No. 874,690. PATENTED DEC. 24, 1907.

E. S. LINCOLN.

LINE TESTER.

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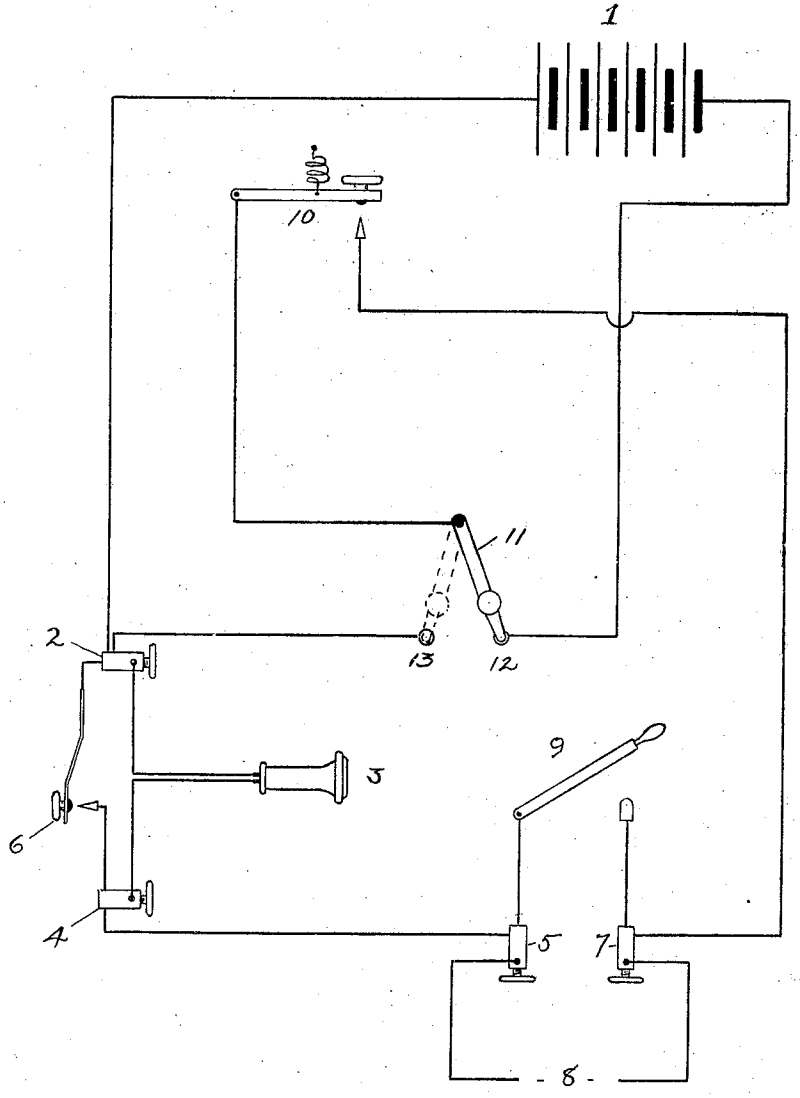

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LINE-TESTER.

No. 874,690. Specification of Letters Patent. Patented Dec. 24, 1907.

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To all whom it may concern:

Be it known that I, EDWIN S. LINCOLN, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Line-Testers, of which the following is a specification.

My invention relates to testing outfits for telephone, telegraph, lighting, bell, or other electrical circuits, by which the condition of the circuit under test is determined with the aid of a telephonic receiver or the like.

The general method of making a test of the above nature consists essentially in putting into the circuit to be tested a telephone receiver, and also a source of electric energy, if said circuit does not already contain one. On completing the electrical circuit a current is started which causes an audible "click" in the receiver. Similarly, a click is caused when the circuit is broken and the current is interrupted. From the sounds so produced an experienced operator may judge whether or not the circuit is in good order, and often can determine the nature of a defect which may be present.

The application of the test as above described is difficult for many reasons, principal among them being the fact that considerable experience on the part of the operator is necessary before he is sufficiently conversant with the characteristic sounds of the click heard in the receiver, under varying conditions of the circuit, to enable him to determine what difficulties may exist therein. This difficulty of application may to a large extent be remedied by providing a means by which there may be obtained the click characteristic of a circuit known to be in good condition, said click thus providing a standard with which the click subsequently obtained on testing a line of uncertain condition may be compared.

My invention resides in a novel combination of apparatus by which I am enabled at will to compare the "clicks" or sounds produced in a telephone receiver when a circuit of uncertain condition is tested, with a standard "click" obtained when testing a circuit of known good condition, under a great variety of differing situations as regards wiring and installation.

The drawing presents a figure illustrating, diagrammatically, the invention.

