(No Model.)

A. E. KEITH.

AUTOMATIC TELEPHONE EXCHANGE.

No. 573,884. Patented Dec. 29, 1896.

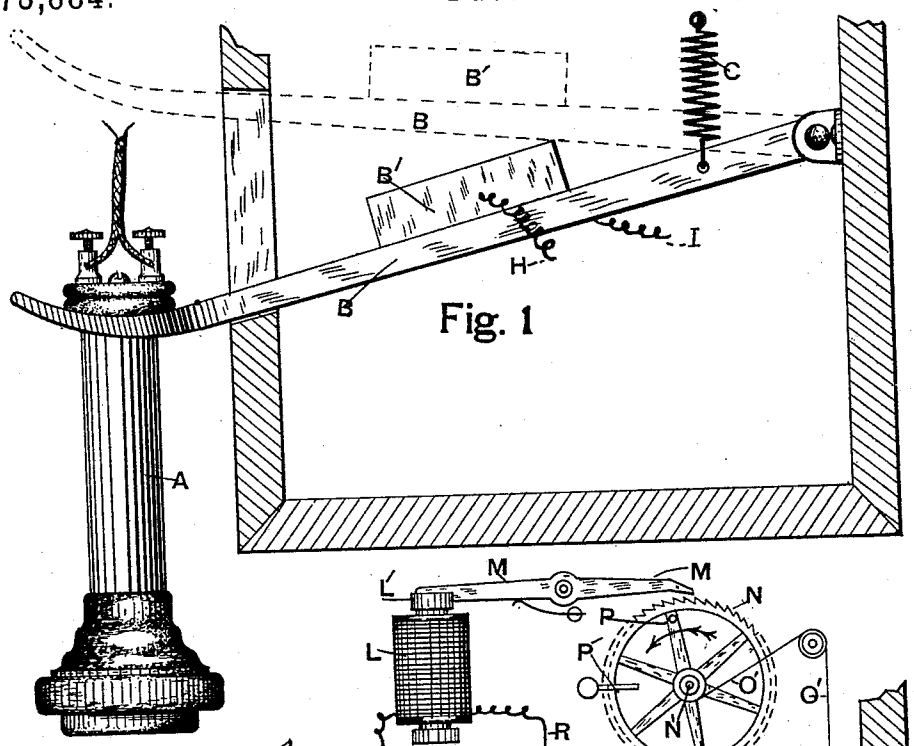


Fig. 1

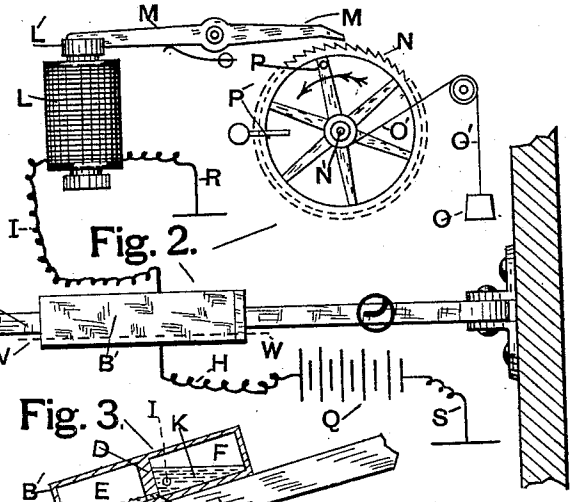


Fig. 2.

Fig. 3.

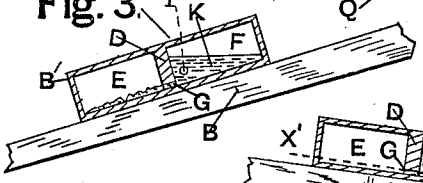


Fig. 4.

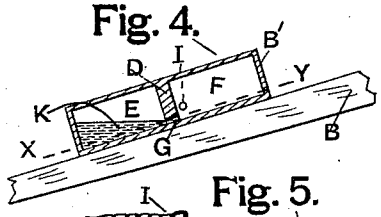


Fig. 5.

