

No. 877,033.

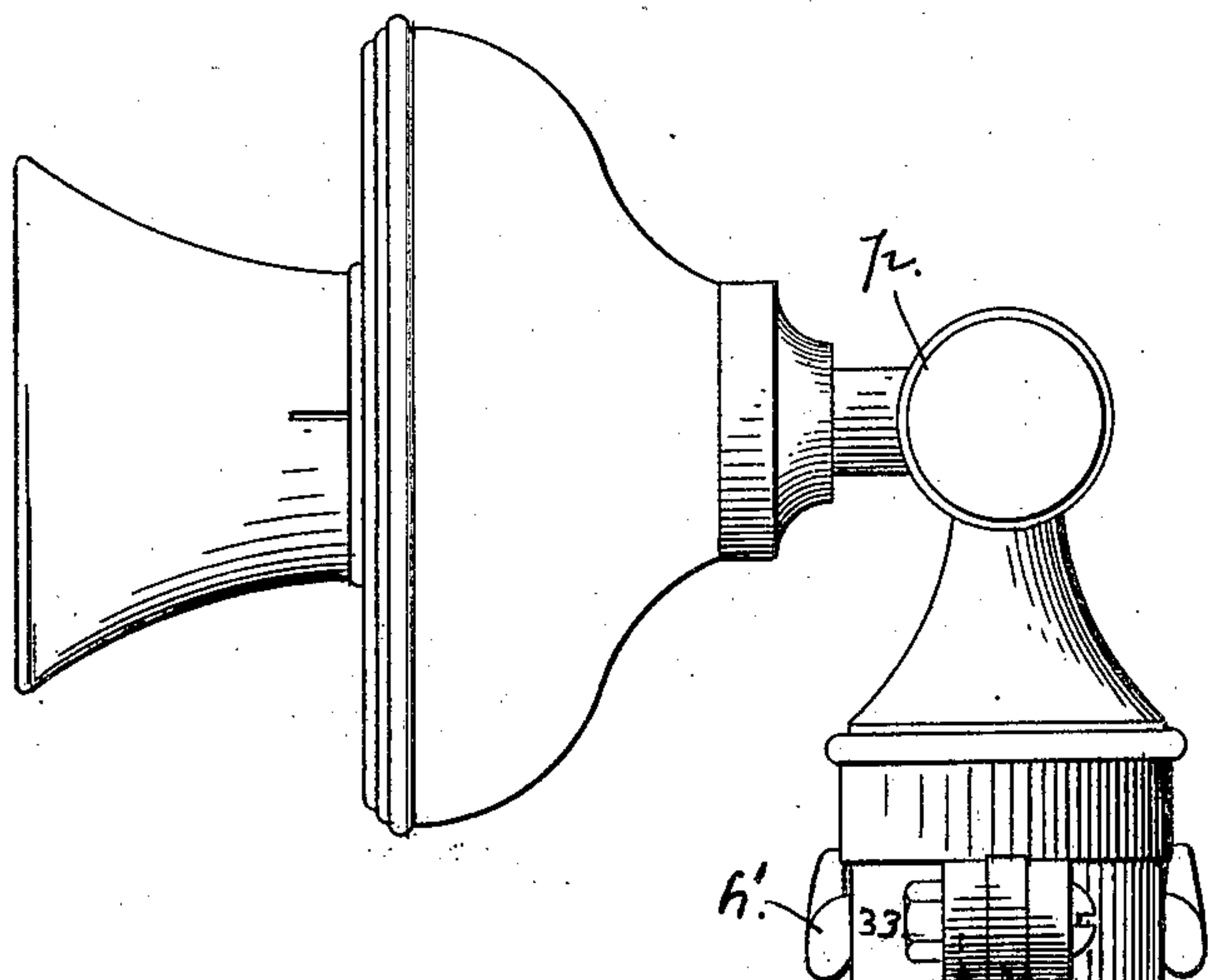
PATENTED JAN. 21, 1908.

