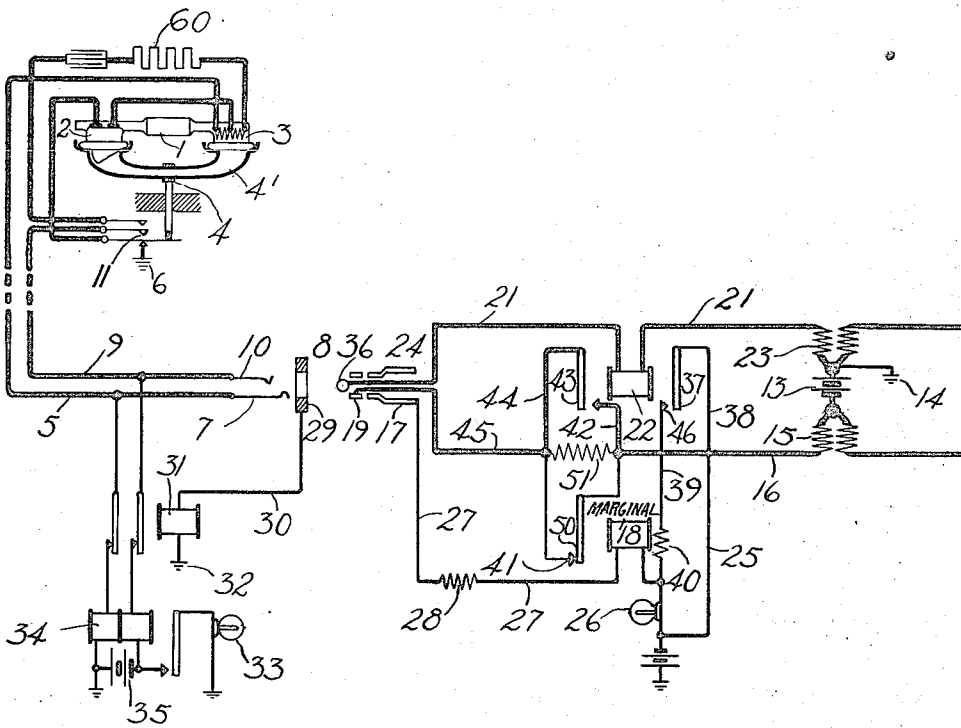


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H. FLETCHER
TELEPHONE CIRCUITS
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UNITED STATES PATENT OFFICE.

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TELEPHONE CIRCUITS.

Application filed April 1, 1920. Serial No. 370,620.

To all whom it may concern:

Be it known that I, HARVEY FLETCHER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Telephone Circuits, of which the following is a full, clear, concise, and exact description.

This invention relates to telephone circuits and apparatus, and more particularly circuits having provision for signaling.

It is well-known that a receiver and transmitter, if properly related to a source of current and if placed adjacent to each other may be made to howl or produce a sustained note.

It is an object of this invention to utilize the above characteristic of the ordinary telephone instruments for calling, thereby avoiding the necessity of using a calling bell or other auxiliary calling device.

A further object of the invention is to enable the use of howling for signaling by relatively slight alterations of the ordinary telephone circuits and by the use of the ordinary source of current employed to energize the transmitter for talking.

To accomplish these objects, means is provided to place the receiver and transmitter of a substation set in mutually reactive relation when not in use for talking, so that an operator merely by plugging in a line connection to the subscriber's line or link circuit may close a circuit through the instruments and the central or other source of current and cause the production of the signal. Means is provided to cancel the signal when the subscriber lifts the receiver and to prevent reestablishing the signal when the receiver is replaced.

It is often desirable, and particularly so when a hand set is employed, that the substation be anti-side-tone during the period when conversation is taking place. If the receiver were wholly anti-side-tone, however, even though it be placed adjacent the transmitter, the set could not be made to howl. This invention provides an arrangement for making the set side-tone when in position for signaling and making it anti-side-tone when in position for conversation.

These and other objects of the invention will be more fully understood from the following detailed description and claims taken in conjunction with the accompanying draw-

ing, in which is represented diagrammatically a subscriber's substation and link circuit together with a line circuit to be connected thereto.

Referring to the drawing there is employed at the substation a hand set 1 comprising a transmitter 2 and a receiver 3. When hand set 1 is not in use it is placed on a vertically moving stand or similar device 4 having a tubular member 4', the opposite ends of which receive respectively the transmitter and the receiver. This provides a means for causing sound waves produced by the receiver to actuate the transmitter when it is desired to cause the set to howl.

A line wire 5 of the subscriber's link circuit is connected to one end of the receiver winding, and when the stand 4 is depressed, as shown in the drawing, line wire 5 is connected through part of the receiver winding and the transmitter to ground at 6. When stand 4 is raised, contacts 11 are closed, and the link circuit 5, 9, is closed at the subscriber's end of the circuit. The other end of the circuit is shown connected to a jack 8 at a central station, the line wires terminating in contacts 7 and 10, the function of which will be described later on.

