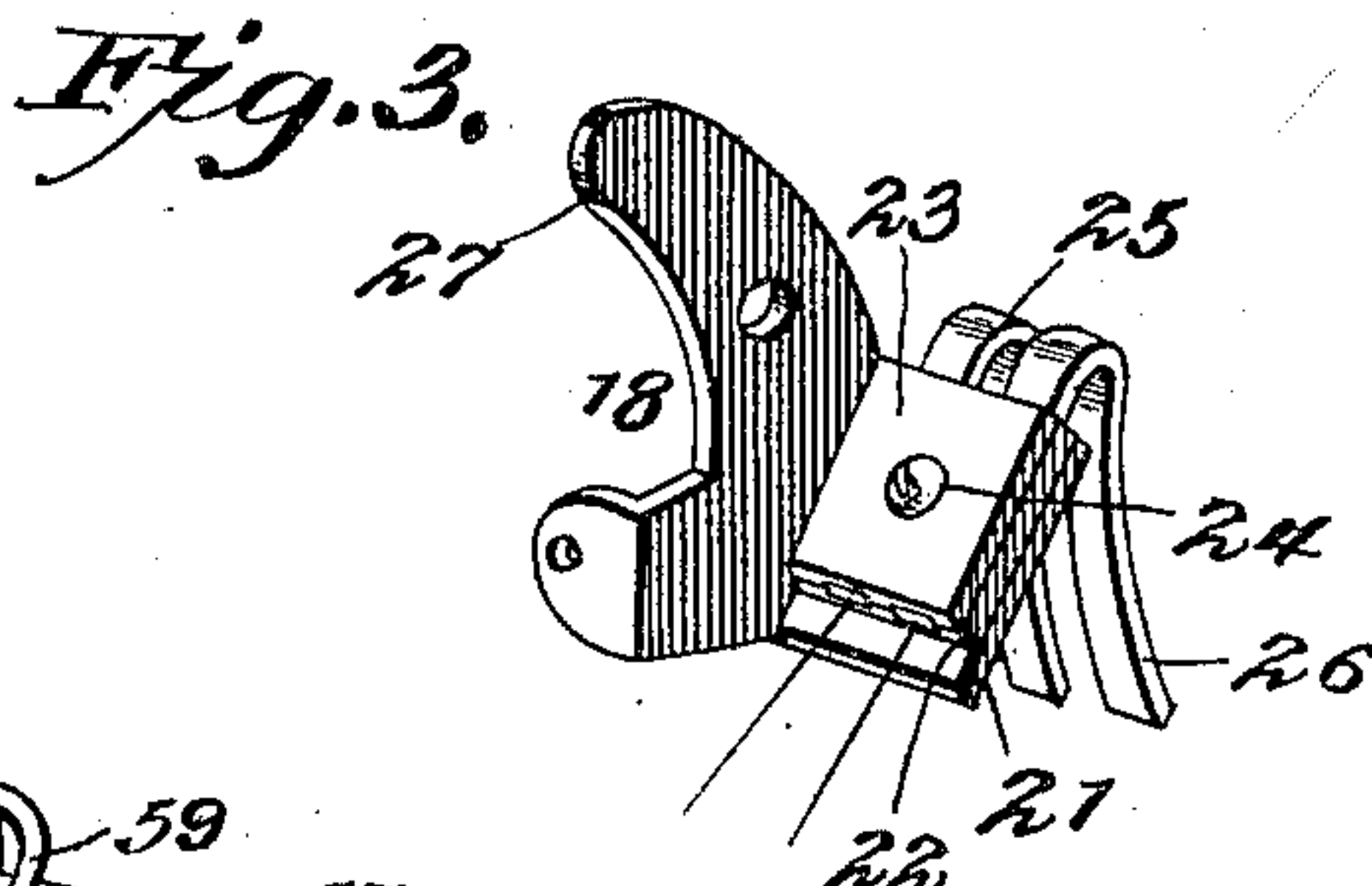
