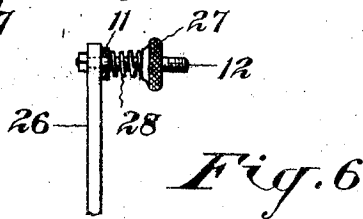
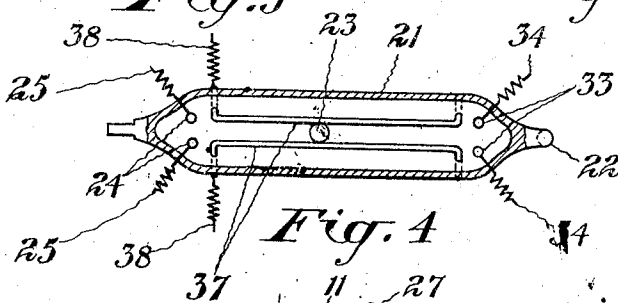
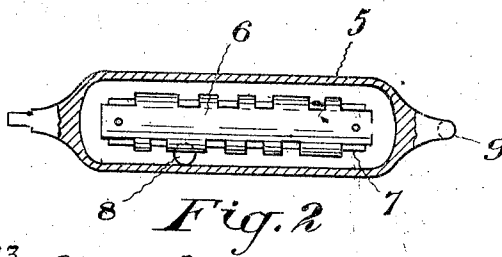
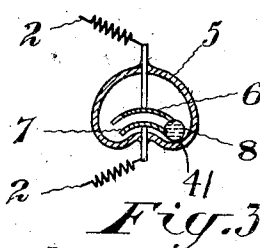
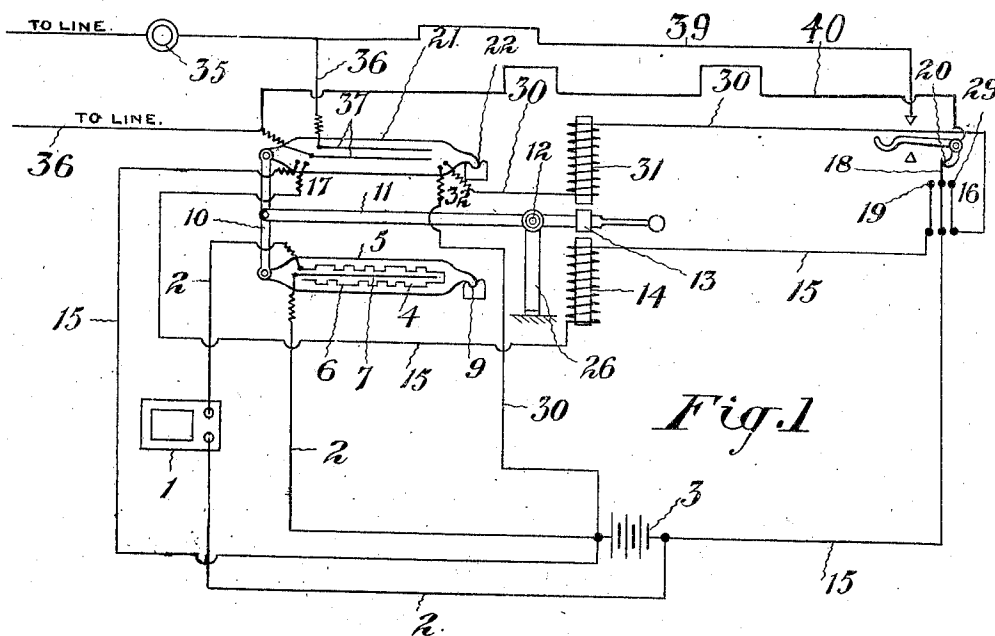


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LISTENING DETECTOR FOR TELEPHONE LINES.
APPLICATION FILED JAN. 3, 1911.

1,016,670.

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LISTENING-DETECTOR FOR TELEPHONE-LINES.

1,016,670.

Specification of Letters Patent.

Patented Feb. 6, 1912.

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To all whom it may concern:

Be it known that we, ERNEST BURGNER, of Wellesley, and CHRISTIAN BURGNER, of Linwood, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Listening-Detectors for Telephone-Lines, of which the following is a specification.

The object of our invention is to devise simple and cheap means for detecting improper listening in telephone systems in which a single line is employed by a number of individuals.

We attain our object by a signal sounding arrangement which may be briefly described as follows:—Adjacent the transmitter of the telephone is located an electro-magnetic buzzer or other signal sounding device and an electro-motor device actuating suitable means for making and breaking the circuit of the buzzer to cause the sounding of a predetermined signal. The circuit of the motor device is closed at starting by the removal of the receiver from the telephone hook. The device is also arranged so that the electro-motor device is again operated to sound a signal when the receiver is put back on the hook. The parties who are legitimately using the line can hear these signals and as each telephone will have a different signal any improper listening is at once detected and the listener identified.

