No. 646,689. Patented Apr. 3, 1900.

W. D. GHARKY.

TELEPHONE SYSTEM.

(Application filed July 1, 1897.)

(No Model.)

Fig. 1.

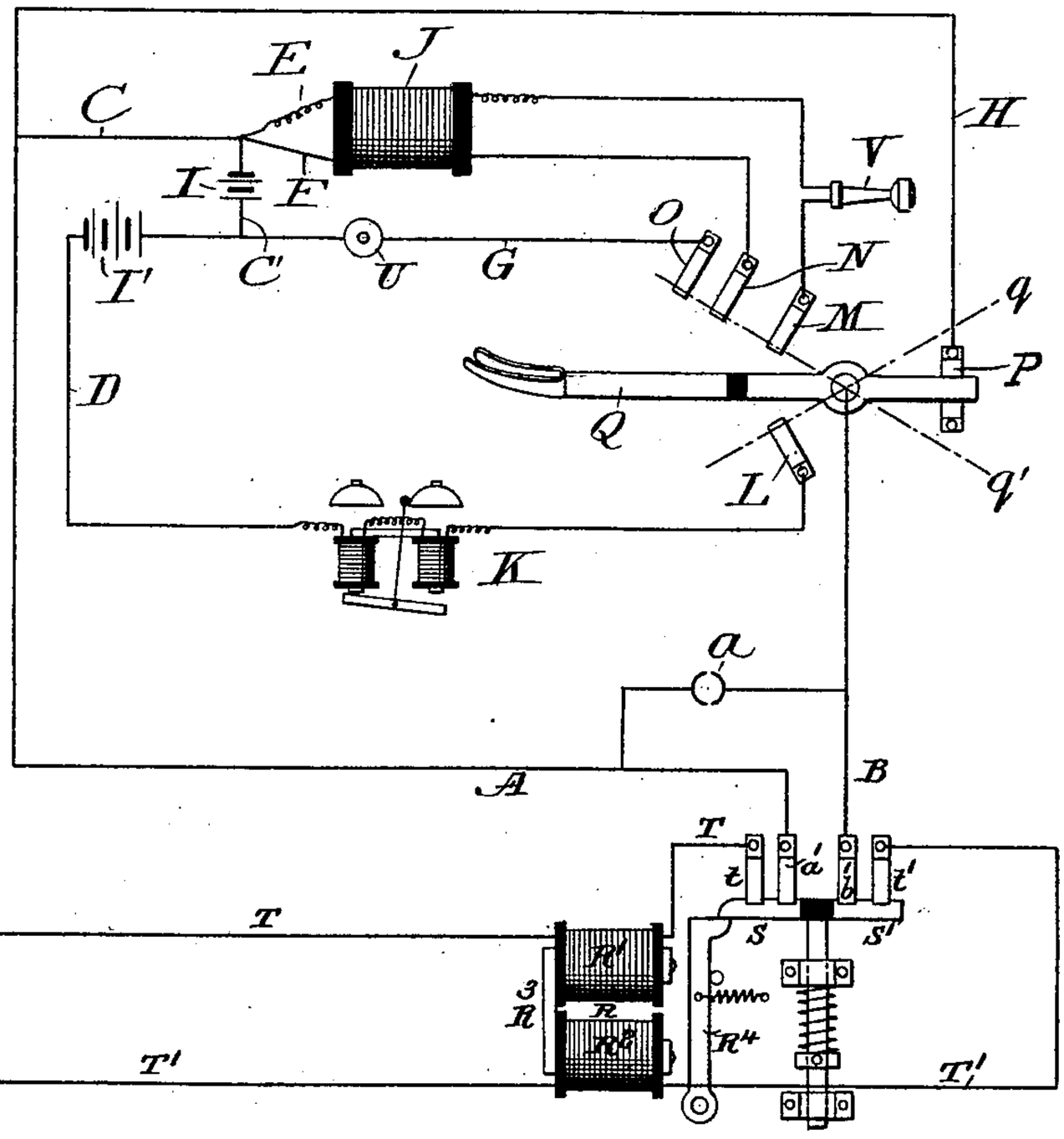
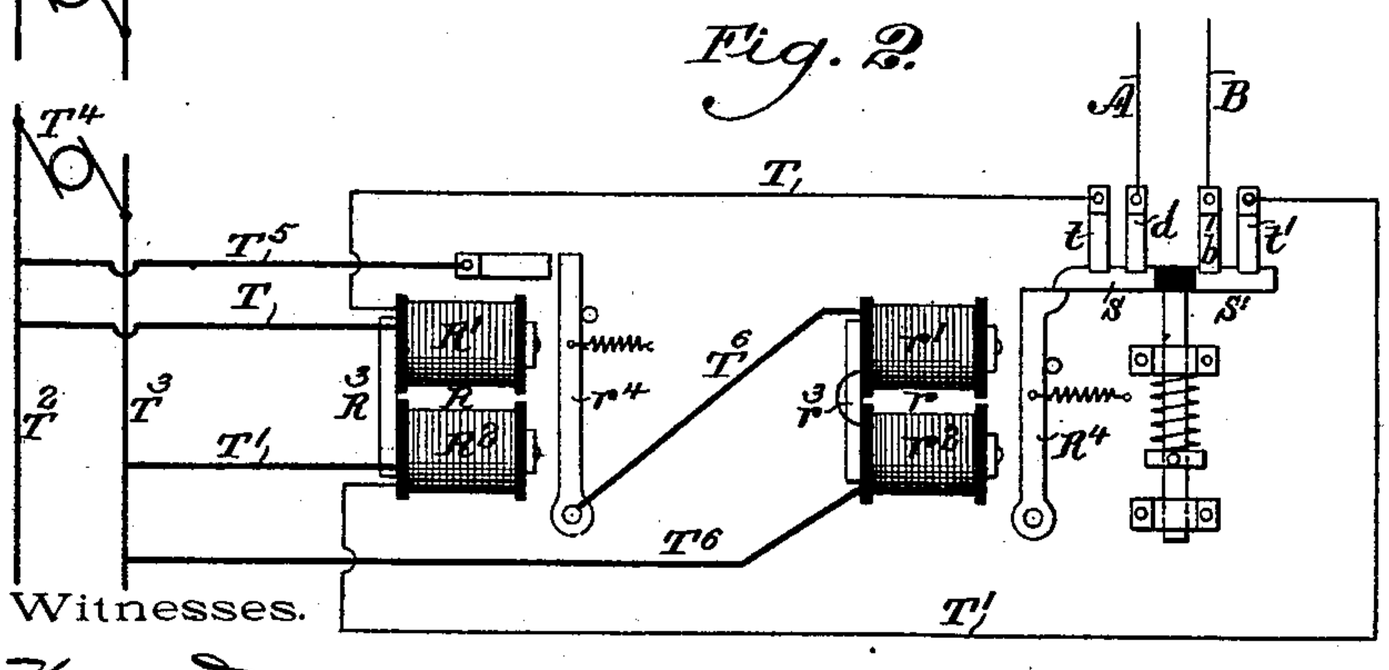