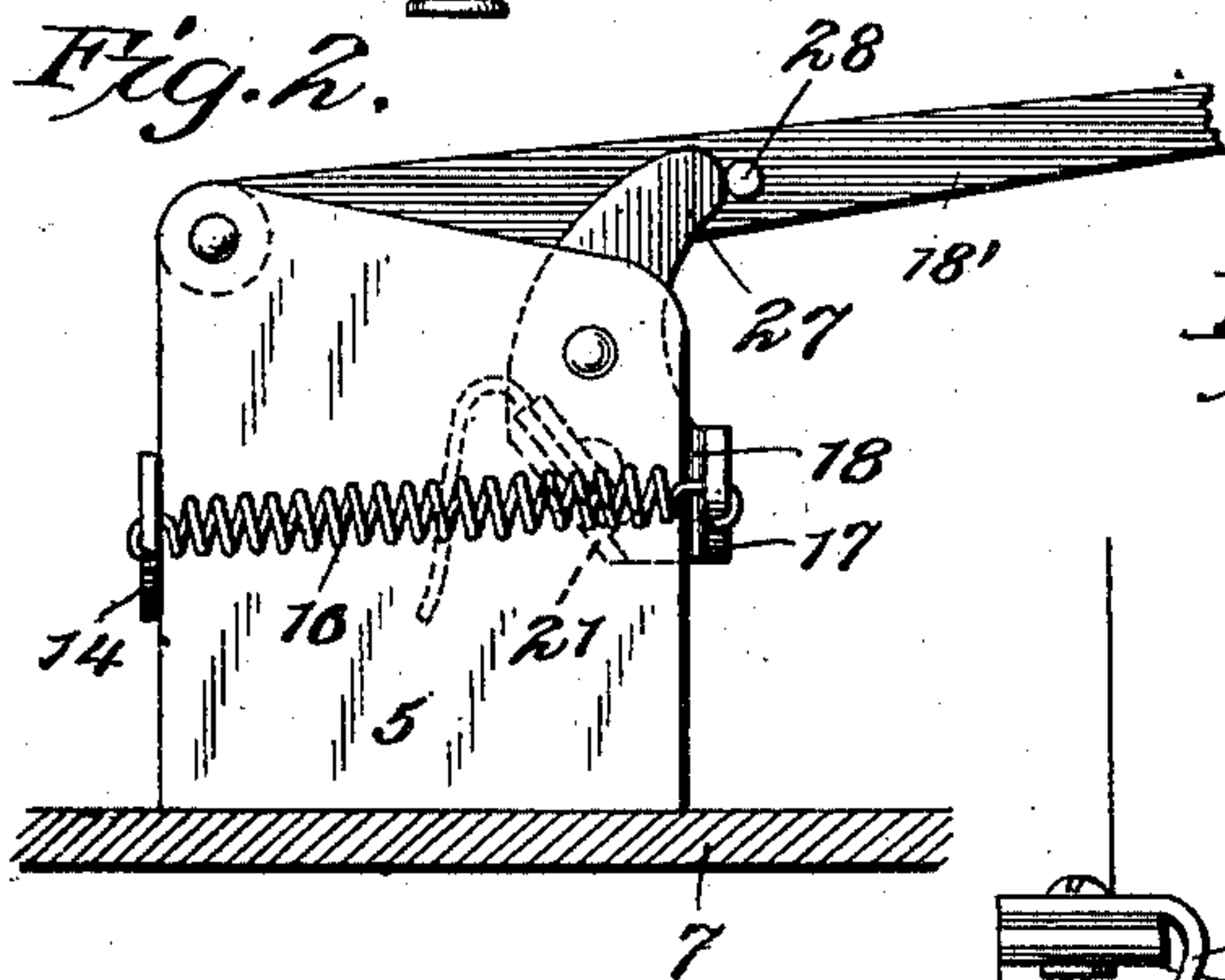