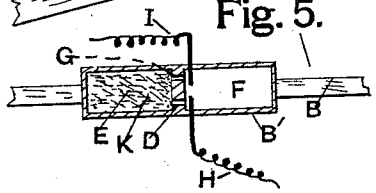


Fig. 6.

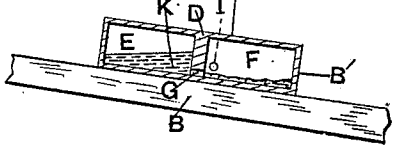


Fig. 7.

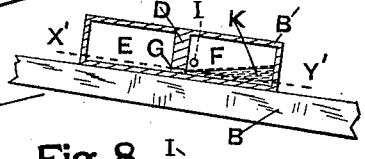
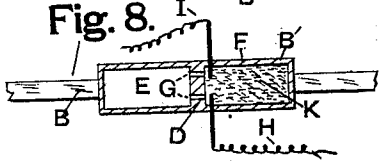


Fig. 8.



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INVENTOR:

Alexander E Keith

By his Atty.

Oscar Snell

UNITED STATES PATENT OFFICE.

ALEXANDER E. KEITH, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE STROWGER AUTOMATIC TELEPHONE EXCHANGE, OF SAME PLACE.

AUTOMATIC TELEPHONE-EXCHANGE.

SPECIFICATION forming part of Letters Patent No. 573,884, dated December 29, 1896.

Application filed September 16, 1893. Serial No. 485,700. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER E. KEITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Automatic Telephone-Exchanges, of which the following is a specification.

My invention relates to improvements in operating automatic telephone and other electrical exchanges, but more especially to improvements in operating the automatic exchanges forming the subject of Letters Patent of the United States No. 447,918, dated March 10, 1891, and No. 486,909, dated November 29, 1892, granted to Almon B. Strowger; and my object is to provide means whereby the release mechanism of such an exchange may be operated by a current of electricity controlled by a means which is initially operated by the weight of the telephone-receiver after it is hung up or placed in any convenient position it would occupy when not in use, so that after a person has used a telephone the main switch-arm at the exchange is automatically returned to the starting position and ready for the next person to connect it with any other exchange and telephone in the system, and a means by which this may be accomplished is described hereinafter and is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a portion of a magneto-box of an ordinary telephone apparatus, showing the side elevation of the receiver-hook lever with the telephone-receiver hanging therefrom, together with a box containing means for controlling the electric release-current. Fig. 2 is a plan view of a portion of Fig. 1, together with a diagrammatic view of the electrical connection from the battery to the release mechanism at the central exchange. Figs. 3, 4, 6, and 7 are vertical sections on line V W, Fig. 2, of a box containing the means for controlling the electrical current which operates the release mechanism of the exchange, and will be hereinafter explained. Fig. 5 is a plan section on the plane of line X Y, Fig. 4; and Fig. 8 is a plan section on the plane of line X′ Y′, Fig. 7.

Similar letters indicate corresponding parts throughout the several views.

A is the telephone-receiver, hanging upon the hook of lever B, which is pivotally attached to the magneto-box, as usual, and is capable of vibration vertically from the down position shown in the solid lines to the high position shown in the broken lines, Fig. 1, being actuated upward by spring C and downward against the tension of the spring by the weight of receiver A.

Secured to lever B is a box B′, which may be of some electric insulating material of any convenient shape and which is divided by partition D into compartments E and F, the partition having one or more openings G, which form passages between the compartments.

At H and I are electric conductors which enter box B′ with their ends a short distance apart, as shown in Figs. 5 and 8.

A small quantity of mercury or any other mobile electric conducting material K is placed within one of the compartments, it being understood that the material K must pass easily by gravity through the passages from one apartment to the other.

At L is represented the electromagnet for the release mechanism of one of the central exchanges, and L′ the armature of magnet L, which is attached to lever M, whose opposite end terminates in a pawl which engages the teeth of ratchet-wheel N, which is secured to the spindle N′, which carries the main switch-arm at the central exchange.