Fig. 2.



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UNITED STATES PATENT OFFICE.

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TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 646,689, dated April 3, 1900.

Application filed July 1, 1897. Serial No. 643,078. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. GHARKY, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Telephone Systems, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to telephone-exchange systems, and has for its object to provide a system wherein the lines will normally serve to convey current from the central station to the subscribers' stations to charge storage batteries thereat and wherein the subscribers' line-signals at the central station may be automatically actuated by the mere act of removing the telephone-receiver from the hook-switch. By my construction local batteries at the subscribers' stations are dispensed with, the storage-cells being cut off from the main line and included in the local transmitter-circuits when the instruments are in use.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a diagrammatic representation of a single line with the subscribers' apparatus and so much of the central-office apparatus as appertains to the particular line. Fig. 2 shows a modification, a relay being interposed between the line and the operative central-office apparatus.

Referring to Fig. 1, A B are the line-wires, connected at the central office to terminal springs a' and b' and also in parallel therewith to the two contacts of the line-jack a, and at the subscriber's station connected to the switch-hook Q as regards line-wire B and the wire C and contact P as regards wire A. The wire C is connected through the secondary winding E of the induction-coil J and the receiver V to the contact-spring M. It is also connected by a wire F through the primary winding of the induction-coil to the spring N. Another connection from wire C is through the storage-cells I and the transmitter U by wire G to the spring O. A branch of this last connection (lettered D) leads through the storage-cells I′ and the polarized bell K to the spring L.

At the central office the line-wires are normally connected by their terminal springs a' b' through twin springs t t' to the windings R′ and R² of a magnet R having a yoke R³, the connection proceeding from the magnet through wires T and T′ to the bus-bars T² and T³, which are connected to opposite poles of a suitable generator T⁴. It will be noticed that one winding of the magnet R is included in each side of the line. The spring-jack contacts are normally open, and it has not been thought necessary to show the plugs or other accessories of the switchboard, as these do not form part of the invention, which relates solely to the current-supply and signals for a single line.