A. K. ANDRIANO.

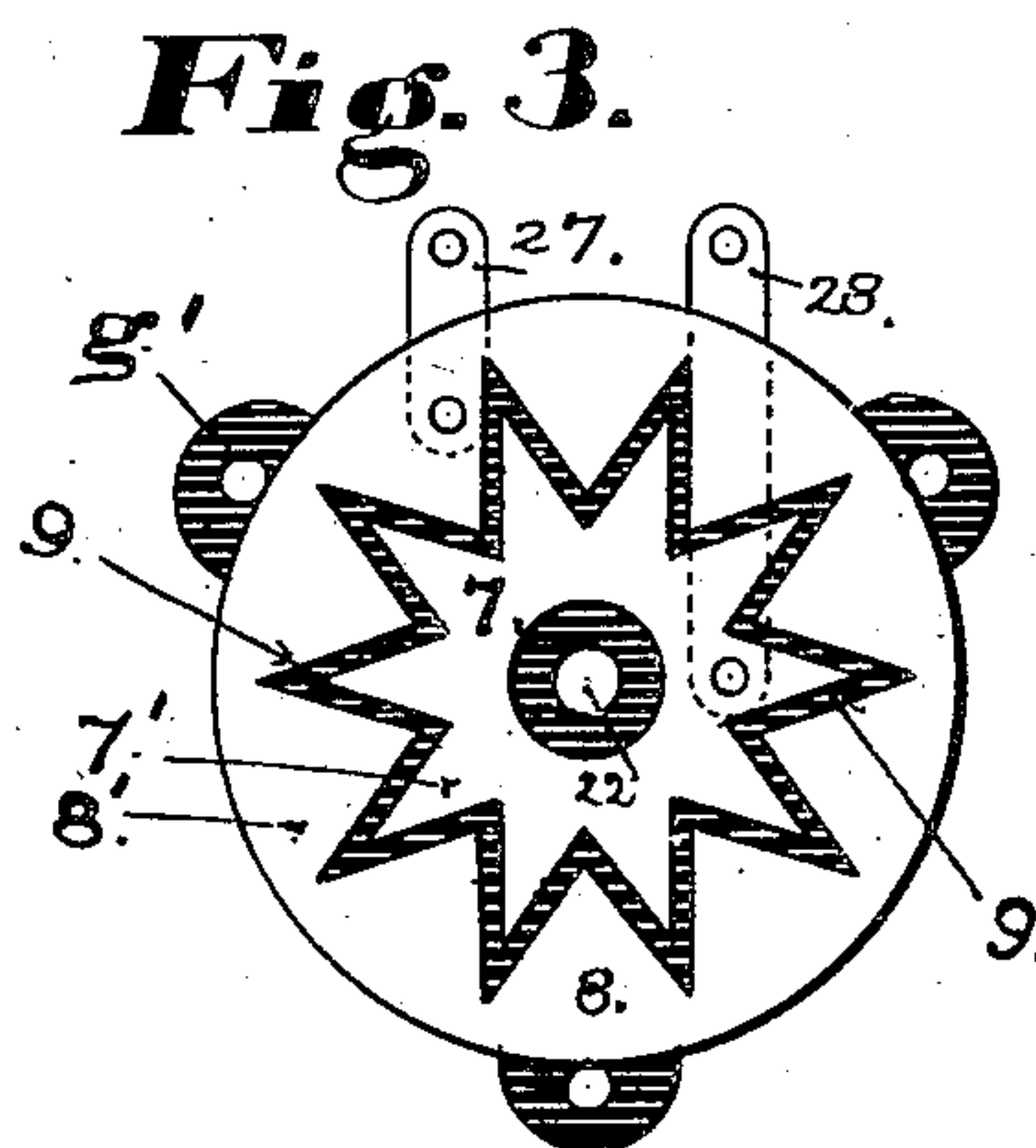
# SWITCHING MECHANISM FOR TELEPHONE CIRCUITS.

APPLICATION FILED MAR. 15, 1905.