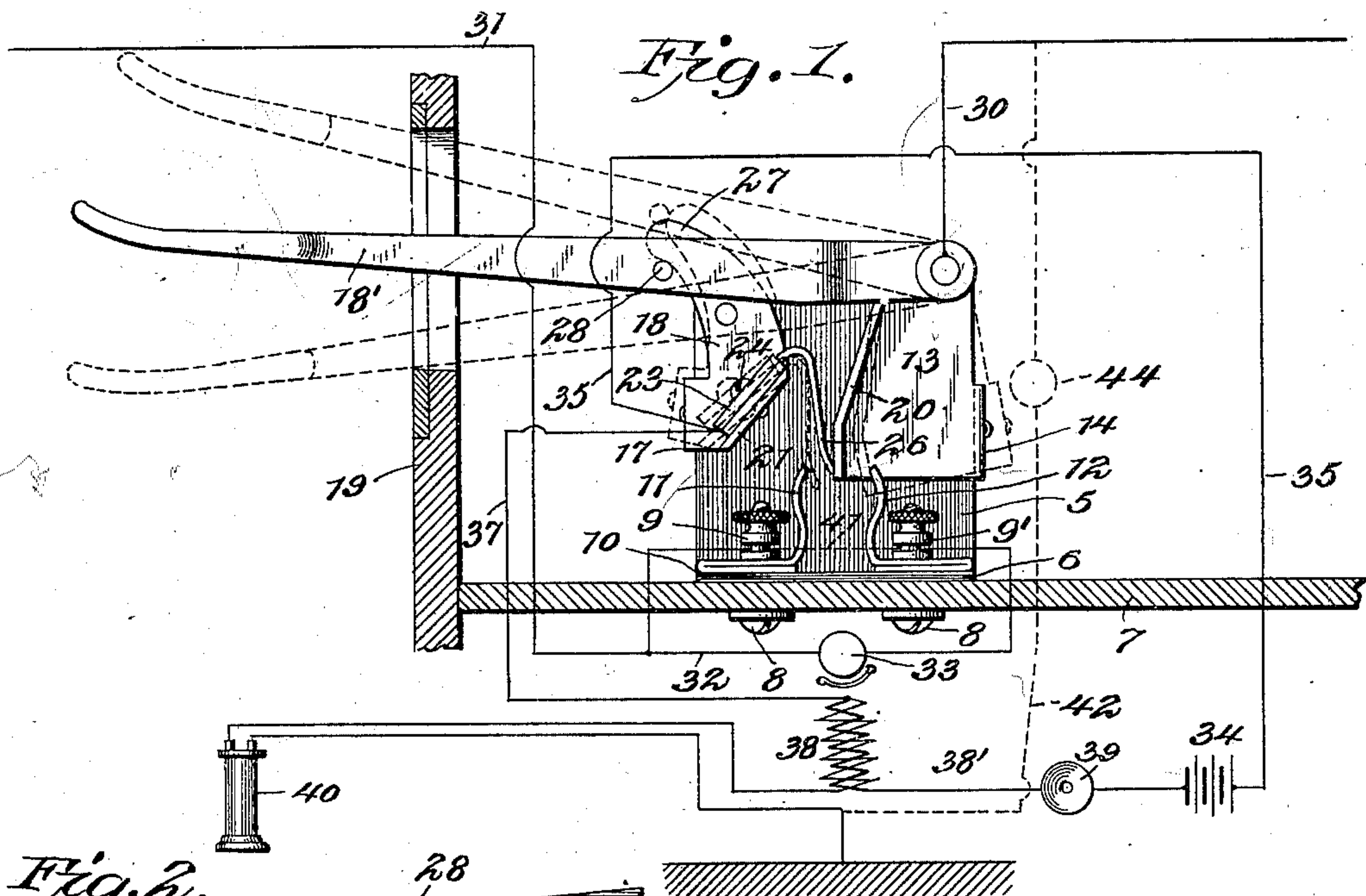
No. 662,543.

