

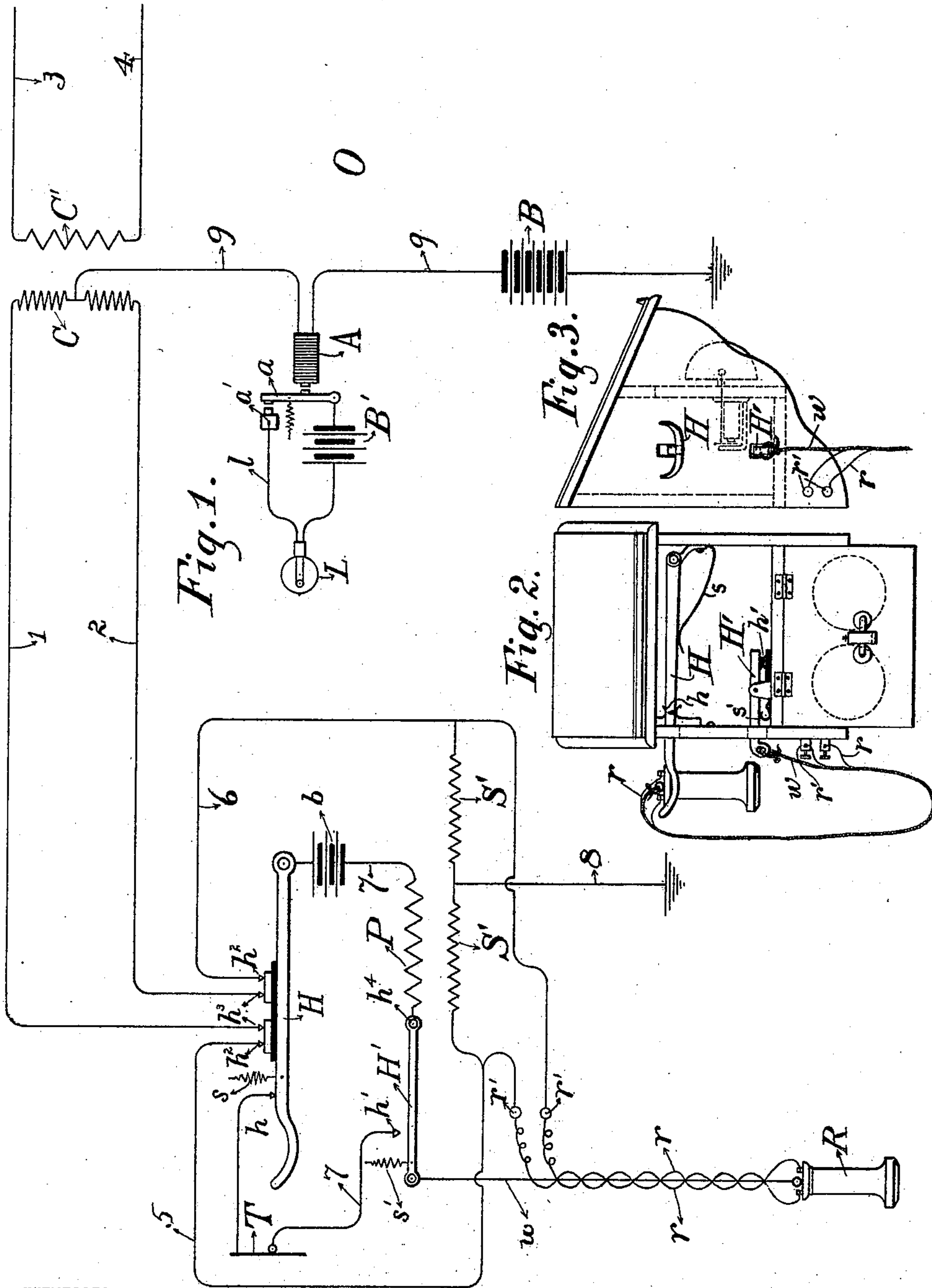
No. 620,440.

Patented Feb. 28, 1899.

W. D. GHARKY.  
TELEPHONE SWITCH.

(Application filed June 16, 1898.)

(No Model.)



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE-SWITCH.

SPECIFICATION forming part of Letters Patent No. 620,440, dated February 28, 1899.

Application filed June 16, 1898. Serial No. 683,637. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM D. GHARKY, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Telephone-Switches, of which the following is a specification.

