

(No Model.)

J. S. STONE.

SYSTEM OF CURRENT SUPPLY FOR TELEPHONE CIRCUITS.

No. 562,435.

Patented June 23, 1896.

Fig. 1.

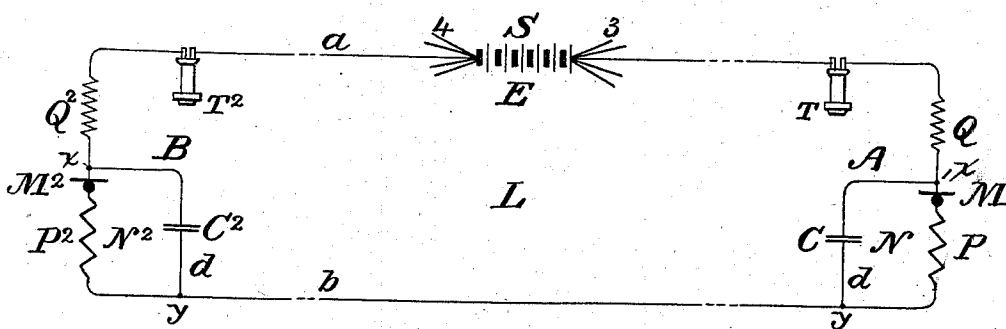


Fig. 2.

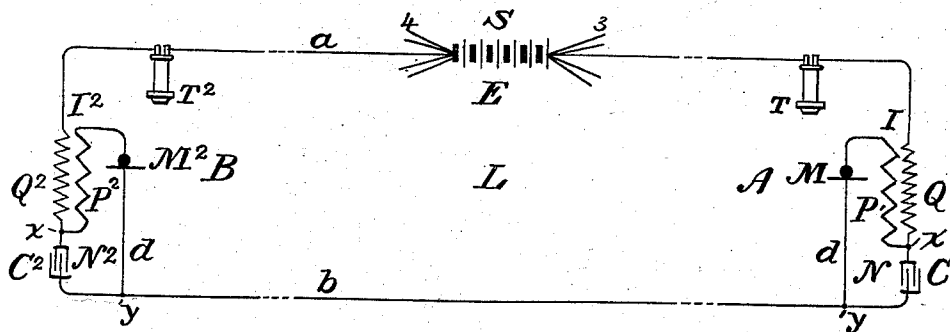
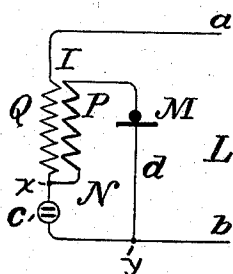


Fig. 3.



Attest.

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SYSTEM OF CURRENT SUPPLY FOR TELEPHONE-CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 562,435, dated June 23, 1896.

Application filed April 23, 1896. Serial No. 588,787. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. STONE, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain
5 Improvements in Systems of Current Supply for Telephone-Circuits, of which the following is a specification.

This invention concerns that class of telephone-circuits in which current is supplied to the transmitters of substations from a common source preferably placed at a central station, and refers particularly to the local transmitter-circuits at the substations, and their connection with the conductors of their
15 main circuits.

In one of the systems of transmitter arrangement and supply at present in use, the current supply for the substation-transmitter is obtained from a local transmitter-battery placed at the substation and included, together with the transmitter and the primary wire of an induction-coil, in a low resistance local circuit, the variations of current produced by the operation of the transmitter being transferred to the main circuit through the intermediation of the said induction-coil whose secondary is included therein. In the other system the transmitter at the substation is included in the main circuit, and its current supply is derived from a centralized battery connected also in the main circuit, which may be common to a number of circuits, and which is preferably located at the central telephone-office.

While the desirability and general convenience of the latter system is generally admitted, it has not up to the present time been found universally applicable to telephone-circuits, since to a certain extent it tends to
40 diminish the range of the transmitter; and especially in long-distance work involves certain losses in efficiency.

In my present invention the advantages appertaining to the system last mentioned, viz.,
45 great economy, uniformity of service, and the capability of using the central source of current for signaling purposes also, are combined with the high-transmitter efficiency and elas-

ticity in operation of the first-mentioned or local-battery plan.

In the drawings accompanying this specification, Figure 1 is a diagram of the invention embodied in a metallic telephone-circuit extending between two stations. Fig. 2 is a similar diagram showing more clearly the relation of the two windings of the transmitter induction-coil, and Fig. 3 is a diagram showing a modification in the apparatus at a substation.

The source of current supply is placed directly in the main telephone-circuit, and preferably is located at the central station. It may be common to a number of circuits. The telephone-transmitters are each associated with an induction-coil, and the receiving-telephone and the secondary helix or winding of the induction-coil at each station are placed in series in the main circuit. The induction-coil primary and the resistance-varying transmitter are also placed in series in the main circuit and a condenser is connected in a branch of the main circuit in shunt relation to the said primary winding and telephone-transmitter. The transmitter and primary and the condenser are therefore in parallel branches of the main circuit and are in series therein with the secondary.