Patented Nov. 27, 1900.

L. M. NEHER.  
TELEPHONE SWITCH.

(Application filed Apr. 4, 1900.)

(No Model.)



Witnesses

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE-SWITCH.

SPECIFICATION forming part of Letters Patent No. 662,543, dated November 27, 1900.

Application filed April 4, 1900. Serial No. 11,556. (No model.)

*To all whom it may concern:*

Be it known that I, LEVI M. NEHER, a citizen of the United States, residing at North Manchester, in the county of Wabash and State of Indiana, have invented a new and useful Telephone-Switch, of which the following is a specification.

This invention relates to telephone-switches in general, and more particularly to that class employed at the subscriber's instrument for cutting his instrument into and out of the talking-circuit, this class of switches being usually operated by manipulation of a switch-lever having a hook at its outer end exteriorly of the box and with which lever the receiver is engaged to hold the switch in one position, the switch being held in the opposite position by a spring when the receiver is removed.

One object of the present invention is to provide a construction of switch which will have three operative positions, in one of which the subscriber's bell will be in circuit with the line, in another position the line at one side of the instrument will be in circuit with the receiver—that is, in the talking-circuit—and in which, with the third position of the switch, the line at the opposite side of the instrument will be in the talking-circuit, the line being grounded at the subscriber's station when the switch is in either of the last two positions.

A further object of the invention is to provide a construction which may be equally well adapted for use on lines including a number of subscribers and in which the bells are all normally in series and on lines in which the bells are of high resistance and are bridged; also, to provide such a switch that the contact will be a rubbing contact, with the well-known benefits incident thereto, and in which the parts will be compactly arranged and will be positive and efficient in their operation.

Further objects and advantages of the invention will be evident from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is an elevation of one side of the preferred form of the switch and show-

ing a portion of the "bell-box" in section, the method of wiring the switch being shown in diagram. Fig. 2 is a reverse view of Fig. 1 and showing the switch-lever at the limit of its upward movement to cut in the line at one side of the instrument, the lever in Fig. 1 showing the line at the opposite side cut in. Fig. 3 is a perspective view showing the rocker and the contact-fingers carried thereby and insulated therefrom and insulated from each other. Fig. 4 is an elevation showing a modification of the switch.

Referring now to the drawings, and more particularly to Figs. 1, 2, and 3 thereof, 5 represents a substantially rectangular plate, the upper end of which, however, lies at an angle to the lower end thereof, and the base of this plate is turned laterally at right angles to form a foot 6, through the medium of which the plate is held in an upright position upon a suitable base. In the present instance the base is formed by the bottom 7 of the bell-box, and the plate is held thereto by the screws 8 of binding-posts 9 and 9', which are passed through perforations in the foot and base. The screws 8 are insulated from the foot 6 by means of bushings in the usual manner, which bushings are of vulcanite or other suitable insulating material, and clamped against the upper face of the foot is an insulating-plate 10, upon which are mounted two contact-plates 11 and 12, of spring metal, the lower ends of which are folded, as shown, and then bent outwardly, the screws 8 being passed through perforations in these folded portions and in electrical contact therewith. The binding-posts are screwed down on the screws 8 in the usual manner and lie against and in electrical relation to the plates 11 and 12, the free ends of the plates being curved upwardly and inwardly to form contacting portions.

Pivoted to the plate 5, adjacent its upper end, is a switch-plate 13, which depends to a point below the upper end of the plate 12, and one edge of this switch-plate is bent outwardly to lie between the contacting upper ends of the plates 11 and 12. The outwardly-projecting contacting edge of the plate 13 is adapted to contact with the contacting portion of plate 12 when moved in one direction; but its movement in the opposite direction is



not sufficient to engage the plate 11 after leaving plate 12, its pivotal movement in the direction of plate 11 being limited by a lug or ear 14, formed integral therewith and bent rearwardly beyond the plate 5, so as to contact with or engage the adjacent edge of plate 5. The contact-plate 13 is held normally in this position—that is, with the stop-ear 14 against plate 5—by means of a helical spring 16, one end of which is engaged with said ear, the spring being then taken transversely of the plate 5 and in the rear thereof and engaged with a similar ear 17 on a rocker 18, which is also pivoted to plate 5 and which will be presently described.