At O is a weight which is attached to a cord O′, which has one end wound around spindle N′ to cause the return movement of the shaft N′ and the attached switch-arm, there being a pin P which contacts with arm P′ when shaft N′ has been revolved by the descent of weight O to the starting position.

At Q is an electric battery, to the positive side of which is attached one end of the wire H, the other end of this wire being attached to and in electrical communication with the interior of box B′. Electromagnet L is connected to box B by means of wire I and to the ground through wire R. Battery Q is connected with the ground by wire S.

In describing the operation of this apparatus we will assume that the box B′ is made of gutta-percha and that the mobile conduct-

ing material K is mercury. After the telephone-receiver has been hung upon the hook of lever A for a few moments all the mercury will have run down into compartment E, where it will have a position similar to that shown in Fig. 4, which is the normal position of the mercury when a telephone is not in use. If now the receiver is lifted from lever B, spring C will lift the lever to the high position shown by the broken lines in Fig. 1, which will cause the mercury to flow into compartment F in the manner shown in Fig. 6, where the stream of mercury is not high enough to reach the ends of either one of the wires H or I, and therefore no electric current is sent into electromagnet L; but after a person is done with the telephone if the receiver is hung upon the hook of lever B the weight of the receiver will cause it to descend to the position shown in the solid lines, Fig. 1, and the mercury having flowed toward partition D fills that end of compartment F above the ends of wires H and I, Fig. 3, and makes connection with battery Q and electromagnet L, when pawl-lever M will be lifted from ratchet-wheel N, and through the action of weight O cause wheel N to revolve backward in the direction indicated by the arrow until pin P strikes arm P′, when the starting-point has been reached. It will be seen that if the passages through partition B are small some time may be made to elapse before the mercury in compartment F runs out, so as to disconnect the ends of wires H and I, thus giving ample time for the operation of releasing and returning the mechanism of the exchange to the starting-point.

It will be observed that the principal feature of this invention consists in connecting the release-electromagnet L with battery Q by a means which is continued in operation for a short time after the receiver and lever B have descended to their lowest position, and must comprise a means capable of connecting the battery Q with release-magnet L for such a length of time as to insure the complete release of the main switch-arm at the telephone-exchange, as is well understood by those skilled in the art pertaining to automatic telephone-exchanges.

I have tried various modifications of the invention hereinbefore described, which, although they differ in their mechanical construction, accomplish the same end by a means whose initial force is derived from the gravity of the telephone-receiver.

I claim as my invention—

1. An automatic telephone-exchange, comprising the combination of release mechanism at the central station operated by a current of electricity which is controlled by a means which is initially started in operation by the gravity of the telephone-receiver, substantially as described; said means comprising two compartments with communicating passages between them, the ends of two wires insulated from each other, and both entering one of said compartments, said wires placed in electrical communication with each other and connect the battery with the release-magnet, through the action of mercury, or some other electric conductor, in the manner substantially as described.

2. An automatic telephone-exchange comprising a releasing mechanism at the central station, said mechanism operated by a current controlled by the telephone-receiver switch, and the telephone-receiver switch comprising a box with a vertical partition in the same having openings in the lower portions thereof and mercury or other electric conductor in said box, and the ends of two wires insulated from each other entering one end of said box, said wires being in connection with a battery and release-magnets, all of said parts being combined substantially as described.

3. An automatic telephone-exchange comprising a releasing mechanism at a central station operated by a current of electricity, means at the substation for completing an electric circuit in which said releasing mechanism is, consisting of a tilting box having means therein adapted to electrically connect or disconnect wires in said circuit, and thereby operating said releasing mechanism and a telephone-receiver adapted to actuate said means by its gravity, said parts being combined substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand, this 29th day of August, 1893, in the presence of witnesses.

ALEXANDER E. KEITH.

Witnesses:

OSCAR SNELL,

JOSEPH HARRIS.