

UNITED STATES PATENT OFFICE.

GEORGE S. MAXWELL, OF RICHMOND, VIRGINIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF THREE-TENTHS TO WILLIAM H. CULLINGWORTH AND JOSEPH N. CULLINGWORTH, OF SAME PLACE.

TELEPHONE-SWITCH.

SPECIFICATION forming part of Letters Patent No. 562,013, dated June 16, 1896.

Application filed March 25, 1895. Serial No. 584,778. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. MAXWELL, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented a new and useful Improvement in Telephone-Switches; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure I is a diagram representing a telephone-switch according to my invention, and Fig. II is a vertical section showing certain details at the line *x* of Fig. I.

The object of this invention is to provide means for increasing the efficiency of telephone systems by providing suitable switching devices in combination with apparatus for regulating the currents flowing in the talking and ringing or calling circuits of a telephone system.

Numerals 1 and 2 represent line-wires secured, respectively, to the binding-posts 3 and 4.

24 represents a push-switch connected with the binding-post 3 by a circuit-wire 5.

25 represents a hand-generator.

22 is a circuit-wire communicating at 23 with the switch 24 and in permanent connection with the generator 25.

21 is a crank geared for rotating the armature of the generator 25.

18 represents a polarized call-bell or ringer connected with the generator 25 by a circuit-wire 20.

36 is a telephone which is left normally hung upon the hook 37 of a lever 31, holding the lever elevated, as shown in the diagram.

15 and 16 represent springs which are normally in contact; but when the telephone 36 is taken off from the hook 37 the weighted lever 31 will descend and press the spring 15 out of engagement with the spring 16 and at the same time complete an electric circuit between the springs 15, 14, and 13.

17 is a circuit-wire communicating between the call-bell 18 and the spring 16, and 6 is a circuit-wire communicating between the spring 15 and the binding-post 4.

26 represents a fixed resistance arranged

as a shunt-circuit between wires 17 and 6. This resistance is short-circuited when the phone 36 is on the hook 37 by the springs 15 and 16 being in contact; but when the phone is removed from the hook 37 for service the lever 31 descending disengages the springs 15 and 16 and the high-resistance coil 26 is introduced into the branch circuit around the talking-circuit for the purpose of absorbing earth-currents and induction, which otherwise would interfere with the transmission of speech. The call is made when the phone 36 is on the hook. Therefore the calling-circuit is directed through the springs 15 16.

7 represents a telephone connected with the spring 14 by a circuit-wire 8 and connected with the binding-post 3 by a wire passing through the secondary coil 32.

28 represents a condenser connected at one side, 27, with the talking-circuit and connected at the other side, 29, with a circuit-wire 8. When the phone 36 is on the hook and the calling-circuit to be used, the condenser 28, being in shunt-circuit with the calling-circuit, acts as a cushion to regulate the current flowing into line when the generator is in operation, thereby producing currents more equal and of greater force owing to the rapid charging and discharging of the said condenser. The battery and primary circuit are in use only when the lever 31 is down in contact with springs 13 and 14.

10 represents a microphone, 11 a battery connected therewith, and 33 a primary coil connected with the battery and with circuit-wire 8.

12 is a primary wire connecting the microphone 10 with the spring 13. The primary and battery circuit are in use only when the lever 31 is pulled down into contact with springs 13 and 14. Starting from the spring 13 the circuit passes through the wire 12, the microphone 10, battery 11, primary coil 33, circuit-wire 8, spring 14, and lever 31 back to spring 13, completing the circuit.

By means of the resistance 26 and the condenser 28 the resistance of the circuit is balanced and the static charges which appear on telephone-lines are overcome, thus avoiding the frying noise common to telephones.

This device also tends to overcome the resistance and various troubles which are caused by the connections becoming dirty at contact-points—such as between the springs 13 14 15 and the lever 31, and between the two springs 15 and 16. When the springs 15 16 are in contact, a short circuit is provided around the variable resistance 26, thus reducing the resistance of the circuit and allowing the full force of the current generated by the magneto-generator 25 to pass into the line. When the lever 31 is down and the contact between springs 15 16 is broken, the resistance 26 is brought into the magneto-circuit acting as a retardation-coil to diminish the inductive influences.

The condenser is the particular device relied upon to overcome the static discharges on the line, thus obviating the popping and frying noises.

The arm 31 may be so balanced as to require the aid of the operator's hand to bring it down into contact first with the spring 15 and then with the springs 13 and 14.

Having thus fully described my invention,

what I believe to be new, and desire to secure by Letters Patent, is the following:

1. In a telephone-circuit a magneto-generator bell and retardation-coil connected in series with each other and in multiple with the receiver and induction-coil, in combination with suitable circuit-changing devices whereby the retardation-coil is brought into the signal-circuit when the talking-circuit is being used and is short-circuited when the signal-circuit is in use.

2. In a telephone system a circuit-changing device in combination with a receiver and induction-coil connected in series with each other and in multiple with a magneto-generator, bell and condenser, whereby the condenser is brought in or out of the circuit according as the circuit-changing device is moved in one direction or the other.

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

GEORGE S. MAXWELL.

Witnesses:

R. J. ACOE, Jr.,

FRED W. COLLOTON.