In connection with the mechanism described there is employed a switch-lever 18', in the form of the usual receiver-hook, and the rear or inner end of which is fulcrumed upon the same pivot which connects the switch-plate 13 with the plate 5. The switch-lever 18' extends through a slot in the side 19 of the bell-box in the usual manner. The switch-lever lies on the outer face of plate 13 and normally rests upon the outwardly-projecting contact portion 20 of the plate 13, so that when the lever is moved downwardly, due to the weight of the receiver engaged with its outer end or from any other cause, it presses against the upper end of this portion 20 and swings the plate 13 rearwardly upon its pivot, causing the lower portion of the part 20 to engage contact-plate 12 to close a circuit hereinafter described.

The rocker 18, above referred to, is pivoted also to the front face of the plate 5, and a lower corner thereof, adjacent plate 13, is bent forwardly to form a flange 21, which lies slantingly. Upon the upper face of the flange 21 is disposed an insulating-plate 22, which coöperates with a second and similar plate 23 to form a clamp which is actuated by a bolt 24, passed through alining perforations in the plates and flange. Between the plates 22 and 23 are clamped the ends of parallel spring contact-fingers 25 and 26, which are separated by an interspace and are thus thoroughly insulated from each other, the free ends of the fingers being bent downwardly to lie between the contacting portions of the contact-plates 11 and 12 and at the opposite side of the portion or flange 20 from plate 12. The helical spring 16, above referred to, acts to hold plate 13 and rocker 18 at their inward limits of motion, at which time the fingers 25 and 26 are in contact with the flange or portion 20. Hence in the normal position of the lever 18'—that is, when the receiver is not engaged therewith—both fingers 25 and 26 are in electrical contact with flange 20 and are thus mutually connected electrically.

It is at times desirable to swing the fingers 25 and 26 into contact with the plate 11, and for this purpose the upper end of the rocker 18 is extended forwardly in the form of a cam 27, which lies in the path of upward movement of a rearwardly-projecting pin 28, car-

ried by lever 18'. Thus when the lever 18' is lifted to the upper position (shown in dotted lines in Fig. 1 of the drawings) this pin will engage the cam 27, and in sliding along its edge will press it rearwardly and swing its lower end forwardly to engage the fingers 25 and 26 with plate 11. The upper end of the cam 27 is arc-shaped, as shown, and to prevent return movement of the lever, due to its own weight or the helical spring, the upper limit of movement of the lever is at a point which will permit the pin 28 to engage and pass partly around this arc-shaped portion, so that in its downward movement the lever must first press the rocker against the tendency of the helical spring 16.

The three positions of the lever 18' are shown in full and dotted lines in Fig. 1, and upon reference thereto it will be seen that when the receiver is engaged with the hook flange 20 is in contact with plate 12, while the fingers 25 and 26 are in the positions shown in full lines. When the receiver is removed, all of the parts are in the positions shown in full lines, which is with flange 20 in contact with fingers 25 and 26 and the flange 20 and the fingers out of contact with plates 12 and 11, respectively. When the lever is raised, the flange 20 remains in its last position and the rocker 18 is operated to contact the fingers 25 and 26 with plate 11.

In employing this switch in a system in which a number of subscribers are on a single line one line-wire is connected with plate 13, as shown at 30, while the second line-wire 31 is connected with binding-post 9, and thence to plate 11. A branch 32 from line-wire 31 connects with plate 12 through a bell 33 and post 9'.

The local circuit includes a battery 34, from which leads a wire 35 to finger 25, the second finger 26 being connected, by means of wire 37, with the primary winding of the induction-coil 38, from the opposite terminal of which leads a wire 38' to transmitter 39, which in turn is connected with the second terminal of battery 34. One terminal of the secondary winding of the induction-coil 38 is connected to ground through the receiver 40, while the opposite terminal is connected with finger 26 through wire 37. Thus if the receiver be upon the hook flange 20 will lie against plate 12, and if a call be sent in from line 31 the circuit will be line 31, wire 32, bell 33, post 9', plate 12, plate 13, and wire 30, it being understood that the ends of the line are grounded. A call from line 30 will sound the bell 33 by the current passing to plate 13, plate 12, post 9', bell, wire 32, and line 31.