The magnet R when energized acts to pull over an armature R⁴, which normally stands in such a position as to hold up a switch-bar consisting of two insulated halves s and s', which, being so held up, serve to maintain the connection between the springs a' t and b' t', respectively. The switch-bar is carried upon a plunger fitted in suitable guides and provided with a retracting-spring acting against an adjustable collar upon the plunger.

The operation of my invention as thus far described is as follows: Suppose the switch-hook Q to stand in its normal position, as indicated by the dotted line q. Then current will flow from the generator T⁴ over wire T′, winding R², wire T′, spring t', bar s', spring b', line-wire B, switch-hook Q, spring L, bell-magnets K, storage-cells l' and l by wires C′ and C and line-wire A to spring a', bar s, spring t, wire T, winding R′, wires T and T², and back to the generator. The effect of this current flow will be to charge the batteries I and I′. These batteries when fully charged have an electromotive force equal to that of the generator, and their resistance is at all times such, when added to that of the bell-magnets K, as to prevent a sufficient flow of current to energize the magnet R. Of course when the batteries have become fully charged and their counter electromotive force is equal to that of the generator there will be no current flow at all. The reason the storage-cells are divided into two groups is because, while it is necessary to have a high counter electromotive force, it is not desirable to use it

in its entirety in the local transmitter-circuit. Consequently the battery I alone is adapted to be included in the local circuit. When a subscriber desires to call the central office, he removes his receiver from the hook Q, which thereupon rises and eventually occupies the position indicated by the dotted line q'. In its passage, however, the tail of the lever makes contact with the spring P, immediately connecting the line-wires A and B through the short circuit H, containing no resistance. The current from generator T^4 will immediately rush out to line and through this short circuit in greatly-augmented volume—more than sufficient to energize the magnet R. The latter will at once attract its armature R^4, releasing the switch-bar s and s' and permitting it to be retracted by its spring, so as to break the connection between springs a' t and b' t'. This movement of the plunger and the switch-bar may well serve as a signal, and I so intend it, besides serving to cut off the generator-current from the line. As the hook Q passes upward into position q' it closes the local circuit G by crossing together the springs N and O, and the storage-cells I, the transmitter U, and the primary winding of the induction-coil are all brought in series with each other. At the same time the line B is connected through the body of the hook and the spring M through the receiver and the secondary of the induction coil to wire C, and thence to line-wire A. The storage-cell I' and the bell-magnets K are left disconnected during conversation.

Fig. 2 shows a form of the central-office apparatus wherein the magnet R does not act directly upon the armature R^4, but acts instead upon an armature r^4 to close the local circuit T^6, containing a magnet r, having windings r' and r^2, which is adapted to act upon the armature R^4. It will be understood that the windings R' and R^2 of magnet R are included in the two sides of the circuit T and T'.

Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a telephone system a central station, a subscriber's station, and line-wires interconnecting the two; a generator of current at the central office, a switch or cut-out normally maintaining said generator in connection with the line-wires, and a magnet controlling said switch or cut-out and included in circuit with the generator; a set of storage-cells at the subscriber's station normally maintained in connection with the line-wires so as to be charged by the central-office generator, together with switching mechanism also at the subscriber's station, adapted to disconnect the storage-cells from the line-wires and to short-circuit the latter, whereby an augmented current may be permitted to flow from the central-office generator through the controlling-magnet of the switch or cut-out, to actuate the same, substantially as described.

2. In a telephone system a central station, a subscriber's station, and line-wires interconnecting them; a current-generator at the central station normally connected to the line-wires, a cut-out switch adapted to break such connection when actuated, a magnet controlling said switch and included in circuit with the generator; a suitable resistance device normally included in the line-circuit at the subscriber's station, and switching mechanism thereat to cut out said resistance device and to short-circuit the line-wires, whereby an augmented current will energize the controlling-magnet of the cut-out switch at the central office, to disconnect switch, magnet, and generator from the line, substantially as described.

3. In a telephone system a central station, a subscriber's station, and line-wires interconnecting the same; a current-generator normally connected to the line; a group of storage-cells or secondary batteries normally connected in series throughout across the line-wires, a local circuit containing a transmitter and one winding of an induction-coil, the other winding of which is adapted to be brought into the line-circuit, and a switching device having terminals connected to the batteries and to the local circuit in such a manner as normally to maintain the batteries in series, but, when actuated, to connect a portion only of the set of cells in the local circuit, and to disconnect the balance of the set at the same time, in order to preserve its charge, all substantially as described.

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