My invention relates to the hook-switches used at all telephone-substations in connection with the instrument set. It has particular reference to the arrangement of such switches in systems where a so-called "automatic call" is used—*i. e.*, where the mere rising of the hook-switch when the receiver is removed therefrom causes certain changes at the central office or at another station which may or may not be continuous in their nature, but which serve as signals. In such systems it is usually necessary to maintain the main circuit unbroken and unchanged during the entire period of the conversation, even if one or the other of the subscribers may temporarily leave his instrument, for the reason that any change in the main circuit results in a corresponding change in or operation of the signals. Consequently if the instrument is temporarily left and disconnection is not desired it becomes necessary to leave the receiver off the hook. Inasmuch as the hook-switch closes not only the main but the local circuits this means that the local circuit is left closed and the local battery practically on short circuit, the transmitter and the primary of the induction-coil having a very low resistance. Under such conditions the battery soon becomes polarized or exhausted.

I am aware that the necessity of providing for the contingency of a receiver being by accident or carelessness left off the hook has been recognized, and means to prevent damage thereby have been designed and patented; but as a rule these means consist of devices for opening both the main and local circuits simultaneously. Therefore they are unsuitable for use in a system of the character I have mentioned.

My invention has for its object to provide a device that will open the local circuit upon the temporary abandonment of the instrument, and yet will not interfere with the hook-switch in its independent functions, but will

coöperate therewith. To this end I provide a second switch, either forming part of the same structure as the main hook-switch or independent in a mechanical sense therefrom, having the local-circuit contacts connected in series with similar contacts thereon, these auxiliary contacts being kept closed at all times, however, except when the receiver is dropped and left hanging off the hook.

My invention is illustrated in the accompanying drawings, wherein the same letters and figures of reference indicate the same parts throughout.

Referring to the drawings, Figure 1 is a diagrammatic view of my invention and the circuits thereof. Fig. 2 is a front view, and Fig. 3 is a side view, of a telephone-desk containing the invention.

Referring to Fig. 1, S is a subscriber's station, and O is the central office or another subscriber's station. At station S are provided the usual elements of a telephone set—*viz.*, a transmitter T, connected in a local circuit 7, containing a battery *b*, and connected to switch-arms H and H', adapted to close upon contacts *h* and *h'* to close said local circuit through the primary winding P of an induction-coil, a receiving-telephone R, connected in proper relation with the secondary winding S' S' of the induction-coil, the terminals of both being connected to the contacts *h*<sup>2</sup> *h*<sup>2</sup> where the line-wires 1 and 2 are adapted to be joined thereto through the medium of the contacts *h*<sup>3</sup> when the hook-switch is elevated during a conversation, and, as shown in Figs. 2 and 3, a proper casing or support for all the parts.

At the station O, I have shown a signal L in a local circuit *l*, adapted to be closed at contacts *a* and *a'* upon the deenergization of the relay A, current from the battery B' then causing the signal L to be displayed. Relay A is included in a ground-tap containing a battery B and leading out from the middle point of one winding C of a repeating-coil, the other winding C' of which is supposed to be connected into another circuit, which is not shown in full, because it in no way concerns the present invention. It may be stated, however, that in the class of systems to which this invention is particularly applicable the signals are of such a character as to



require a dividing-coil or its equivalent to be inserted at some intermediate point of any two connected lines—that is to say, any two connected lines must be continuous for voice-currents, but may be actually mechanically discontinuous. This arrangement enables each line to control its own signals. Such an arrangement is here illustrated simply for convenience and not because it is the only one with which my invention is useful. Thus an arrangement in which the lines 1 2 and 3 4 were continuous and the coil C was simply an impedance-coil bridged across the circuit would fulfill the requirements, although not so well.

Attached to the binding-posts of the receiver R at the station S is a flexible cord containing conductors  $rr$ . The circuit leads from the binding-posts  $rr$  to the posts  $r' r'$ . Woven into or inclosed within the same sheath as these conductors is a cord or wire  $w$ , whose function is to support the weight of the receiver when it hangs off the hook. One end of the wire is attached to the receiver-tailpiece and the other end to an eye or other suitable fastening device at the end of the auxiliary switch-lever H'.