If the call is from line 30, the subscriber simply takes down his receiver, when plate 13 moves its flange into contact with fingers 25 and 26, at which time current coming in over line 30 passes to plate 13, to flange 20, to finger 26, through wire 37 to secondary of coil 38, to receiver, and to ground. At the same time the fingers 25 and 26 are electric-



ally connected by engagement of flange 20 therewith, and the local circuit from battery 34 is through wire 35 to finger 25, through flange 20 to finger 26, to primary winding of induction-coil, to transmitter, and to battery, so that conversation may be carried on over wire 30.

Should the call have come from line 31, then the subscriber would raise the lever 18' to the uppermost position shown in Fig. 1, when the fingers 25 and 26 would contact with plate 11 and leave flange 20. The circuit from line 31 is then to post 9, to plate 11, to finger 26, to secondary of induction-coil 38, to receiver, and ground, the primary circuit being the same as formerly, with the exception that in this instance the fingers are electrically connected through plate 11.

In using this switch where the bell is in a bridge the posts 9 and 9' are electrically connected by a wire 41, (shown in dotted lines,) or plates 11 and 12 may be formed integral, the bridge-wire being shown in dotted lines at 42 connected at one end with wire 30 and at the other with the ground, said bridge-wire including the high-resistance bell 44 in its circuit, as indicated.

In Fig. 4 of the drawings there is shown a modification in which there is employed a plate 50, corresponding to plate 5, and having a contact-plate 51 mounted thereon and insulated therefrom, this contact-plate corresponding to plate 12. In this construction the lever 52, which is the receiver-hook, is pivoted to the front of the plate and carries a contact-spring-plate 53, which passes around the end of the lever, one end of the plate 53 being adapted for engagement with plate 51 when the receiver is engaged with the hook. The spring-plate 53 corresponds to flange 20. The rocker 55 in this instance is pivoted upon the back of plate 50 and has a flange 56, which projects forwardly over the edge of the plate, and upon this flange and insulated therefrom and from each other are two fingers 57, which correspond to fingers 25 and 26. The fingers 57 project from both sides of the flange, and when the lever is in its normal position, with the receiver disengaged, plate 53 lies against the fingers at one side of the flange. A pin 58, carried by the lever 52, lies against the rocker, and when this lever is raised to its uppermost position the pin operates the rocker to throw the fingers from engagement with plate 53 and to move their opposite ends into engagement with a second contact-plate 59, which is mounted upon and insulated from plate 50 and corresponds to plate 11. The several parts of the modification are connected in operation in the same manner as their corresponding parts in the structure shown in Fig. 1.

It will of course be understood that in practice various other modifications of the construction may be made and that any suitable materials and proportions may be used for

the various parts without departing from the spirit of the invention.

In a complete metallic-circuit system the return-wire is of course connected in place of the ground-wire, which latter is omitted.

What is claimed is—

1. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate and adapted to lie normally out of such contact, a second contact-plate, a contact-finger movably mounted independently of the switch-plate for contact with the second contact-plate and adapted to lie normally out of said contact, and a lever disposed for alternate operative engagement with the switch-plate and the finger to move them alternately into contact with their respective plates the switch-plate and the finger being normally in contact.

2. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate and adapted to lie normally out of contact therewith, a second contact-plate, a contact-finger movably mounted for contact with the second contact-plate and adapted to lie normally out of contact with the second contact-plate, and a lever in operative relation to the switch-plate and finger to move them into contact with their respective contact-plates, the finger and switch-plate lying normally in mutual contact.

3. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate, a second contact-plate, an independently-movable finger for contact with the second contact-plate, a lever in operative relation to the switch-plate and finger to move them alternately into contact with their respective plates, and a single means for holding the finger and switch-plate normally out of contact with their respective plates and in mutual contact.

4. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate, a second contact-plate, a finger for contact with the second contact-plate, a lever in operative relation to the switch-plate and finger to move them into contact with their respective contact-plates alternately, said finger and switch-plate being adapted for mutual contact normally, and means for holding the finger and switch-plate yieldably out of contact with their respective contact-plates and in contact with each other.