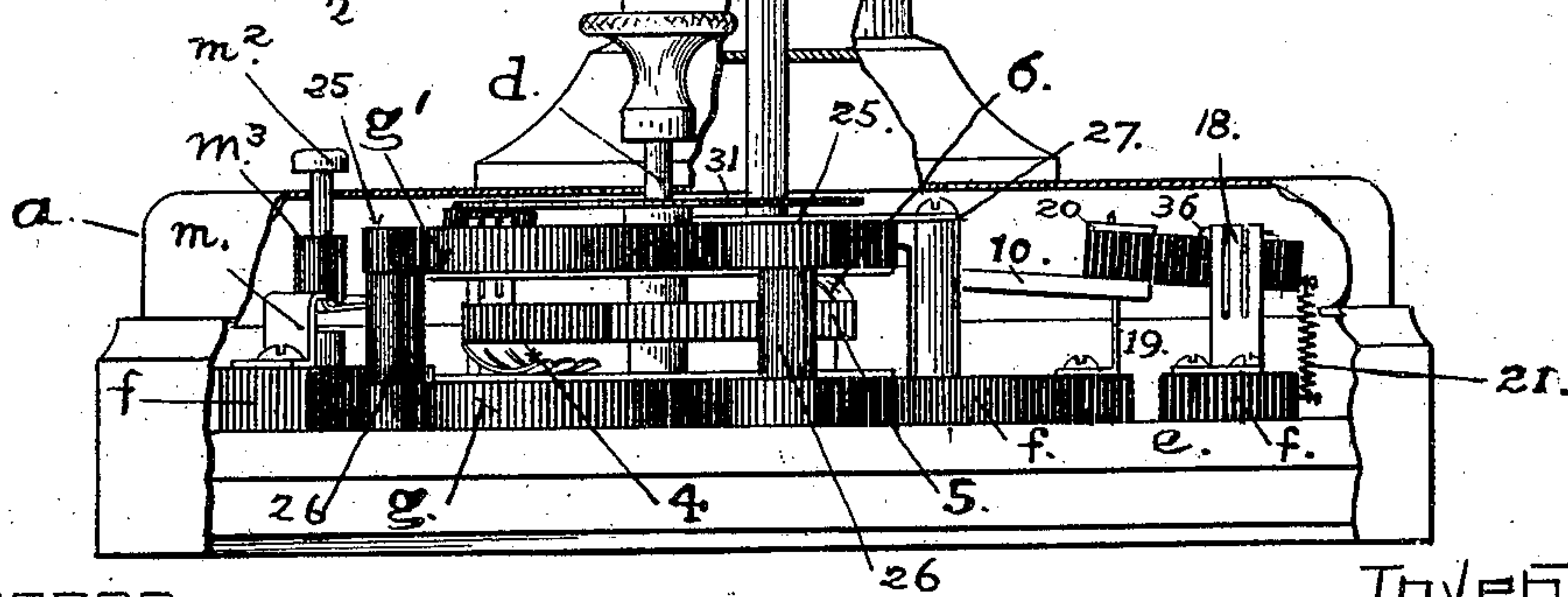
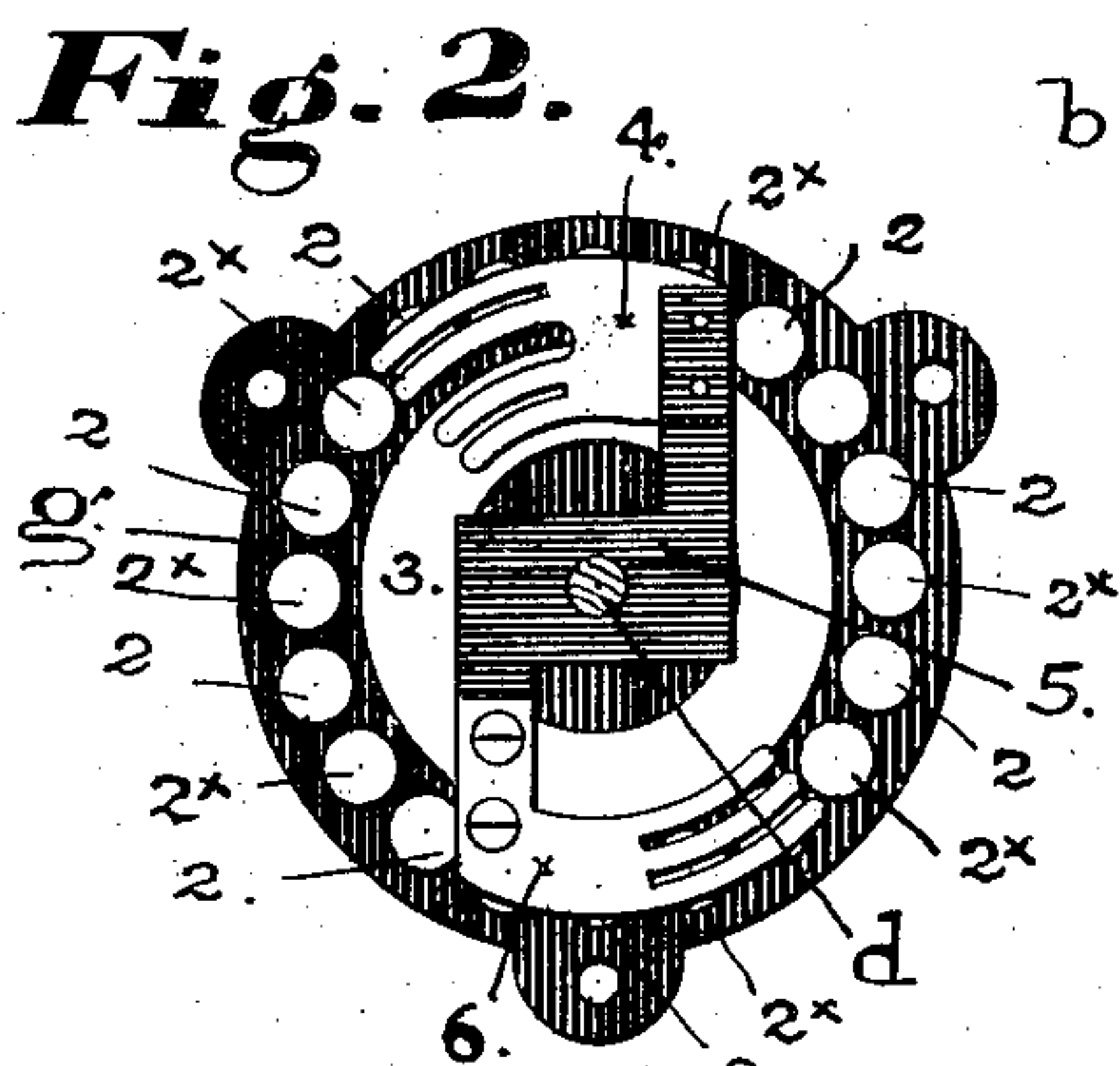
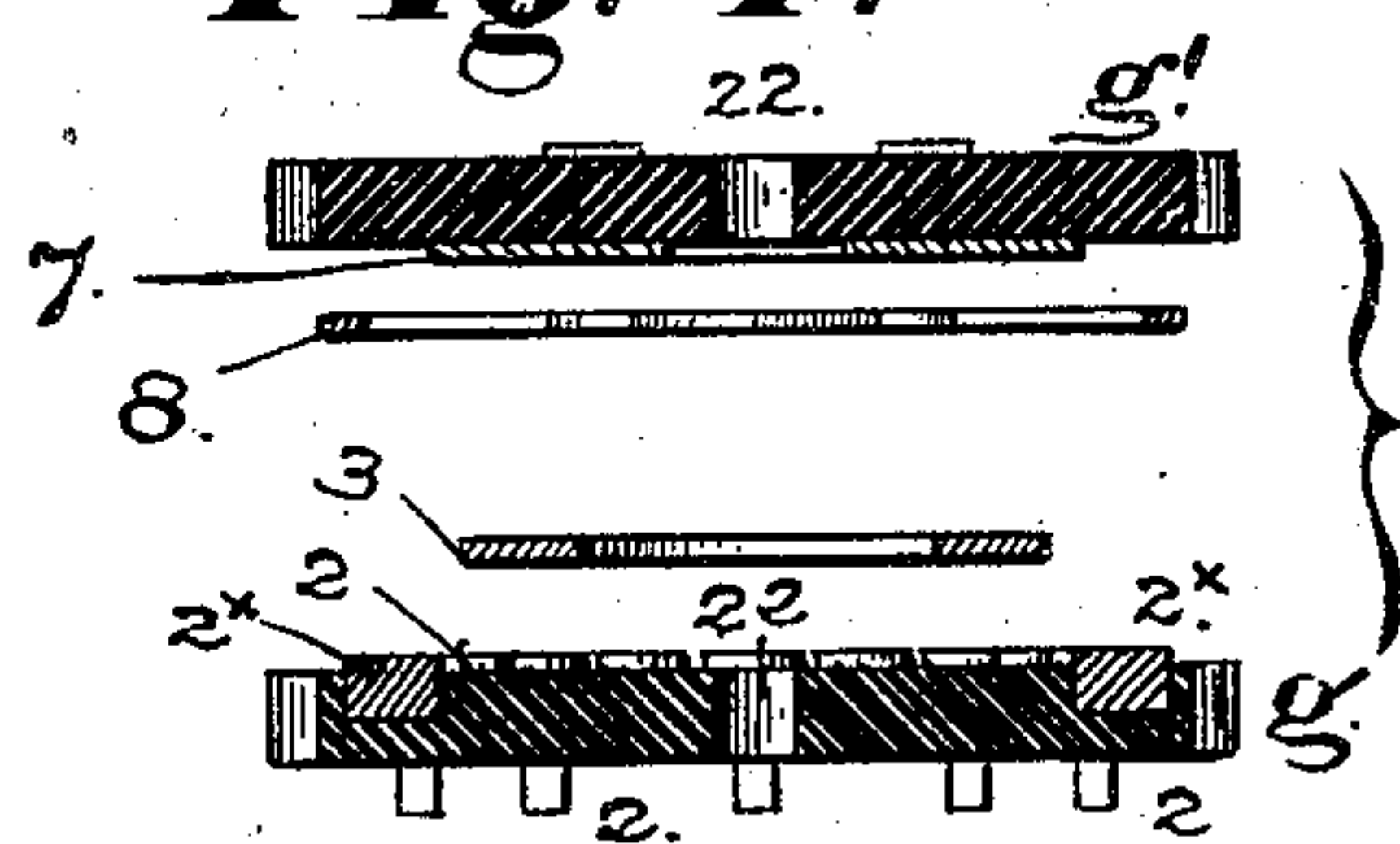
2 SHEETS—SHEET 1.



