(No Model.) 2 Sheets—Sheet 1.

N. L. BURCHELL.

TELEPHONIC APPARATUS.

No. 534,547. Patented Feb. 19, 1895.

Fig. 1.

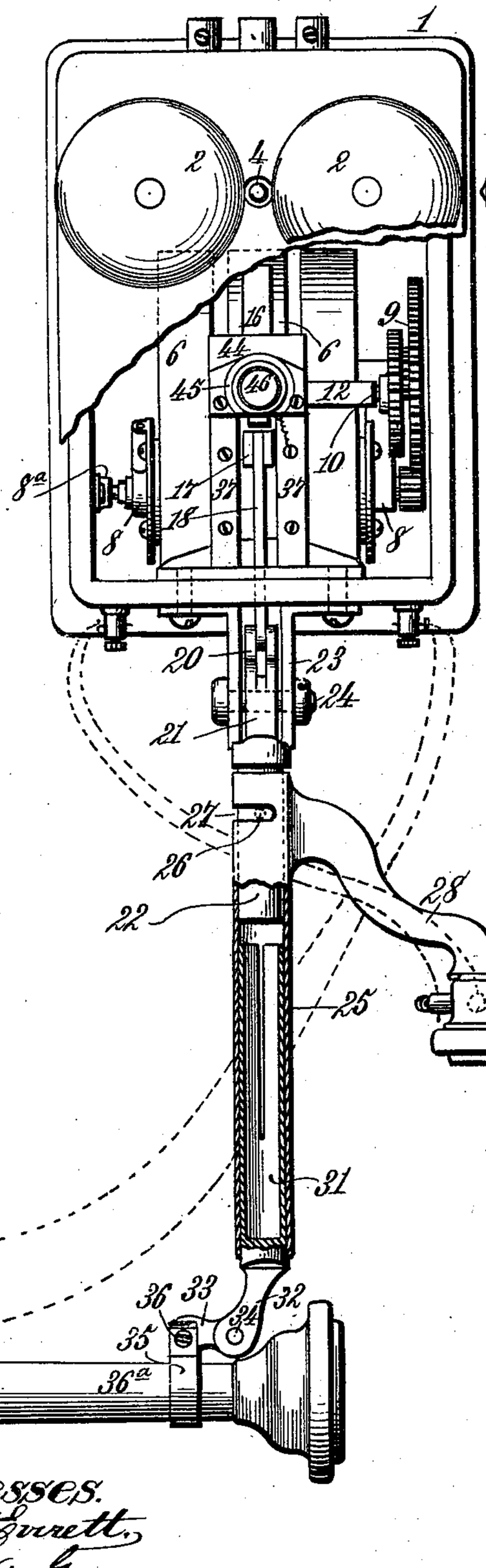
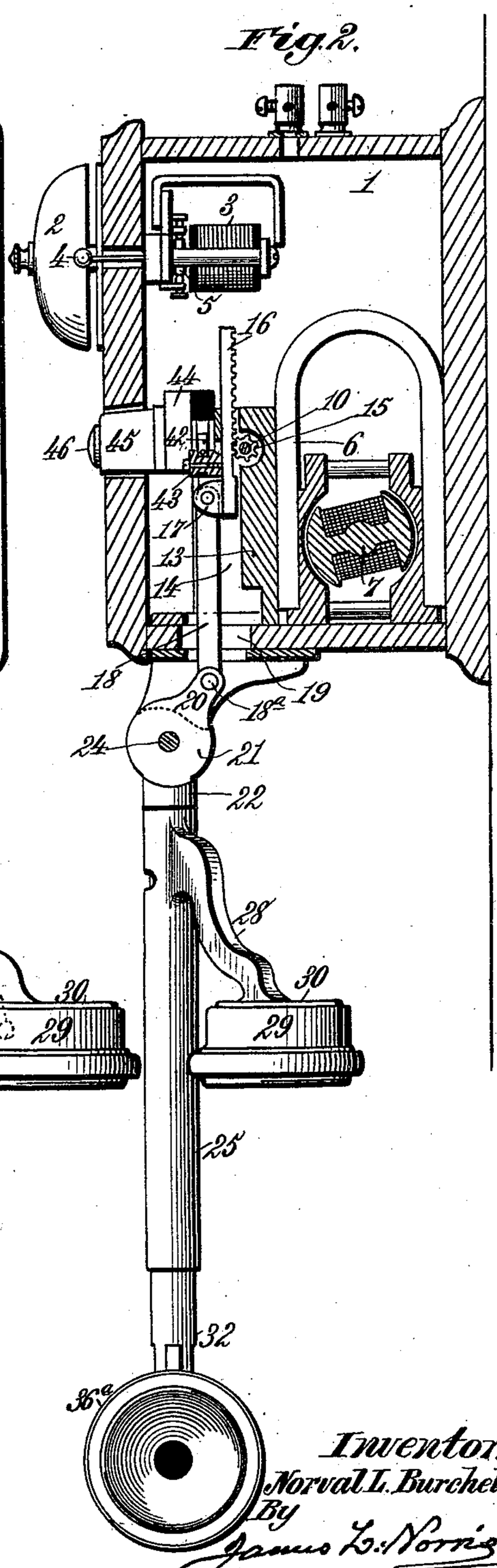