5. A telephone-switch comprising a contact-plate, a supporting-plate adjacent thereto, a switch-plate pivoted to the supporting-plate and adapted for movement into contact with the contact-plate, a rocker pivoted upon the supporting-plate, a contact-plate in the path of pivotal movement of the rocker in one direction, and a pivoted lever, said lever being disposed to engage the switch-plate and move it into contact with its contact-plate when the lever is moved in one direction, and to



operate the rocker to engage the second contact-plate when moved in an opposite direction the switch-plate and rocker being movable into and out of electrical connection.

5 6. A telephone-switch comprising two contact-plates, a movable switch-plate for contact with one of the contact-plates and having means for holding it normally out of such contact, a rocker having fingers for contact  
10 with the second contact-plate and having means for holding it normally out of such contact, and a receiver-lever in operative relation to the switch-plate and rocker to move them alternately into contact with their respective contact-plates, said fingers and  
15 switch-plate being movable into and out of contact and lying normally in electrical contact.

7. A telephone-switch comprising a contact-  
20 plate, a movable switch-plate for contact with the contact-plate, a second contact-plate, a movable finger for contact with the second contact-plate, a single means for holding the finger and switch-plate normally from contact  
25 with the contact-plates and in contact with each other, and a lever disposed to engage the switch-plate and finger alternately when moved in opposite directions and move them into contact with their respective contact-plates and out of mutual contact.  
30

8. A telephone-switch comprising a contact-plate, a pivoted switch-plate having a projecting portion for contact with the contact-plate, a rocker having a finger, a contact-  
35 plate in the path of movement of the finger for contact thereby, means for holding the finger and switch-plate normally out of contact with their respective contact-plates and in mutual contact, and a pivoted lever disposed to alternately engage the projection of  
40 the switch-plate and the rocker as the lever is moved in alternate directions, and move the finger and switch-plate projection into contact with their respective contact-plates  
45 and out of mutual contact.

9. A telephone-switch comprising a contact-plate, a pivoted switch-plate for contact therewith, a second contact-plate, a pivoted  
50 rocker having a finger for contact with the second contact-plate, said rocker having also a cam, a lever disposed for engagement with the switch-plate to move it into contact with its contact-plate, a pin upon the lever for engagement with the cam alternately with the  
55 engagement of the lever with the contact-plate, to move the finger into contact with its contact-plate, and a single means for holding

the finger and contact-plate normally out of contact with their respective contact-plates, and in mutual contact. 60

10. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate and adapted to lie normally out of such contact, a second contact-plate, contact-fingers insulated from each  
65 other and mounted for simultaneous movement into contact with the second contact-plate and adapted to lie normally out of such contact, and a lever in operative relation to the switch-plate and the fingers to move them  
70 alternately into contact with their respective contact-plates.

11. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate and adapted to lie normally out of such contact, a second contact-plate, contact-fingers insulated from each  
75 other and movably mounted for contact simultaneously with the second contact-plate and adapted to lie normally from contact therewith, and a lever in operative relation to the switch-plate and fingers to move them  
80 alternately into contact with their respective contact-plates, the fingers and switch-plate lying normally in mutual contact. 85

12. A telephone-switch comprising a contact-plate, a movable switch-plate for contact with the contact-plate, a second contact-plate, fingers insulated from each other and mounted  
90 for movement into contact with the second contact-plate, a lever in operative relation to the switch-plate and fingers to move them alternately into contact with their respective contact-plates, and a single means for holding the fingers and switch-plate normally out  
95 of contact with their respective plates.

13. A telephone-switch comprising a contact, a movable contact for engagement with the first contact, a third contact, a fourth and movable contact for engagement with the  
100 third contact, a single means for moving the movable contacts into engagement with their respective contacts alternately, and means for holding the movable contacts normally out of such engagement and in mutual engagement. 105

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

LEVI M. NEHER.

Witnesses:

GEO. H. CHANALEE,  
C. E. HOGLE.