Figure 1 is a diagrammatical view of the installation. Fig. 2 is a horizontal longitudinal section of the signal device. Fig. 3 is a cross section of the same. Fig. 4 is a horizontal longitudinal section of the double switch. Fig. 5 is a cross-section of the same. Fig. 6 is a sectional detail of a friction device used in the operating mechanism for the double switch and signal device.

In the drawings like figures of reference indicate corresponding parts in the different figures.

Referring particularly to Fig. 1, 1 is a buzzer or other electric sounding device and 2 is the circuit of the said buzzer which includes the battery or other source of current 3.

4 is a signal device. While any device which will, when suitably actuated, make and break the buzzer circuit in such a way as to give a recognizable signal would answer the purpose of our invention, we prefer the arrangement shown diagrammatically in

Fig. 1 and constructively in Figs. 2 and 3. The device comprises a tube 5 within which are located the metal plates 6 and 7 suitably supported, and connected with the wires 2 of the buzzer circuit. Electrical contact between these plates is formed by means of a globule 8 of mercury. The tube is so proportioned relative to the plates that the mercury when the tube is tilted endwise may run down one side of the tube and then back along the other side when the tube is tilted in the reverse direction thus making contact alternately between opposite sides of the plates 6 and 7. A channel 41 extends down each side and around the ends of the tube and in this channel the mercury will circulate as the tube is oscillated. By notching one or both of these plates the buzzer circuit may be alternately made and broken in such a way as to sound a signal. The notches are preferably cut as indicated in Fig. 2, so that the same signal is sounded when the mercury runs down one side as when it runs back along the other side. The signal device is actuated through the medium of constructions we will now describe. The signal device is suitably pivoted at 9 on a suitable stationary part and its other end is pivotally connected by means of a link 10 with an arm 11 fulcrumed at 12 on a suitable stationary part. This arm 11 is connected with the armature 13 of an electro-magnet of which 15 is the circuit, and in this circuit is located the starting switch 16 and a stopping switch 17. The starting switch 16 comprises a movable contact finger 18 and a fixed contact 19. The telephone hook 20 engages this finger 18 and when the hook is up moves it over to engage the fixed contact 19 closing the circuit of the electro-magnet 14.

The stopping switch is preferably arranged as follows: 21 is a tube pivoted at 22 on a suitable stationary part and pivotally connected at its other end with the link 10. In the tube is located a globule 23 of mercury, the tube being preferably shaped at its lower side to form a trough for the mercury to run in, see Fig. 5. Two contacts 24 are located within the tube connected with the lead wires 25 extending through the glass and suitably connected with the wires 15 of the circuit of the electro-magnet 14. The parts are shown in Fig. 1 in an intermediate position. If the circuit of the electro-magnet 14 be closed, by lifting the receiver from

its hook the electro-magnet 14 will be energized and the arm 11 rocked to incline the signal device 4 and the switch tube 21 toward the right. This causes the sounding of a signal as the mercury globule 8 travels down the edges of the plates 6 and 7. The signal ceases, of course, as soon as the mercury globule reached the end of the tube. The instant after the tubes have been rocked the circuit of the electromagnet 14 is broken by the mercury globule 23 in the switch tube 21 rolling away from the contacts 24 and the deenergizing of the magnet leaves the arm 11 free to be returned to its normal position. The arm and the parts connected therewith may be so counterbalanced that the arm tends to rock neither one way nor the other. We prefer, however, to apply some friction to the arm so that it will tend to stay in the position to which it has been moved. For this purpose we show the fulcrum 12 of the arm 11 formed as a threaded pin secured to the post 26. On the pin is threaded the nut 27 and between the end of the arm 11 we place a coil spring 28. The frame is thus frictionally held against the post 26 and the degree of friction may be regulated by means of the nut 27.

In order to return the parts to the normal position and incidentally sound a second signal, when the receiver is replaced on its hook we provide the following arrangement: The starting switch 16 is provided with a back contact 29 connected with the circuit 30 of an electro-magnet 31 arranged diametrically opposite the electro-magnet 14 so as to attract the same armature 13. Part of the circuit of the electro-magnet 31 is formed by the part of the circuit 15 between the battery 3 and the movable contact finger 18 of the starting switch. The contact finger 18 is preferably a spring or spring actuated and tends to engage the back contact 29. Consequently when the receiver is replaced on the hook the starting switch will close the circuit 30 of the electro-magnet 31. This circuit 30 also includes a stopping switch 32. This is precisely similar to the stopping switch 17, but is arranged at the other end of the switch tube 21, two suitable contacts 33 being provided within the tube, connected by means of the lead wires 34 with the wires of the circuit 30. When the signal tube and switch tube were inclined to the right as previously described the mercury globule 23 rolled down the tube and closed the circuit of the electro-magnet 31 at this point. As soon, therefore, as the circuit was closed at the starting switch, as previously described, the electro-magnet 31 would be energized and the arm 11 rocked to restore the switch tube and signal tube to their original positions. This movement not only sounds a warning signal owing to the construction of the signal tube, hereinbefore described, but

also closes the stopping switch 17 of the circuit of the electro-magnet 14 so that the device is ready for operation to again send a signal as soon as the circuit of the electro-magnet 14 is closed at the starting switch 16 by the lifting of the receiver from its hook.