Fig. 2.



Witnesses.
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Thos. A. Green

Inventor.
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By
James L. Norris.
Atty.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

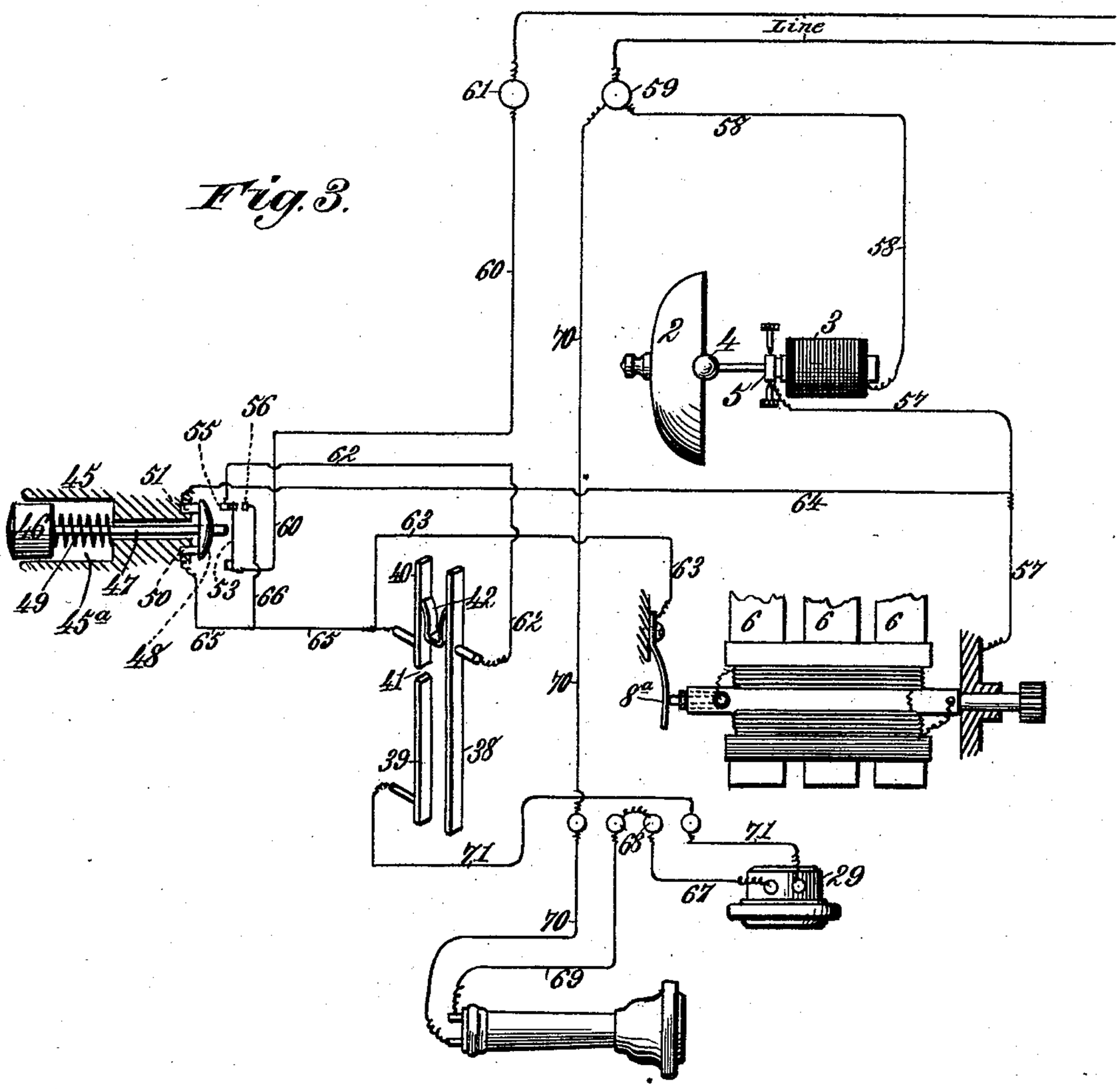
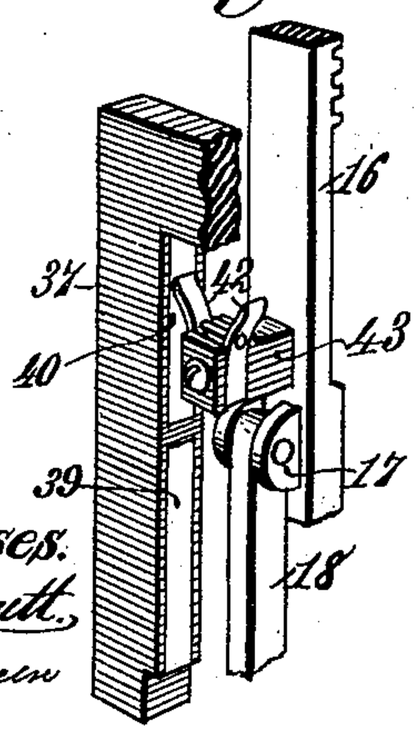