**Fig. 1.**



**Fig. 4.**



witnesses

Arthur G. Slee  
M. Regner

Inventor

Albert H. Andriano  
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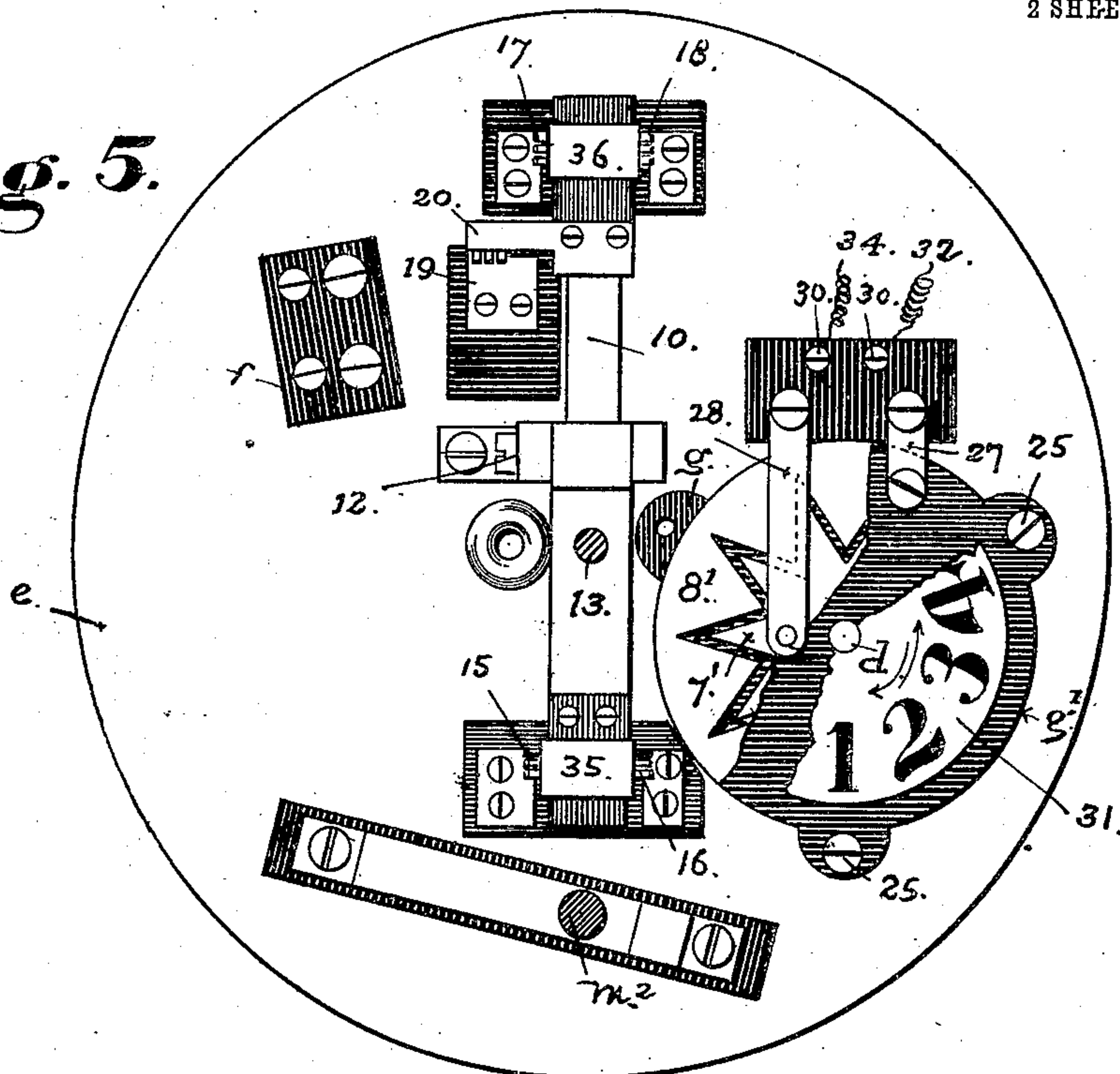
A. K. ANDRIANO.