The operation of the device constructed as shown is as follows: With the parts in the normal position of disuse, as shown in Fig. 2, the person at station S wishing to use the instrument removes the receiver from the hook. This causes the completion of the ground-circuit through wire 8, coils S' S' in opposite directions, wires 5 and 6 in parallel, contacts  $h^2 h^2$ , contacts  $h^3$ , line-wires 1 and 2 in parallel, the two halves of coil C in opposite directions, wire 9, relay A, battery B, and to ground. The switch-hook H in rising not only closes this circuit, but also the local transmitter-circuit through the contact  $h$ . The break in this local circuit at the contacts H'  $h'$  is normally closed by the force of the spring  $s'$ . The closure of the circuit of the relay A causes the extinguishment of the lamp-signal L, and during the time conversation is proceeding the lamp is supposed to remain extinguished. If it should again light, it would be construed as a signal for disconnection or a discontinuance of the conversation. Obviously the switch-hook cannot be disturbed without breaking the main line and giving this signal. So if from any cause it becomes necessary for the man who is talking to leave the instrument temporarily he simply allows the receiver to hang by the cord. Incidentally I may remark that this is the natural thing for him to do anyhow. As soon as the weight of the receiver comes upon the cord or wire  $w$  the spring  $s'$  is overcome and the contacts H'  $h'$  are separated. The local circuit is thus opened and remains open until the receiver is again taken up. It will be observed, however, that the main switch-hook has not been disturbed and that the main circuit has in consequence remained intact, and the connection is still established when the

man returns to his instrument ready for the continuation of the conversation.

In practice the coil C C', with its ground-tap, would be included in a cord-circuit, so that the signal L would only be under the control of the connected circuits after a call had been answered—that is, the signal A is really a clearing-out signal, and the real line-signals are omitted for the sake of simplicity in the diagram.

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

1. In a telephone system, line-wires extending to a subscriber's station, a subscriber's talking-circuit adapted to be connected thereto, a switch for completing said connection, a signal included in said completed circuit and remaining unaffected as long as the circuit remains intact, a local circuit containing a subscriber's transmitter, a battery and the primary of an induction-coil, means on said switch for closing said local circuit, a normally-closed auxiliary switch in said circuit and means, whereby the latter is automatically opened, when use of the instrument is suspended, substantially as described.

2. In a telephone system, line-wires interconnecting two stations, a subscriber's talking-circuit, a main switch at the subscriber's station adapted to connect said talking-circuit with the line-wires, a local circuit containing a transmitter and a battery, also adapted to be closed by said main switch, an auxiliary switch included in said local circuit and normally closed to maintain the continuity thereof, a receiving-telephone connected electrically to the talking-circuit and mechanically to said auxiliary switch, whereby the latter may be operated to open the local circuit without disturbing the main switch when the receiver is allowed to hang therefrom, substantially as described.

3. In a telephone system, line-wires forming the two sides of a metallic circuit, a subscriber's talking-circuit containing a receiver and the secondary of an induction-coil, adapted to be connected to said line-wires, so that the talking instruments are included in the metallic circuit, a subscriber's hook-switch adapted to complete said connection, connections from said line-wires in parallel and from the said subscribers' circuits to a return-conductor, a signal therein adapted to be actuated by a change in the main circuit, a local circuit at the subscriber's station, containing a transmitter, a battery and the primary of the induction-coil, an auxiliary switch also included in said local circuit, and normally closed to maintain the continuity thereof, and a mechanical connection between the receiver and said auxiliary switch whereby the latter is automatically opened, upon occasion, without affecting the hook-switch or the main circuit, substantially as described.

4. Subscribers' telephone apparatus including receiving and transmitting instruments,



and main and local circuits; a main hook-switch to operate both circuits, and an auxiliary switch normally closed and adapted to open the latter circuit only, and a permanent  
5 mechanical connection between the receiver and the latter switch, whereby the receiver when placed upon the main hook-switch will operate all the circuits, and when allowed to hang off the hook will open the local circuit  
10 only, substantially as described.

5. Subscribers' telephone apparatus including transmitting and receiving instruments,

main and local circuits; independent switches for said circuits, and means whereby the weight of the receiver may automatically operate either of them as occasion requires, substantially as described. 15

In testimony whereof I have hereunto set my hand this 10th day of June, A. D. 1898.

WM. D. GHARKY.

Witnesses:

EDWD. E. CLEMENT,  
MORTIMER A. JONES.