Fig. 4.



Witnesses.
Chas. Gratt.
T. A. Green

Fig. 5.

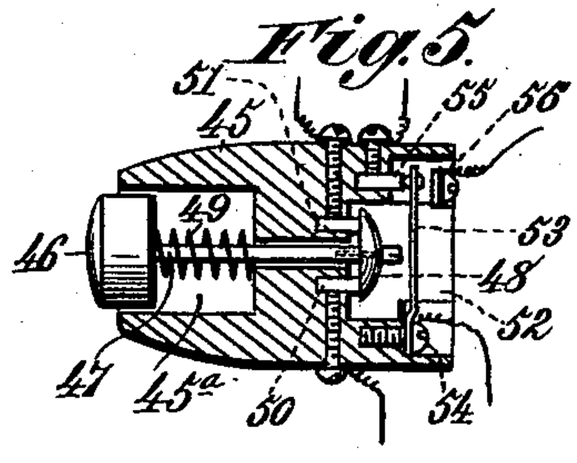


Fig. 6.

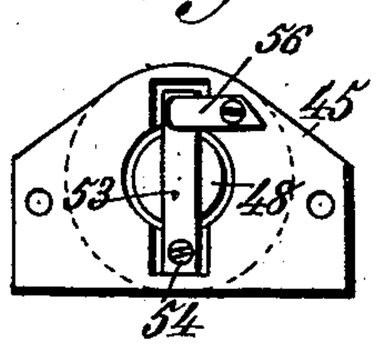
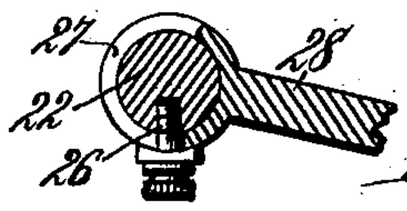


Fig. 7.