# SWITCHING MECHANISM FOR TELEPHONE CIRCUITS.

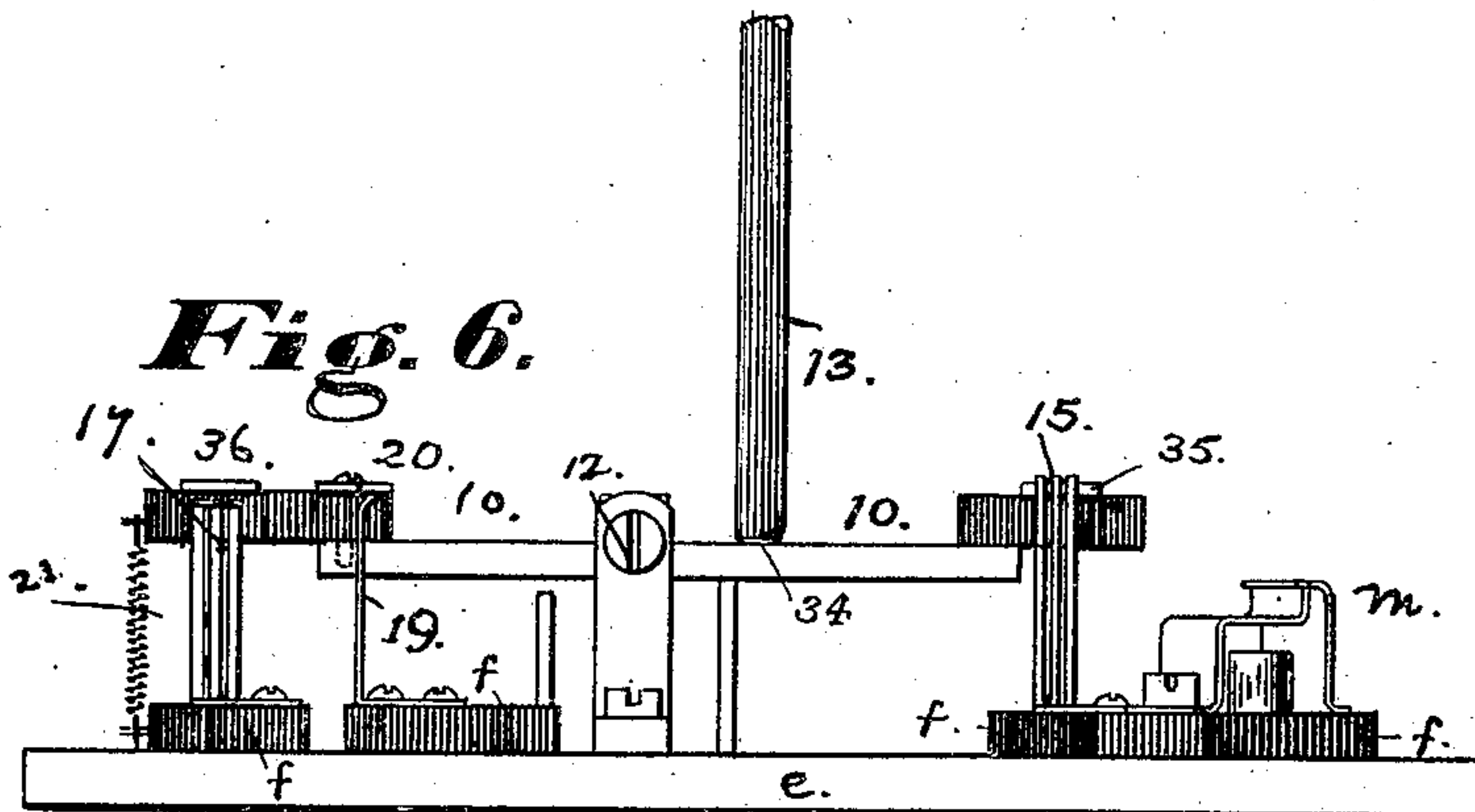
APPLICATION FILED MAR. 15, 1905.