The operator's cord circuit includes the source of current 13, grounded at 14, repeating coil 15, ring-conductor 16, relay armature 50, contact 41, conductor 45 and ring contact 19 of the plug 8, with a return path by way of tip contact 36 of plug 24, conductor 21, relay 22, repeating coil 23, back to battery 13. The relay coils 18 and 22 have different resistance values assigned to them and the relays function to select the proper resistance values to carry out the operation of signaling, as will be herein after described.

The operation of calling a subscriber over the circuits referred to is as follows: The operator inserts the plug 24 into the jack 8 in the usual manner and thereby sets up a circuit having a current value such that a howl is produced by the interaction of the transmitting and receiving instruments at the subscriber's substation. This circuit includes the grounded battery 13, conductor 16, relay armature 50, contact 41, conductor 45, ring contact 19 of the plug ring contact 7 of the jack, subscriber's line wire 5, receiver 3, transmitter 2, contacts 11, and ground at 6. A secondary circuit is simul-

taneously established through conductor 25, supervisory lamp 26 which acts as a resistance to prevent the actuation of relay armature 50, relay 18, conductor 27, resistance 28, sleeve 17 of the plug 24, jack sleeve contact 29, conductor 30, and cut-off relay 31 to ground at 32, to prevent the energization of subscriber's line lamp 33 by the operation of line relay 34 from battery 35, in the usual manner.

The howling action produced by the current flowing through the relatively adjacent transmitter 2 and receiver 3 can be terminated by the subscriber's lifting the handset from the stand 4 and thereby preventing the reaction of the receiver on the transmitter through member 4'. As an additional precaution against howling when the handset is removed from the stand, the substation circuit is made anti-side-tone when contacts 11 are closed. The circuit employed is that disclosed in the application of F. W. McKown, Serial No. 311,543, filed July 17, 1919. The transmitter is connected to an intermediate point on the receiver winding and fluctuating currents produced in the transmitter divide between the parts of this winding, one part going through the line and the other part going through a balancing impedance 60. The relative values of impedances and windings are such that no flux is produced in the receiver core when the transmitter is actuated. When the handset is on the stand, however, the circuit branch containing impedance 60 is open circuited and a circulation of energy between the transmitter and receiver is possible.

When the talking circuit is established by lifting the handset from its stand, supervisory relay 22 is energized and closes a shunt circuit at the contact 46 and armature 37 which shunts out the supervisory lamp 26. The resistance 40 is sufficiently less than that possessed by the lamp 26 to energize the relay 18 and withdraw the relay armature 50 from engagement with contact 41 thus interrupting the shunt circuit through that point. A substitute circuit has, however been established through conductor 42, armature 43 of relay 22 and conductor 44 so that the continuity of the talking circuit now established through the subscriber's instruments is uninterrupted.

Upon completing his conversation and replacing the handset, the subscriber breaks the circuit through the supervisory relay 22 at contact 11 and thereby releases the relay armatures 37 and 43. It will be seen that the release of the armature 43 breaks the shunt circuit at that point and as the relay coil 18 is so wound that the current flowing therethrough is sufficient to hold the armature when already attracted, although not sufficient to move the armature from the released position, the current must now flow

through the resistance 51 which has a value such that the current now flowing through the transmitter 2 and receiver 3 is insufficient to produce a howling action. The subsequent withdrawal of the plug 24 from the jack 3 by the operator has the effect of breaking all circuits and releasing the armature 50 of relay 18 to restore all parts to their normal condition shown in the drawing.

While one substation arrangement and one form of cord circuit adapted to be used in carrying out the invention have been shown and described, it is to be understood that the invention is not limited to the details of the arrangements disclosed, but is capable of employing a wide variety of apparatus embraced in the scope of the appended claims.

What is claimed is:

1. The method of operating a telephone substation, which comprises rendering said substation side-tone at times, causing said substation to howl at certain of said times as a signal to the subscriber, and rendering said substation anti-side-tone for ending said signal.

2. The method of operating a telephone substation having a two winding receiver, which comprises sending current through only one of said windings when calling and sending current through both of said windings when talking.

3. In combination, a substation circuit comprising a branch having impedance to balance out side-tone, means operative to open said branch to render said circuit side-tone, and means acting through said side-tone arrangement to produce a sustained tone for calling.

4. In combination, a line, a substation circuit comprising a receiver and a transmitter, means for placing said instruments in circuit with both sides of said line for talking, and means for placing said instruments in circuit with one side of said line and ground for calling.

5. In combination, a line, a substation circuit comprising a receiver and transmitter, means for placing said instruments in circuit with both sides of said line for talking, means for placing said instruments in circuit with one side of said line and ground for calling, and means associated with said ground circuit to produce howling of said instruments.

6. In combination, a telephone hand set, means causing interaction between the receiver and transmitter to produce a sustained tone for signaling purposes, and means for preventing said interaction during conversation.

7. In combination, a telephone hand set and a stand therefor, said stand comprising means causing interaction between the re-

ceiver and transmitter to produce a sustained tone.

8. In combination, a telephone hand set, a stand therefor comprising means causing interaction between the receiver and transmitter to produce a sustained tone, and means to prevent said interaction when said hand set is removed from said stand.

