

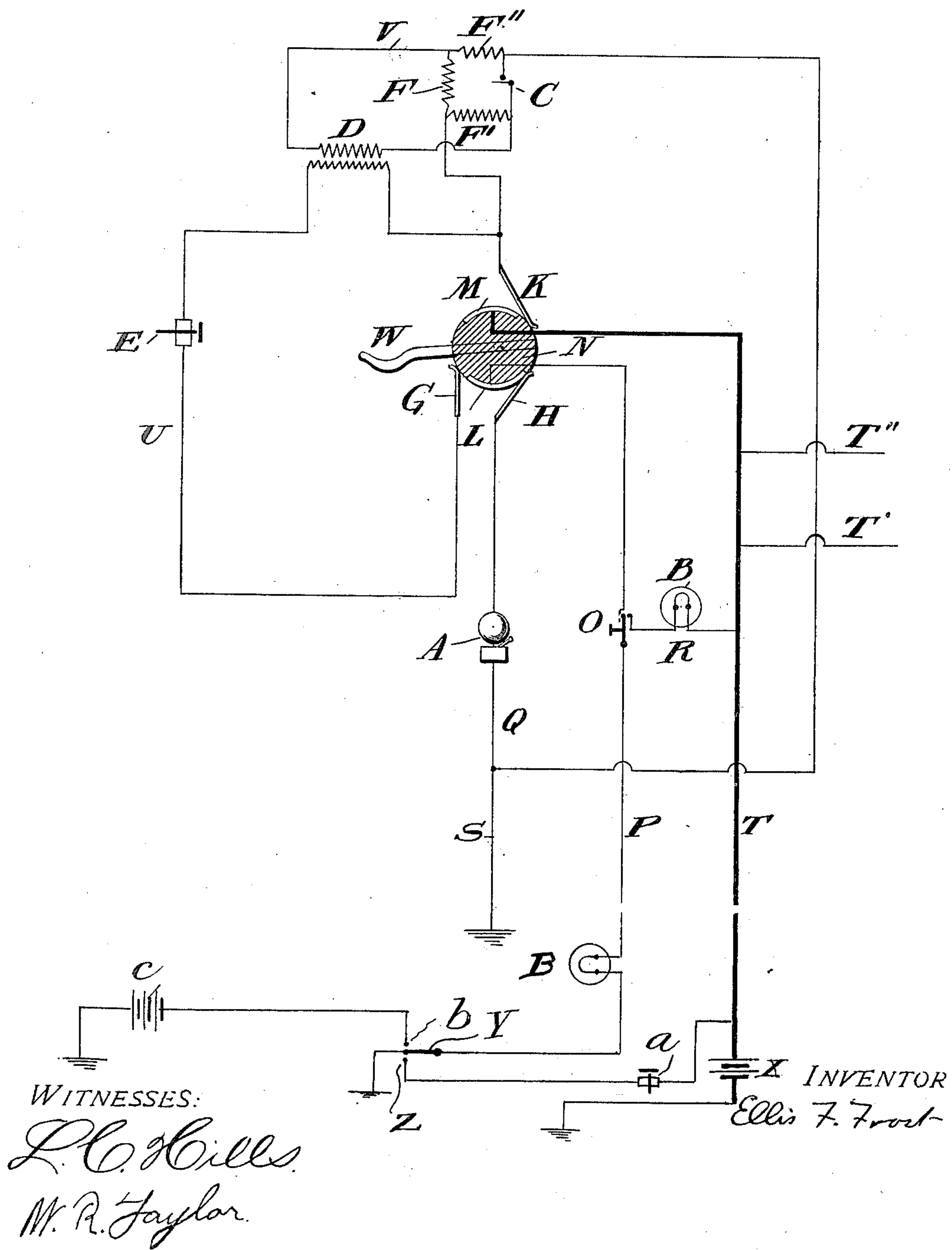
No. 674,964.