Inventor.
Norval L. Burchell.
By
James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

NORVAL LANDON BURCHELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

TELEPHONIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 534,547, dated February 19, 1895.

Application filed September 20, 1894. Serial No. 523,636. (No model.)

To all whom it may concern:

Be it known that I, NORVAL LANDON BURCHELL, a citizen of the United States, residing at Washington city, in the District of Columbia, have invented new and useful Improvements in Telephonic Apparatus, of which the following is a specification.

My invention relates to certain improvements in telephones, my purpose being to provide a telephone of any ordinary type with adjustable means for supporting the transmitter and receiver in such manner as to permit such adjustment as will adapt the instrument to persons of different height and enable the receiver to be used with either ear.

It is a further purpose of my invention to provide a telephone with a pivotally mounted arm upon which the transmitter is mounted, and to combine therewith an extensible arm carrying the receiver, the construction and arrangement of parts being such that the distance between the transmitter and receiver may be varied easily and quickly; the position of the latter adjusted to suit persons of any height and its adjustment accompanied by a suitable relative adjustment of the transmitter, and whereby the receiver may be reversed in order to be applied to either ear, its reversal being accompanied by a corresponding change in the position of the transmitter, or vice versa, the shifting of the transmitter being accompanied by a reversal of the receiver.

It is my object, also, to combine with a telephone a pivotally mounted arm supporting the receiver and transmitter, and, in its normal position, switching the magneto-bell into the main line and cutting out the receiver and transmitter, and, by its adjustment for use, switching both the latter into the main line and cutting the bell-circuit out.

It is my further purpose to utilize the arm carrying the transmitter and receiver for operating the magneto-bell; to combine therewith an arrangement of circuits and contacts by which the magneto, or other generator, shall supply current to the bell-coils during the whole range of movement of the arm, or during a part thereof, only at the pleasure of the person using the telephone, and to so organize the apparatus that the said arm shall be supported at any angle to which it may be adjusted, when using the telephone, by the resistance of the armature of the magneto mechanism.

To these ends the invention consists in the several novel features of construction and in the parts and new combinations of parts hereinafter fully described and then particularly pointed out in the claims.

To enable those skilled in the art to which my invention pertains to clearly understand and to make and use said invention, I will describe the latter in detail, reference being had, for this purpose, to the accompanying drawings, in which—

Figure 1 is a sectional elevation, part of the front wall of the telephone-box being broken away to expose the interior. Fig. 2 is a central vertical section through the telephone-box, the parts below the same being shown in side elevation. Fig. 3 is a diagram illustrating the arrangement of circuits. Fig. 4 is a detail perspective showing part of the mechanism for operating the magneto and for limiting, or extending, the supply of current to the bell-coils. Fig. 5 is a central, or axial section, showing the circuit-controller. Fig. 6 is a bottom plan view of the same. Fig. 7 is a detail section taken transversely through the pivotally mounted arm and the supporting-arm for the transmitter.

The reference numeral 1, in said drawings indicates the telephone-box, which, in this instance, contains only the bell-coils and the magneto exciting said coils, though it may in other cases, be organized and equipped with parts used in telephones of other types. The bell-gongs 2 are mounted on the front of the box and their coils 3 upon the inner face of the front wall, the striker 4 being between the gongs on a rocking, or vibrating armature 5.

The magneto by which the coils 3 are excited and by which current is supplied to the line wire and bell-coils at a distant station consists of a series of permanent horse-shoe magnets 6, forming the magnetic field and a Siemens "H" armature which is carried by a shaft 7, mounted in suitable bearings 8 and driven by a train of multiplying gears 9. These parts are so familiarly known that they require no specific description.