In telephone connections are usually so arranged that when the receiver is on the hook the transmitter is cut out from the line wire. As the successful operation of our apparatus depends on the transmission of signals whether the receiver is on or off its hook it is necessary to provide some means for connecting the transmitter to line when the signal apparatus is in operation. In Fig. 1 we indicate the transmitter at 35 and show it connected with the wire 36 which may be connected to line. This wire 36 is connected with a special switch in the switch tube 21. This comprises two parallel bars 37 suitably supported within the tube and extending within a short distance of the contacts at each end of the tube. Lead wires 38 are connected with these bars and serve for connection with the wire 36. The mercury globule 23 contacts with these bars 37 as it rolls from one end of the tube to the other, and this connects the transmitter to line as long as a signal is being given as the bars 37 are suitably proportioned to maintain this connection of the transmitter to line as long as the mercury globule 8 is making signal contacts between the plates 6 and 7 of the signal device. As soon as the mercury globule 23 reaches either end of the tube it breaks connection between the bars 37 and leaves the telephone in its normal condition.

In Fig. 1 we indicate diagrammatically, means for establishing a talking circuit when the receiver is lifted from the hook 20. A wire 39 is shown connected with the upper hook contact and with the transmitter 35, and a wire 40 is shown connected with the hook and the wire 36 at the line side of the switch 37. When the hook engages the upper contact as it does when the receiver is lifted off the hook, a talking circuit is established.

From the above description it will be seen that we have devised an anti-listening device which will send a signal whenever the receiver is removed from the hook and which cannot in any way be manipulated to stop the sound of the signal once it has started. If the signal sounded when an unauthorized listener takes down his receiver is not sufficiently well heard there is always the final signal which is sounded when the receiver is put back on the hook.

What we claim as our invention is:—

1. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device; an electro-motor device and its circuit for actuating

the signal device; a telephone hook; and a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver.

2. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device; an electro-motor device and its circuit for actuating the signal device; a telephone hook; and a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver; and means arranged to maintain a break in the buzzer circuit as soon as the signal has been sounded.

3. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device; an electro-motor device and its circuit for actuating the signal device; a telephone hook; a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver; means arranged to maintain a break in the buzzer circuit as soon as the signal has been sounded; and means whereby the return of the receiver to the hook causes a second actuation of the signal device.

4. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device; an electro-motor device and its circuit for actuating the signal device; a telephone hook; a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver; and means for automatically breaking the electro-motor circuit as soon as the signal device has been sufficiently actuated to cause the giving of a signal.

5. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device; an electro-motor device and its circuit for actuating the signal device; a telephone hook; a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver; a second electro-motor device and circuit adapted to actuate the signal device; and a starting switch in the circuit of the second electro-motor device actuated by the telephone hook on the replacing of the receiver on the hook.

6. In a telephone listening detector the combination of a buzzer and its circuit; a

contact maker and breaker in the buzzer circuit forming a signal device; an electro-motor device and its circuit for actuating the signal device; a telephone hook; a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver; a normally open circuit connecting the transmitter to line; and a switch actuated by the electro-motor device to close the circuit during the sounding of a signal.

7. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device and movable to operate in either of two directions; an electro-motor device and its circuit for actuating the signal device in one direction; an electro-motor device and its circuit for actuating the signal device in the other direction; a double starting switch adapted to close the circuit of one electro-motor device and open the other and vice versa; and a double switch actuated by the electro-motor devices whereby the actuation of either one of the electro-motor devices causes, as far as said switch is concerned, the breaking of said electro-motor circuit and the closing of the circuit of the other electro-motor device.

8. In a telephone listening detector the combination of a buzzer and its circuit; a contact maker and breaker in the buzzer circuit forming a signal device and comprising a tiltable trough, a globule of mercury in the trough, and two separated metal plates connected in the buzzer circuit and shaped to make and break the buzzer circuit as the mercury rolls between them; an electro-motor device and its circuit for actuating the signal device; and a starting switch in the circuit of the motor device actuated by the telephone hook on the removal of the receiver.

9. A signal device for the purpose described comprising a tube; a mercury globule therein; two separated metal plates having lead wires connected therewith and shaped at the adjacent edges at both sides to make and break contact with the mercury globule, the tube being channeled so that the globule will roll along one side and then back along the other as the tube is oscillated.

Dated at Berlin this 27 day of Dec. 1910.

ERNEST BURGNER.

CHRISTIAN BURGNER.

Signed in the presence of—

C. W. CHAPMAN,

Miss C. SCHWEITZER.