2 SHEETS—SHEET 2.

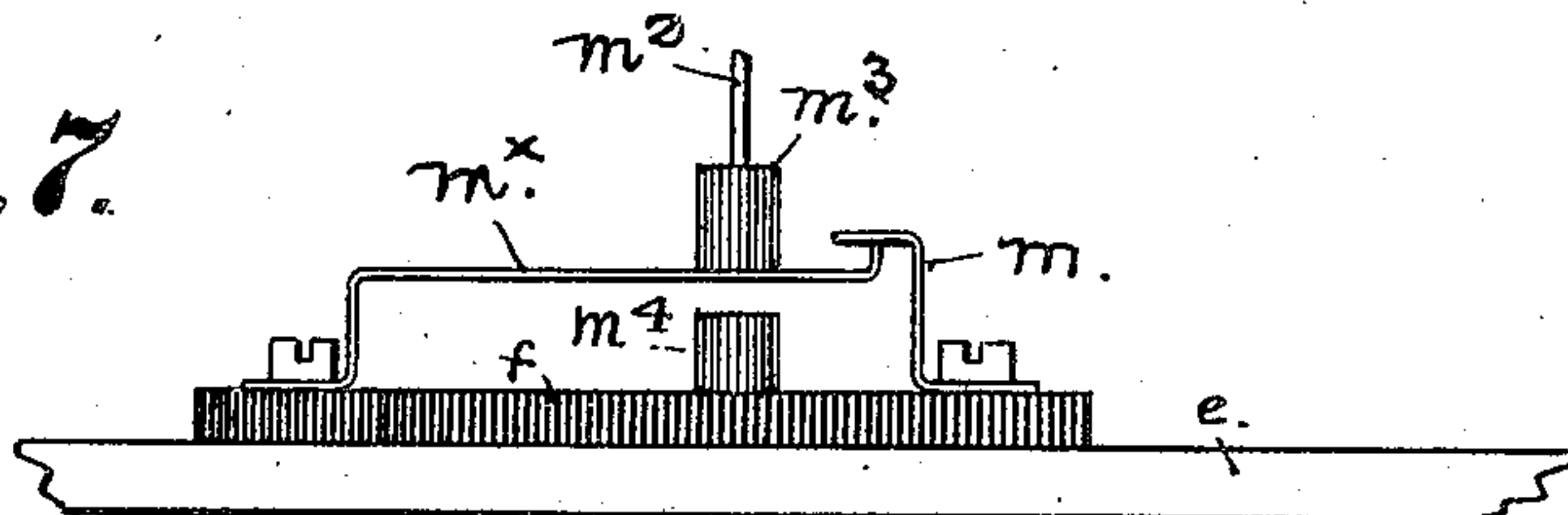
**Fig. 5.**



**Fig. 6.**



**Fig. 7.**



Witnesses.

Arthur G. Slee.  
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# UNITED STATES PATENT OFFICE.

ALBERT KOCH ANDRIANO, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO DIRECT-LINE  
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## SWITCHING MECHANISM FOR TELEPHONE-CIRCUITS.

No. 877,033.

Specification of Letters Patent.

Patented Jan. 21, 1908.

Application filed March 15, 1905. Serial No. 250,155.

*To all whom it may concern:*

Be it known that I, ALBERT KOCH ANDRIANO, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Switching Mechanism for Telephone-Circuits, of which the following is a specification.

This invention relates to improvements made in portable switching-mechanism for telephone-circuits, applicable more particularly to what are known as desk-telephones, and designed especially for setting up and controlling circuits for ringing, or calling, and for talking between one station and another in those systems wherein the connecting and calling are performed directly from the station.

The improvements comprise certain novel construction and combination of switching or line-selecting mechanism, in which a single movable switch-piece capable of being moved in either direction over the line-contacts contains two sets or series of circuit-closing contacts, one of which operates to select the line for the talking-circuit, while the other set or series controls through electrically actuated means the completion of the talking circuit in such manner that the switch can not be disturbed after it is once placed to the desired line; that is to say, no further or additional adjustment of the movable contact-piece can be made in either direction without breaking the circuit and placing the station back on its own line. A circuit-breaking means mechanically controlled from or through the telephone-hook is also combined with this line-selecting switch, through the medium of which the primary-circuit of the station, or the local circuit that includes the induction-coil, the transmitting instruments and a source of current, is automatically returned to its own line independently of the switching-mechanism, or the position occupied by its movable switch-piece, by the operation of returning the receiving instrument to place on its hook.

The nature of my said improvements, and the manner in which the same are applied to and embodied in a portable switch-stand and telephone-support of the kind referred to, are explained at length in the following description, in which the accompanying drawings are referred to by figures and letters:—

Figure 1 is an elevation of the instrument

having all the parts of the switching-mechanism contained in the base; a portion of the external walls or shell of the base and the pillar broken away to expose parts within. Fig. 2 is a top-view of the stationary line-contacts and the movable-contacts of the line-selecting switch. Fig. 3 is an inverted or reversed plan of the contact-plates that overlie the line-contacts and the movable circuit-closer shown in Fig. 2. Fig. 4 is a transverse section taken in a vertical plane through the two series of stationary-contacts and the intermediate plates; the two insulation-blocks carrying the upper and lower series being separated from each other. Fig. 5 is a top-view, on an enlarged scale, of the switching-mechanism, and the circuit-closing devices that are controlled from the telephone-hook. The dial and the stationary contact-plates immediately beneath it are broken away in part. Fig. 6 is an elevation, in detail, of the stationary and movable members of the circuit-closer that is controlled from the telephone-hook; the elevation being taken from the left side of Fig. 5. Fig. 7 is a side-elevation, in detail, of the fixed stops and the movable-stops of the ringing-key.

In the following description the term "stationary contacts" is used to designate the points 2 in the switch which are the terminals of individual lines entering or running out from the station. The term "movable switch-piece", means the centrally-pivoted member of the switch that rides over and makes contact with the points 2. The word "home-line", means the line or conductor individual to the station; and the term "primary-circuit", designates the local circuit of every station that includes the transmitting device and the inductive apparatus, and is connected with a source of current through the home-line peculiar to the station.

These improvements in switching and circuit-controlling means, as I have illustrated them and will now proceed to describe them, are arranged for operation in connection with stations in which the primary-circuit of each is normally connected into its home-line through the circuit-controlling means and not through the line-switch; so that the movable contact-piece or member of the last-named switch performs no part in connecting the primary-circuit with or into its own home-line and source of current. A telephone sys-



tem having circuit connections such as just described is shown and claimed in my Patent No. 846,889, dated March 12, 1907.