The initial gear of the multiplying train 9 is carried by a shaft 10, journaled in a closed

bearing 12 which is supported upon the edges of the permanent magnets 6 adjacent to the front wall of the telephone-box. The support for the bearing 12, is a metallic bracket 13, bolted, or screwed, to the pole-pieces. In this bracket is formed a vertical channel 14, lying between the front wall of the box and the closed bearing 12. This channel is cut to such depth that it passes through the outer wall of the bearing and exposes the shaft 10, on which is a small spur-pinion 15, the teeth of which project into the channel 14, as shown in Fig. 2. In said channel lies a flat bar 16, having a rack of teeth which mesh with the teeth of the spur-pinion 15. Upon its lower end this bar is provided with lugs 17, projecting toward the front, and between said lugs is inserted the end of a connecting rod, or pitman 18, a pivotal connection with said lugs being made by means of a pin. The lower portion of the pitman passes through an opening 19 in the bottom wall of the box, and its lower end is coupled by a pin 18^a to the ends of parallel arms 20, which project from the periphery of a circular bearing 21. This bearing forms part of, or is mounted upon, the end of an arm 22 and lies between the parallel plates of a bracket 23, to which it is connected by a pivot-pin 24. The bracket 23 hangs from the bottom of the telephone-box, as shown in Figs. 1 and 2. The construction is such that, when the arm 22 hangs straight downward, as in Fig. 2, the parallel arms 20 will be inclined upwardly and rearwardly, the angle formed by the axial line of the arm 22, and by a line drawn through the pivotal axes 24 and 18^a, being sixty-five or seventy degrees, or thereabout. This, or a substantially similar construction, is considered preferable for reasons which will appear hereinafter.

Upon the arm 22 is mounted a supporting-arm 25, capable of limited rotary movement, but prevented from longitudinal adjustment by means of a pin, or screw 26, tapped into the arm and lying in a slot 27, cut in the supporting-arm 25 transversely to its axis. Projecting laterally, or nearly so, from the supporting-arm 25 is a bracket-arm 28, formed or mounted rigidly thereon, and upon the extremity of the bracket-arm is arranged a transmitter 29, of any preferred type. The diaphragm of the transmitter is usually at right-angles to the axis of the arm 22 and supporting-arm 25, and the transmitter casing may be conveniently attached to a flat plate 30, of circular, or other form, and a rigid part of the bracket-arm. The length of the slot 27 and the position of the screw, or pin 26, are such that the transmitter may be shifted to either side of the arm 22. When it is swung outward, toward the person using the telephone, the transmitter will be supported a little below the arm 22 and supporting-arm 25.

The supporting-arm 25, extends some distance beyond the end of the arm 22, and is preferably of uniform diameter throughout. In its open end is inserted a telescoping extension-arm 31, which is split in its axial, or diametrical plane for a portion of its length, the parts separated by the split being slightly spread, so that in order to enter the supporting-arm 25 they must be compressed. The purpose of this construction is to produce and maintain a frictional contact which will securely hold the telescoping extension-arm 31 at any point to which it is adjusted, while at the same time it permits the person using the telephone to make any desired longitudinal, or rotary adjustment of the extension arm. Upon the end of the latter projecting from the open end of the supporting-arm 25, is a forked bracket 32, in which is inserted the end of a short link plate 33, pivotally connected by a pin 34. Upon the free end of the link and at, or about, a right-angle thereto, is formed, or mounted a clip 35, one arm of which is detachable and fastened in place by a screw 36. This clip engages the body of any ordinary telephone receiver 36^a clamped therein, or otherwise conveniently attached. The receiver may be adjusted in the clip, in the direction of its length, but this will seldom be necessary. Its usual position is that shown in Fig. 1, the enlarged end containing the diaphragm lying near the forked bracket 32, so that its opening will lie upon one side of the supporting-arm 25 and extension arm 31, and upon the same side thereof that the transmitter lies. Thus, any person using the telephone and standing directly in front of the transmitter, will have the receiver close to one ear. If it is necessary, or preferable, either from partial deafness, or habit, to use one ear in preference to the other, the transmitter may be swung completely over to the other side of the arm 22. As its supporting-arm 25, contains the extension arm 31, the receiver will be reversed by the same movement, so that its diaphragm and sound opening will always face toward the side upon which the transmitter lies. The change referred to can also be made by merely reversing the receiver, as the frictional contact between the extension arm 31 and supporting-arm 25 will be sufficient to cause the transmitter to move with it.