Patented May 28, 1901.

E. F. FROST.
TELEPHONE CIRCUIT SYSTEM.

(Application filed June 27, 1900.)

(No Model.)



UNITED STATES PATENT OFFICE.

ELLIS F. FROST, OF WASHINGTON, DISTRICT OF COLUMBIA.

TELEPHONE-CIRCUIT SYSTEM.

SPECIFICATION forming part of Letters Patent No. 674,964, dated May 28, 1901.

Application filed June 27, 1900. Serial No. 21,762. (No model.)

To all whom it may concern:

Be it known that I, ELLIS F. FROST, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Telephone-Circuit Systems; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to telephone-circuit systems, more particularly to the circuits of a telephone-subscriber's telephone apparatus.

The object of my invention is to produce a subscriber's telephone-circuit system which shall be simple and permit by means of appropriate mechanism certain desired operations of its various parts.

My invention consists in the combination, in a subscriber's telephone-circuit system, of the various parts hereinafter mentioned in such operative relation to each other as will when operated achieve the desired objects of my invention, as fully described and claimed below.

The accompanying drawing serves to illustrate my invention.

The apparatus at the subscriber's station consists of a call-bell A, a signal-lamp B, a microphone-transmitter C, an induction-coil D, a magneto telephone-receiver E, resistances F, contact-springs G, H, and K, contact-plates L and M, forming part of the telephone-hook switch N, and a button-switch O.

The parts of my invention are the line-circuit P, bell-circuit Q, lamp-circuit R, ground-circuit S, common return or battery-supply circuit T, telephone-receiver circuit U, and microphone-circuit V.

The telephone-hook switch N, as shown, consists of a disk of non-conducting material designed to oscillate about its center accordingly as the telephone-hook W is moved upward or downward. Fastened to this disk are two conducting contact-plates L and M, flush with the periphery of the disk. Against the periphery of the disk the contact-springs G, H, and K press in such relation to the contact-plates that when the telephone-hook is

down the spring H is in contact with the plate L and springs G and K only contact with the material of the disk and that when the telephone-hook is up the spring G is in contact with the plate L, the spring K with the plate M, and spring H in contact with the material of the disk. The battery-supply or common return circuit T is connected to the plate M and the line-circuit P to plate L. Any other suitable form of switch construction may be used. When in normal condition—i. e., when the telephone is hung on the hook W and the line P not in use—the line P is supposed to be connected to earth at the central office.

At the central office in the line P is a proper signaling device, as a filament-lamp or a drop. The battery-supply or common return circuit T is connected at the central office with one pole of a source of energetic electric energy, as a battery X, the other pole of which is connected to earth.

The several parts and apparatus being arranged as in the figure and the whole being in the normal state, suppose the subscriber is desirous of talking to the central office. In this normal state the line P from the earth at the central office passes through the button-switch O to the contact-plate L, spring H, bell A to earth, the battery-supply or common return circuit T and the telephone-receiver circuit being open. The subscriber first calls the central office by pressing the button O, thus opening the line P at O and making contact with the line R. The circuit is now from the earth at the central office to the battery, battery-supply line T, line R through the lamp B, button-switch O, line P through the central-office signaling device to the earth at the central office. The electric current flowing over this circuit will signal the central office and light the lamp B while the button O is pressed, until the operator at the central office disconnects the line P from the earth by the switch Y, whereupon the lamp B will become extinguished. The extinguishment of the lamp B signifies to the subscriber that the operator at the central office is ready to converse. The subscriber now lifts the telephone from the hook W, allowing the hook to lift upward by a spring. (Not shown.) The rotation of the switch N disconnects the spring H from the plate L and makes the spring G