The steady current of the main battery flows through the entire circuit, and at the substation through the transmitter and the two windings of the induction-coil; but of course no portion of it flows through the condenser. But so slight is the impedance offered by the condenser to the waves or fluctuations of electromotive force produced when the transmitter is operated to transmit conversation that the said fluctuations pass through it with great facility, and are shunted from any conductive passage to the remaining portions of the main circuit. A local transmitter-circuit for these fluctuations is thus virtually formed through the transmitter, the primary winding, and the condenser, and they are enabled to transfer themselves from it to the main circuit for the operation of the distant receiver by the action

of the primary induction-coil winding upon its secondary, in the same manner as is done where the transmitter is furnished with current from a local battery, and has the well-known primary circuit.

One end of the main circuit entering the station is connected with the local circuit between the transmitter and the condenser, and the other between the primary winding and condenser.

S is the common battery, or centralized source of transmitter-current supply.

T T² are the receiving-telephones, and M M² the resistance-varying transmitters.

P P² are the primary windings, and Q Q² the secondary windings of the transmitter induction-coils I, and C C² represent the condensers.

L is a main telephone-circuit extending between two telephone-substations A and B, one of its conductors being marked *a* and the other *b*. This main circuit may of course be either a permanently-formed talking-circuit between the said stations, or in a manner well understood, may be a compound talking-circuit formed by connecting two subscribers' circuits converging to the same central station E by means of a switchboard. In the latter case the transmitter-battery, which is most conveniently located at the central station, may be included in the switch-cord conductor-circuit.

The battery, as indicated by the rays 3 and 4, may be common to a number of circuits or switchboard connections.

The main circuit-conductor *a* is indicated as having the battery S placed serially in its circuit, and both conductors *a* and *b* extend between stations A and B through E. The main circuit may be traced, as in Fig. 1, from the positive pole of the battery to its negative pole, through main conductor *a*, telephone T, induction-coil secondary Q, transmitter M, primary winding P at station A, main conductor *b*, primary winding P², transmitter M², secondary Q², receiver T², and main conductor *a*.

In Fig. 2 the relative position of the induction-coil primary and the transmitter is transposed, but this obviously is an immaterial change. A branch or shunt wire *d*, containing the condenser C, joins points *x* and *y* of the main line, which points are placed, respectively, on the two sides of the associated transmitter and primary winding. Thus a main circuit for the battery is arranged, in which the secondary and primary induction-coil windings and the transmitters are serially included, the transmitter and primary being each shunted by a condenser.

The wire *d*, condenser C, transmitter M, and primary winding P together form a local transmitting-circuit N at each substation, in which may circulate the fluctuations of electromotive force due to the normal operation

of the transmitters M; and such changes are transferred to the main circuit for the corresponding operation of the distant receiver through the induction-coils I, whose secondaries are in the main circuit L, and whose primaries are in their respective local circuits N. Practically, therefore, the steady current of the battery does not pass through the condensers; the original fluctuations, set up in the local circuits N, do not pass conductively to the main line, because to them the condensers offer so little obstruction that the said main line is substantially shunted or short-circuited; and for the same reason the corresponding current fluctuations induced upon the main line do not pass through the branches which contain the primary winding and transmitters.

The currents induced in the main circuit L by the transmitter and induction-coil at station A, passing through the receiver T² at station B, cause the reproduction there of the sound actuating the said transmitter, and in a similar manner the variations of the transmitter M² at B actuate the receiver T, thus accomplishing the desired telephonic intercommunication between the stations A and B.

If desired, an electrolytic cell may be employed instead of the condensers in the shunt *d* round the primary and the transmitter, since under the usual conditions of systems of this class its action is substantially the same. Such a modification is disclosed in Fig. 3, where an electrolytic or Planté cell *c* replaces the condenser C in the conductor *d* of the local transmitting-circuit N.

Having thus described my invention, I claim—

1. In a central-battery telephone system, the combination at a substation, of the primary and secondary helices of an induction-coil, and the resistance-varying transmitter, all connected in series in a main-line telephone-circuit containing the main transmitter-battery, and a condenser in a branch of the said main circuit shunting the said primary helix and transmitter, substantially as described.

2. In a centralized-battery telephone system, a main telephone-circuit, and a source of transmitter-current supply included therein, combined at a substation with a telephone-transmitter, an induction-coil and a condenser, the said transmitter and primary winding of the induction-coil, and the condenser, respectively, being in parallel branches of the main circuit, and the secondary winding of the said induction-coil being also in the said main circuit, and in series with the said parallel branches thereof.

3. The combination in a main-line-battery telephone system, of a substation or local transmitting-circuit containing a telephone-transmitter, the primary winding of an in-

duction-coil, and a condenser, with a main telephone-circuit containing a common source of current supply, and the secondary winding of the said induction-coil, the substation ends
5 of the said main circuit being connected with the said local transmitter-circuit, one at a point between the primary winding and the condenser, and the other at a point between the transmitter and the condenser.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 18th day of April, 1896.

JOHN S. STONE.

Witnesses:

GEO. WILLIS PIERCE,
KATHARINE DUFFEE.