Immediately in front of the vertically channeled face of the bracket 13 in which the toothed bar 16 moves, is a vertical frame formed of hard rubber or other insulating material and having two parallel members 37 separated from each other. In the adjacent edges of these parallel parts are formed channels, in one of which is set a strip 38, of copper or other suitable conducting material. In the other and opposite channel are placed two strips of like material 39 and 40, the former having the greater length. These strips are separated from each other by a small space 41, which is filled with insulating material so as to make a flush surface throughout. Between these opposite and parallel strips is arranged a bridge-contact, consisting of two conducting brushes 42, mounted

on an insulating block 43, which is secured to the front face of the toothed bar 16. The brushes are electrically connected so that, as they move back and forth with the bar 16, they will establish communication between the strips 38 and 39, and the strips 38 and 40.

Upon an insulating bracket 44, erected on the front of the parallel members 37, is mounted a circuit-controller, consisting of a rigid housing 45, having a chamber 45ª in which is arranged a push-button 46. To this push-button is rigidly connected a spindle 47, which lies in the central line of the chamber and passes entirely through its end wall. Upon the inner end of the spindle 47 is a washer 48, formed of conducting material and loosely mounted on a reduced portion of the spindle so that it may have a rocking movement to enable it to accommodate its position to the points with which it may come in contact, so that it will have substantially the same pressure on each. Upon the spindle, between the push-button 46 and the end of the chamber 45ª, is coiled a spring 49, by which the push-button is normally projected from the mouth of the chamber 45ª as far as permitted by the washer 48, which is held by the spring against two electrical contacts 50 and 51, which are placed in communication, electrically speaking, by said washer. The contacts 50 and 51 project into a chamber 52, in which is an elastic conducting strip 53, rigidly fastened at one end by a screw 54 and bearing at its other end, against a contact 55. At a little distance from the latter is a separate contact 56, and by driving the push-button 46 into the chamber 45ª the washer 48 may be removed from the contacts 50 and 51, thereby breaking the communication between them, and by pushing said button still farther, in the same direction, the end of the spindle 47 will impinge upon the elastic conducting strip 53 and will throw its end off the contact 55 and against the separate contact 56. The normal position of the contact strip 53 is, however, that shown in Figs. 1 and 5, in which it bears against the contact 55, the washer 48 being in electrical engagement with the contacts 50 and 51. I will now trace the several circuits by reference to the diagram in Fig. 3.