contact with the plate L and also makes the spring K contact with the plate M. The button-switch O in the meantime has been released, restoring the continuity of the line P to the plate L. The operator at the central office also in the meantime has connected the line P at the central office through her talking apparatus with the battery-supply or common return line T by the switch Y making contact with the switch-point Z. The line-circuit is now from the common return-line at the central office, operator's telephone apparatus, a line P, button-switch O, Plate L, spring G, line U, telephone-receiver E, secondary winding of the induction-coil D, spring K, plate M, to common return-line T. The spring K by its contact with the plate M has also closed the transmitter-circuit as follows: From the earth at the central office, battery X at the central office, battery-supply or common return line T, plate M, spring K, to the arms F F' F'', and microphone-transmitter C to earth. In the arms F F' F'' are proper resistances to balance the resistance of the microphone-transmitter C in a bridge-circuit, the bridge-circuit proper including the primary winding of the induction-coil D. The parts are now arranged in proper relation for the subscriber to converse. It will be noticed that the line T serves as a return for the talking-circuit—a closed metallic one—and at the same time serves as a battery-supply line for the transmitter over a grounded circuit. When the conversation is finished, the subscriber hangs the telephone-receiver on the hook W, thus restoring the parts to their normal state, as described above. The common return-circuit T is an open circuit at each subscriber's station when the telephone-receiver is hung on the switch. The common return-line T is of relatively low resistance to that of the telephone-lines, and, moreover, extends to other subscribers' stations, as by branches T' and T''. The parts being in their normal state, if the central-office operator desires to call the subscriber she connects the line P by means of the switch making contact with the switch-contact b through a source of electric energy, as a battery c, designed to ring the bell A to the earth. The circuit is now from the earth at the central office, through the source of electric energy, line P, button-switch O, plate L, spring H, bell A, to the earth. The electric energy will now ring the bell A, and thus notify the subscriber that he is desired. The subscriber now removes the telephone-receiver from the hook, as above described.

I claim—

1. In a telephone-subscriber's circuit system the combination with a telephone-line circuit, a call-bell circuit, a receiving-telephone circuit, a microphone-transmitter circuit, and

a switch, of a line in operative relation thereto constituting a common return for the telephone-line circuit and constituting for the transmitter-circuit a battery-supply circuit grounded at the central office and at the subscriber's station.

2. In a telephone-subscriber's circuit system, the combination with a plurality of telephone-lines and a switch for each of said lines, of a battery-supply line grounded at the central office and at the subscriber's station and connected to said telephone-lines and said switches, said battery-supply line constituting a common return for the telephone-lines.

3. In a telephone-subscriber's circuit system, a circuit for signaling the central office consisting of a battery-supply line grounded at the central office and at the subscriber's station, a switch, a signaling device at the said central office and an electric lamp at the subscriber's station in circuit therewith, and a signaling-line.

4. In a telephone-subscriber's circuit system, a circuit consisting of a telephone-line, a telephone-receiver the secondary winding of an induction-coil in circuit therewith, a common return-line and a switch, combined with a circuit consisting of a battery-supply line grounded at the central office and at the subscriber's station, a microphone-transmitter, and the primary winding of the induction-coil in circuit therewith substantially as shown.

5. In a telephone-subscriber's circuit system, a circuit consisting of a telephone-line, a telephone-receiver and the secondary winding of an induction-coil in circuit therewith, a common return-line in circuit with a battery and grounded at the central office and at the subscriber's station and a switch, combined with a circuit consisting of the said common return-line, a microphone-transmitter, and the primary winding of the induction-coil in circuit therewith.

6. In a telephone-subscriber's circuit system, a circuit consisting of a telephone-line, a receiving-telephone and the secondary winding of an induction-coil in circuit therewith, and a common return-line in circuit with a battery, combined with a circuit consisting of the said common return-line, a switch and a bridge in circuit therewith in one arm of which is a microphone-transmitter and in the other arms balancing-resistances the cross-wire of said bridge including the primary winding of the induction-coil.

In testimony whereof I affix my signature in presence of two witnesses.

ELLIS F. FROST.

Witnesses:

F. A. LEHMANN,
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