The function of the line-switch is to select the home-line of the station to be communicated with, and to place that line in proper relation to form in connection with the line provided for the other side a complete metallic circuit between the two stations. No return movement or adjustment of the switch to the home-line of the station is required; and its movable-member may be left at any point or position without affecting the operation of the instrument. The operation of connecting the primary-circuit with its own line again after every time of use, as well as of making connection with the home-line of another station, is performed by that part of the apparatus designated as the circuit-controlling means. The switching-mechanism is well adapted also for use in those systems where the battery or source of current is located inside and not outside the switch.

The construction and arrangement of the switching-mechanism will be described with reference to Figs. 2, 3, 4 and 5. The stationary-contacts 2 that form the terminals of the line-wires at the switch in every station are embedded in a block *g* of insulating fiber fixed on the bed-plate *e*, the line-wires being connected individually to the contacts in the well-known manner. The spindle *d* carrying the movable switch-piece 5 is rotatable in bearings 22 in the block *g*, and also in another and similar block *g*<sup>1</sup> situated above the block *g*. To the underside of the upper block *g*<sup>1</sup> are fixed contact-plates 7—8; room between the two blocks being afforded for the movable switch-piece. The two blocks *g g*<sup>1</sup> are secured to the bed-plate by screws 25, and by spacing washers 26 that support the upper block and maintain it at proper distance from the lower block. The contacts 4—6 on the movable switch-piece 5, insulated from each other, are fixed on the ends of the two oppositely-extending arms of the piece 5, so that the springs 4 will touch the contacts 2, one at a time, as the switch-piece is turned, and will also ride continually on the central contact-ring 3 lying within the circle of stationary-contacts. The contact ring 3 is insulated from the last-named contacts, and is so connected by a conductor or connection into one side of the primary-circuit that the ring 3 forms the circuit-closing means between the primary-circuit and any selected one of the lines that has a terminal in the circle of contacts 2, when the contact-spring 4 is placed on the proper contact. In like manner the contact-spring 6 at the opposite end of the switch-piece will bridge the space that separates the inner plate 7 from the outer plate 8 on the upper block *g*<sup>1</sup>, and thus complete metallic connection between them.

The contact-piece 6 is so placed with ref-

erence to the other contact 4 that, while the latter is resting on a line-contact 2, the contact 6 will touch the contact-plates 7—8 above it only on the outer side, as on 8<sup>1</sup>, and will not bridge the gap or space 9 that separates the two parts 7—8, and the circuit in which the parts 7—8 are situated will then be open. But, on the other hand, the contact-spring 6, when brought into such position that it will bridge the space 9 and close the circuit by touching one of the inner parts 7<sup>1</sup> and an adjacent outer part 8<sup>1</sup> will close the circuit; and thus on the instant that the switch-piece 5 is moved in either direction a sufficient distance to carry the contact-spring 4 away from the line-contact it will also connect the two plates 7—8 across the gap 9, and complete the circuit through those parts. This results from the peculiar construction of the contact-plate 7—8 and the arrangement of the same with respect to the other members of the mechanism. The operation will be more clearly understood by referring to Figs. 2, 3 and 4. The contacts that close and open the circuit through the circuit-controlling means before mentioned are seen in Figs. 3 and 4, where the two insulation blocks *g—g*<sup>1</sup> and the contact-plates 7—8 are shown in their relative positions. The working position of the upper portion, represented in Fig. 3, is directly over the parts seen in Fig. 2; and the face of the block *g*<sup>1</sup> which is uppermost in Fig. 3 will overlie and face the circle of contacts 2 in the switch, and will lie next to the contact-spring 6 on the switch-piece when placed in position.

The inner portion 7 and the surrounding portion 8 of the contact-plate on the block *g*<sup>1</sup> are separated from each other by a continuous slit or gap concentric with the axis of the movable-piece 5 and having alternate salient and reëntering angles of such proportions that the angular members or sections 8<sup>1</sup> of the outer member present a sufficient breadth of surface for the contact-spring to rest on without touching the similar angular section or point 7<sup>1</sup> lying on either side of a section 8<sup>1</sup>; the position assumed by the contact-spring 6 while the contact-spring 4 is resting on a line-contact will put it in contact with a section 8<sup>1</sup> alone. Movement of the switch-piece in either direction out of working position on a line-contact will cause the contact 6 to touch the nearest section 7<sup>1</sup> on the opposite side of the gap before passing off the outer section 8<sup>1</sup>, and thus it will close the circuit by connecting the two sections or portions 7<sup>1</sup>—8<sup>1</sup> across the gap. These sections 7—8 are connected by metallic strips 27—28 to separate binding-posts 30 on the bed-plate, and to these points are brought and connected the conductors 32—34 of the controlling-circuit in which is situated the means that controls the connection between the primary-circuit and the line-wires. For



convenience in setting the switch-piece to the desired line the spindle is provided with a dial-plate 31 located and operating in the well-known manner to indicate to the user the position of the switch with respect to the contacts 2 that are concealed from view. The construction and operation of the circuit-closing and opening means will be understood from the details Figs. 5 and 6 in connection with the other figures of the drawings. It should be noticed in the present construction that the circuit-closing and opening means does not control the switching-mechanism, as the latter has no resetting movement and does not require to be returned to an initial position after each time of use.

The complete instrument is provided with a ringing-key  $m^2$ , and a hinged support  $p$  for the transmitter, in addition to the supporting hook  $h^1$  for the receiver, in the usual manner.