9. In combination, a telephone substation comprising a telephone receiver and transmitter, a tubular support having seats for removably holding said instruments with their normally external faces directed toward the interior of said support, the interior of said support serving as a medium for the passage of sound waves from said receiver to said transmitter.

10. In combination, a telephone hand set comprising a receiver and transmitter, a tubular support for said hand set, the interior of said support serving as a medium for the passage of sound waves from said receiver to said transmitter.

11. In combination, a telephone substation comprising a telephone receiver and transmitter for signaling in opposite directions respectively, means for energizing said receiver and said transmitter and means forming a confined passage for sound waves between the normally external faces of said receiver and said transmitter.

12. In combination, a telephone substation comprising a telephone receiver and transmitter for signaling in opposite directions respectively, means for energizing said receiver and transmitter, and a tubular member forming a passage for sound waves between the normally external faces of said receiver and said transmitter.

13. In a telephone system a line circuit, a transmitter and receiver associated therewith, a link circuit for connection with said line circuit, and means responsive to the connection of the link circuit with the line circuit to cause the transmitter and receiver to react upon each other to produce an audible signal.

14. In a telephone system, a line circuit, a transmitter and receiver associated therewith, a link circuit for connection with said line circuit, means responsive to the connection of the link circuit with the line circuit to cause the transmitter and receiver to react upon each other to produce an audible signal, and means for canceling said signal by lifting said receiver.

15. In a telephone system, a line circuit, a transmitter and receiver associated therewith, a link circuit for connection with said line circuit, means responsive to the connection of the link circuit with the line circuit to cause the transmitter and receiver to react upon each other to produce an audible signal, and means for canceling said signal by lifting said receiver, and means

to prevent the reestablishing of said signal when the receiver is replaced.

16. In a telephone system, a subscriber's station having the transmitter and the receiver mounted in relatively adjacent relation, means whereby the operator may establish a circuit including said station and over which current may be sent having characteristics such that a howl is produced by said relatively adjacently placed receiver and transmitter, means for canceling said howl by lifting the receiver, and means arranged to control said circuit through said receiver and transmitter to prevent the reestablishing of the howl when the receiver is replaced.

17. In a telephone system, a subscriber's station having the transmitter and the receiver mounted in relatively adjacent relation, means whereby the operator may make a switchboard connection to establish a circuit including said station and over which current may be sent having characteristics such that a howl is produced by said relatively adjacently placed receiver and transmitter, means for canceling said howl by lifting the receiver, means arranged to control said circuit through said receiver and transmitter and prevent the re-establishing of the howl when the receiver is replaced, and means for restoring the circuit to its normal condition when the switchboard connection is broken.

18. In a telephone system, a subscriber's station having the transmitter and the receiver placed in relatively adjacent relation, means whereby the operator may make a plug connection to establish a branched circuit one branch of which includes a current source and said transmitter and receiver and the other branch of which is a supervisory circuit including said current source, said circuit branch including said receiver and said transmitter having a resistance value such that a howl is produced by said receiver and transmitter, means whereby a branch current path so arranged as to cancel the signal and permit the transmission of speech is established by lifting the receiver, means in said supervisory circuit having controlling relation to said circuit including said receiver and transmitter, means in said branch current path arranged to place said controlling means in said supervisory circuit in condition to prevent the re-establishing of the howl when the receiver is replaced, and means for restoring said controlling means and said signaling circuit to normal when the plug connection is disrupted.

19. In a telephone system, including a transmitter and a receiver mounted in signaling producing relation, a supervisory circuit, a signaling circuit and a talking circuit having a common current source, means whereby the supervisory circuit and the sig-

naling circuit are established by a switchboard connection made by the operator, means whereby the lifting of the receiver establishes a talking circuit and cancels the
5 signal, and means in the supervisory circuit and controlled by the talking circuit for acting on the signaling circuit and preventing the reestablishing of the signal when the receiver is replaced, said supervisory and signaling circuits being restored to normal
10 when the switchboard connection is disrupted.

20. In a telephone system including a transmitter and a receiver mounted in adjacent relation, a circuit arranged to be established by a central operator including a source of current and said receiver and transmitter, said circuit having a resistance value such that a signal will be produced by the
20 juxtaposition of said receiver and transmitter, a circuit branch adjusted to silence said signal, means for diverting current through said branch when the receiver is

lifted, a resistance, and means in said branch for causing the diverting of current through
25 said resistance when the receiver is replaced, to thereby continue the silenced condition of said signal.

21. In a telephone system including a transmitter and a receiver mounted in signaling relation, a circuit arranged to be established by the operator to include a source of current and said receiver and transmitter, said circuit having a resistance value arranged to produce a signal by said receiver
25 and transmitter; means for diverting the current path to silence the signal and establish a talking circuit when the receiver is lifted, and means for including sufficient resistance in the circuit to cause the signal to remain silenced until the operator has
40 broken the circuit.

In witness whereof, I hereunto subscribe my name this 30th day of March A. D., 1920

HARVEY FLETCHER.