The signal, or bell-circuit, is by way of a wire 57, from one pole of the magneto, or other form of generator, to the first terminal of the coil of the electro-magnet which operates the bell-call, and from the second terminal of said coil by a wire 58 to a binding post 59, to which the line-wire L is secured. The circuit is completed by a wire 60, from a second binding-post 61, which is also in the main line circuit, to the contact 53, thence, from the contact 55, by a wire 62, to the contact strip 38, through the brushes 42 to the contact-strip 40, and thence by a wire 63 to a brush 8ª, which is in electrical contact with the end of the armature shaft, or the other pole of the magneto. When the brushes 42 are between the contact-strips 38 and 40, which is their normal position when the telephone is not in use, the magneto, or other generator will be on a short circuit, formed by a shunt wire 64, from the wire 57 to the contact 51, thence through the washer 48, and contact 50 to a wire 65, which runs from said contact to the strip 40, and, from the point of connection of the wire 65, over the wire 63 to the brush 8ª. In order to call the central station, or to ring up any subscriber on the line, this short circuit must be opened, and this is accomplished by pushing the button 46 far enough to draw the washer 48 off the contacts 50 and 51. If the button is moved far enough to merely break the short circuit between the said contacts 50 and 51, the circuit of the magneto, including the bell-coils and line-wire, will be over wires 57, 58 and 60, contact-strip 53, contact 55, wire 62, strip 38, brushes 42, strip 40 and wire 63, as described. With this circuit, the magneto being operated by the vibration of the arm carrying the transmitter and receiver, the bell will ring as long as the brushes 42 remain on the strips 38 and 40. When they pass the break 41, the circuit will be broken, so that the peals of the bell will be proportioned, in duration, to the length of the contact-strip 40. If it is desired to ring a longer continuous peal, the button 46 is pressed still farther in, so as to throw the contact strip 53 off the contact 55 and against the contact 56. The circuit will then be over the wire 57 and on the same path already described as far as, and including the contact strip 53, from which it will be by way of the contact 56, through the wire 66 which connects said contact to the wire 65, and over the latter and the wire 63 to the brush 8ª. As this circuit does not include the contact strips 38—39—40, it is evident that the bell will ring as long as the armature of the magneto revolves continuously, or, in other words, as long as current is supplied, while the contact-strip 53 remains on the contact 56. This arrangement enables the person using the telephone to ring a short call, or a series of such calls, without regard to the length of the vibrations of the arm 22, or to ring one or more peals each continuous during the full length of each vibration, or stroke, of said arm. This provision is convenient, as it enables the operator to avoid all unnecessary clamor of the bell, while, at the same time, he can prolong the call, should circumstances render this necessary.

The transmitting and receiving circuits are as follows: Starting from the positive electrode of the transmitter 29, the circuit is over a wire 67 to and through two connected binding-posts 68, thence by wire 69 to one electrode of the receiver, and thence by a wire 70 to the binding-post 59 and line wire. The circuit is completed by wire 60, contact strip 53, contact 55, wire 62, strip 38, brushes 42, strip 39 and a wire 71 to the negative electrode of the transmitter.

The receiving-circuit, starting from the line wire and binding-post 61, is over wire 60, contact-strip 53, contact 55, wire 62, contact-strip 38, wire 71, through the electrodes of the transmitter, then by wire 67, binding-posts 68, wire 69, through the receiver, and by wire 70 to the post 59 and line wire. It will be understood that both the circuits last described are made by raising the arm 22, to bring the transmitter and receiver into position for use, since by this adjustment the brushes 42 are drawn off the strip 40 and brought between the two strips 38 and 39. When the telephone is not in use, these circuits are open, since the pivoted arm 22 is then hanging vertically downward as shown in Figs. 1 and 2, and in this position the bridge-contact is in the position shown in Fig. 3, with its brushes 42 upon the contact strips 38 and 40. When the arm 22 is swung outward to bring the transmitter and receiver into position for use, the brushes are drawn down and remain between the strips 38 and 39 as long as communication over the line continues.

The pivoted arm 22 with the supporting-arm and extension arm, and the transmitter and receiver, will be supported at any point to which the arm may be adjusted, by the resistance to rotation of the armature of the magneto, at the points where the armature coils cut the maximum lines of force. This resistance which is caused by the coils of the armature in cutting the maximum lines of force of the magnetic field is sufficient to sustain the parts referred to, especially when it co-operates with the comparatively small degree of friction of the parts operated by the arm.

By my invention the receiver is readily and instantaneously adjustable to any desired point with relation to the ear, and its adjustment also produces a corresponding and relatively suitable adjustment of the transmitter, which may, also, be placed at any suitable distance from the mouth of the person using the telephone. The adjustment of the arm 22 may also be caused to operate the magneto-call at the central station, or at a local station with which communication is being held. Moreover, swinging of the arm outward switches in the transmitting and receiving circuits and cuts out the magneto circuit, while the restoration of the arm to its normal position when the telephone is not in use, cuts out the receiver and transmitter and switches the bell-circuit into the main line.