As the switch-piece 5 has no spring to return it to position and is freely movable in either direction in making a switch, the complicated locking and releasing mechanism heretofore required to reset the switch to normal position by the act of hanging up the receiver is rendered unnecessary. Such controlling devices being omitted from the present construction, the mechanism is greatly simplified both in number of parts and in its operation. Its durability as well as its reliability of operation under all the conditions of use to which these switching-devices are exposed are materially increased. In addition to its function of selecting any one of the lines of the other stations, this switching-mechanism also controls the connection between its primary-circuit and its own home-line, as well as with the home-line of the selected station, through the circuit-controlling means which is located between the switch and the primary-circuit in such manner that while the station is not being used its primary-circuit will be connected to its own home-line; or, when the line switch is moved to make a switch and the operation of ringing up the other station is performed, the primary-circuit will be connected to the home-line of the selected station to which the switch has been set.

It will be understood that the contact plates 7 and 8 constitute respectively the terminals of a circuit that includes an electro-magnet and some suitable source of power, such as the battery employed for ringing the call bells of the telephones; and that the said electro-magnet is arranged to operate a cut-out or circuit controller that serves to disconnect the primary-circuit from the line of the selected station, and to return it to the home-line of the station where the call was made. From this it is evident that the line-switch cannot be disturbed from its

position after being set to a selected line, without electrically connecting the terminal plates 7 and 8 and causing an automatic restoring of the parts of the instrument to normal position, that is with the primary-circuit connected with its home-line only, and disconnected from the line of every other station. It is not possible, therefore, for a user to place his instrument temporarily in circuit with the home-line, by switching and closing his ringing-key to operate the circuit-closer, and then attempt to get the home-line of another station, by moving his line-switch out of position, without going through the same operation of switching and calling, by which operation his own instrument will be disconnected from his line-switch and restored to its initial position.

I do not herein claim the system of automatically controlling the local talking circuit whereby secrecy of service between stations is insured, such as above described, as I have made such system the subject-matter of another application for patent which I have filed of even date herewith, Serial Number 250,154.

The switch-piece 5 is caused to perform and bring about the two operations of selecting the line and controlling the connection of the primary-circuit by making the switch-piece 5 and the movable member 6 a single part.

The circuit-closer that is operated mechanically from the telephone-hook consists of a tilting-lever 10 supported on pivots 12 and provided with two circuit-closing contact-strips 35—36, both insulated from the lever and so arranged between two sets of contact-springs 15—16, 17—18 that when one end of the lever is depressed in one direction it will close the circuit through the conductors of which the contact-springs 15—16 are the terminals, and at the same time open the springs 17—18 of the set at the opposite end. Or, if depressed at the other end, the lever will close the springs 17—18 and open the other set 15—16. An additional circuit-closing piece 20 carried by the lever 10 acts to connect a third contact-spring 19 at the time that the outer end of the lever is depressed to connect the springs 17—18. The contacts 15—16 operate to cut out the bell when the talking-circuit is completed by removing the receiver from the hook; and the contacts 19—20 make or break the primary-circuit to the line by the act of taking down or hanging up the receiver. The contacts 17—18 open and close the ringing-circuit.

A rod 13 loosely attached to the arm  $h$  of the hook on one side of its fulcrum-point 33 extends down through the pillar to the lever 10, on which its lower end rests with sufficient pressure under the weight of the receiver on the hook to depress the inner end of the lever 10 and hold up its outer end clear



of the contact-springs 17—18. On being relieved of the weight of the receiver the lever 10 will be tilted in the opposite direction through the tension of a spring 21 attached to the end of the lever 10 and to a fixed point on the plate *e* of the frame. These parts are mounted on the plate *e* of the frame, and are insulated from one another and from other metallic parts, where necessary, by blocks of insulation fiber *f—g*.

The ringing-stops *m m<sup>x</sup>* are normally closed as seen in Fig. 7, and are operated by the ringing-key *m<sup>2</sup>*, the lower end of which terminates in an insulation *m<sup>3</sup>*. The fixed stop *m<sup>4</sup>* is located on the insulation block *f* beneath the movable stop *m<sup>x</sup>*.

What I claim as my invention, and desire to secure by Letters Patent is:—

1. In a telephone switching-mechanism two circular series of stationary-contacts in parallel planes one over the other and having a common axis, the contacts in the lower series comprising insulated contact-points, and a contact-ring concentric therewith, the contacts in the upper series comprising an inner plate having alternate and concentric salient and reëntering angles and an outer ring having salient and reëntering angles corresponding in order and position to those on the inner-plate, situated in the same plane and insulated therefrom; in combination with a rotatable switch-piece centrally pivoted between the said lower series and upper series of contacts and movable in either direction around the circle, two separate contact-pieces carried thereby and insulated from each other, one of said contact-pieces operating to connect with the continuous contact-ring the selected stationary-contact to which it may

be set, and the other contact-piece adapted by its position to rest on one side of the space between the inner plate and the outer ring of the upper contacts when a contact in the lower series is in metallic connection with the contact-ring, or to bridge the said space between the upper contacts when the switch-piece is moved.

2. In a telephone switching-mechanism, the combination of two circular series of stationary-contacts in parallel planes one over the other, the contacts composing one series constituting separate terminals for individual lines, and a continuous contact-ring common to said contacts, insulated therefrom, the contacts in the other series comprising an inner plate having concentric and alternate salient and reëntering portions, and a surrounding ring having corresponding but relatively larger salient and reëntering portions on the inner edge parallel with the corresponding portions on the inner ring, and separated therefrom; a rotatable switch-piece pivotally mounted between said upper series and lower series of contacts, and adapted to move in either direction, and contact-pieces on said movable switch-piece for making and breaking connection between the contacts in one series in alternate order to those in the other series by the same movement of the switch-piece.

In testimony whereof I have hereunto set my name to this specification in the presence of two subscribing witnesses.

ALBERT KOCH ANDRIANO.

Witnesses:

B. W. MORGAN,  
A. V. B. DAVIS.