What I claim is—

1. In a telephone, a pivoted arm adapted to vibrate in a vertical plane and provided with a supporting-arm extended in the same axial line, and having a lateral bracket-arm carrying the transmitter, and a support for the receiver at or near the end of the supporting-arm, the latter being capable of a limited rotary or swiveling movement upon its own axis, to shift the transmitter to either side of the supporting arm and to give a corresponding adjustment to the receiver, whereby the latter may be applied to either ear, substantially as described.

2. In a telephone, the combination with an arm pivoted to vibrate in a vertical plane, of a supporting-arm extended in the same axial line and provided with a lateral bracket-arm carrying the transmitter, and an extension-arm capable of prolongation and substantially in the axial line of the supporting arm, and having an attachment for the receiver, the said supporting-arm having a limited rotary, or swiveling movement upon its own axis, to shift the transmitter to either side of the same and to give a corresponding adjustment to the receiver, whereby the latter may be applied to either ear, substantially as described.

3. In a telephone, the combination with a pivoted arm adapted to vibrate in a vertical plane, of a supporting-arm having its axis coinciding with that of the pivoted arm which enters its end, said supporting-arm having a transverse slot to receive a pin rigidly set in the pivoted arm to allow a limited rotary adjustment in the common axial line, a transmitter mounted on a rigid arm projecting laterally from the supporting-arm, and a receiver at or near the end of the same, whereby the receiver may be adjusted to either ear and the transmitter brought upon either side of the arm, substantially as described.

4. In a telephone, the combination with a pivoted arm of a supporting-arm capable of a limited rotary adjustment thereon and having a lateral arm supporting the transmitter, a receiver on the end of said supporting-arm, and a magneto mechanism the armature of which is revolved by the vibration of said pivoted arm, substantially as described.

5. In a telephone, the combination with a pivoted arm supporting a transmitter and a receiver, of a magneto mechanism operated by said arm and supporting the same at different angles by the resistance to rotation of its armature, substantially as described.

6. In a telephone, the combination with a pivoted arm supporting one or more of the parts of the telephone of a magneto mechanism operated by said arm and supporting the latter at different angles by the resistance which the armature offers to rotation due to its cutting the lines of force of the magnetic field, substantially as described.

7. In a telephone, the combination with a pivoted arm carrying a receiver and transmitter of a magneto-mechanism, a multiplying train of gears operating the armature, a toothed bar engaging the initial gear of the train and pivotally connected to the pivoted arm, an electric circuit for the magneto including the bell-coils, receiving and transmitting circuits, a short circuit for the magneto, brushes operated by the pivoted arm to cut the magneto-call out and the receiver and transmitter into circuit with the line, and a circuit-controller which normally completes the short circuit of the magneto and vice versa, substantially as described.

8. In a telephone, the combination with a pivoted arm supporting a receiver and transmitter of a magneto mechanism means for operating the armature thereof by said arm, a bell-circuit, a short circuit for the magneto, a transmitter and a receiver circuit and a circuit controller to cut out the short-circuit, substantially as described.

9. In a telephone, the combination with a pivoted arm carrying a transmitter and receiver, of a magneto mechanism, bell-coils excited thereby, means for operating the armature of the magneto by the vibration of the pivoted arm, circuits for the bell, and for the magneto, a short circuit for the magneto, transmitter and receiver circuits, a circuit controller having a push-button and spindle carrying a conducting washer which makes and breaks the short circuit, parallel contact-strips one thereof being divided into two parts, one part connected in the transmitter circuit and the other in the short circuit of the magneto, and a bridge-contact having brushes sweeping the parallel strips as the pivoted arm vibrates, substantially as described.

10. In a telephone, the combination with a pivoted arm carrying the transmitter and receiver, of a sliding switch operated by said arm, circuits for the transmitter and receiver and for the generator supplying current to the bell coils, a short circuit for said generator, and parallel contact strips on which the sliding switch moves, said strips being connected in the separate circuits and one of said strips having a break to enable the switch to cut the bell-coils out and the receiver and transmitter in, and vice versa, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

NORVAL LANDON BURCHELL.

Witnesses:

ALBERT H. NORRIS,

THOS. A. GREEN.