Referring to the figure, 1 is a source of electrical energy, preferably a battery of dry cells sufficient to produce the desired current. From one pole of the battery an electrical connection, or wire extends to 2, where preferably a binding post is provided by which one of the terminals of a telephonic receiver 3 or the like may be connected into circuit. The other terminal of receiver 3 is connected in at binding post 4, whence the line continues to 5. Intermediate the binding posts 2 and 4 is connected a short circuiting device, preferably a push button 6, by which the binding posts 2 and 4 may be electrically connected, thus cutting out the receiver 3 when desired.

At 5 and 7 are preferably the binding posts, or other means for connecting in the terminals of the line under test, 8. Between these terminals or binding posts is preferably a single pole, single throw switch 9 by which said terminals may be short circuited.

From 9 the circuit extends through a make and break device 10 as for example a telegraph key having normally separated contacts, to the multiple way switch here shown as having the arm 11 adapted to contact with either of the two contact points 12 and 13. Assuming the switch to be in contact at 12, the circuit continues back to the battery. The other contact point 13 is connected into the circuit between the receiver 3 and the first mentioned pole of the battery 1.

The manner of using my testing device is as follows. Assuming arm 11 in contact with 12, and the line under test to be connected in at 5 and 7, knife switch 9 is closed and key 10 is pressed causing a current to flow from battery through receiver 3, switch 9, key 10, and switch 11 back to the battery 1, which current is interrupted when key 10 is released. The starting or interruption of the current passing through the receiver 3 causes a more or less audible click therein, of which the characteristics may be mentally noted. Switch 9 is then thrown into its open position and key 10 is again pressed and released; the flow of current in this instance following the course above traced out except that it follows through the circuit 8 under test, instead of through switch 9 as in the former case. As before there is heard in the receiver 3 a click which may or may not vary in sound from the standard click obtained under conditions when the circuit, being all embodied in the testing apparatus, was

known to be in good condition. A comparison of the sound of the standard click obtained when switch 9 was closed with the click produced under conditions where said switch 9 is opened, causing the current to pass through circuit 8, of doubtful condition, will enable the operator to determine whether or not line under test is in satisfactory condition. It is obvious that, in testing as above, the circuits may be made and broken by manually placing terminals of wires of same in or out of contact, as well as by the manipulation of a special make and break device, as described.

For testing a circuit in which there is already connected a source of electrical energy, it may not be necessary to make use of the battery embodied in the testing outfit. In such case arm 11 may be shifted to contact with 13, as shown in dotted lines, and switch 9 is left open. In this case current generated in line 8, by means not shown in the drawing, will be conducted through binding post 7, and through key 10, when same is depressed, to arm 11, passing thence to contact 13 and binding post 2, next traversing receiver 3 and returning to circuit 8 through binding posts 4 and 5. As before, starting or interrupting of this current produces a click of which the characteristics afford a basis by which operator is enabled to determine the condition of the line under test, and which may be readily compared with the standard click, if desired, by changing arm 11 over to contact 12 and closing switch 9 so as to temporarily cut out line under test.

Should a bell circuit be under test in which the bell is located at a point too remote to be heard, the satisfactory operation of the circuit will be manifested by a buzzing noise within the receiver, when circuit is closed by depressing key 10, caused by the rapid making and breaking of the current by the bell mechanism. Since the resistance of the telephone receiver coils are comparatively high, the current in some cases may not be strong enough to start bell, in which case the receiver 3 may be momentarily short-circuited by means of the push-button 6. The cutting out of the receiver resistance will permit the flow of a current strong enough to start bell ringing, which after being started will continue to ring, although the receiver resistance was too high to allow bell to ring in the first instance.

Having described my invention what I claim and desire to secure by Letters Patent is:

1. In a line tester, in combination, a source of electrical energy and a telephonic receiver, or the like, adapted to be placed in circuit under test, and means for short circuiting the terminals of said circuit under test.

2. In a line tester, in combination, a source of electric energy, a telephone receiver, or the like, in circuit with said source of energy, a make and break device in said circuit, means for connecting into said circuit terminals of a line to be tested, and a short-circuiting device intermediate the said terminals.

3. In a line tester, in combination, a source of electric energy contained in said tester, a telephonic receiver or the like in circuit therewith, means for short circuiting said receiver, and selective means whereby said receiver may be put in circuit either with said source of electric energy contained in the tester, or with a source of electric energy contained in the line under test.

4. In a line tester in combination, a source of electrical energy, a telephone receiver or the like, means for short circuiting said receiver, means for putting in circuit with said receiver the line to be tested, means for short circuiting said line, selective means by which said telephone receiver may be put in circuit either with source of electric energy in the line tester or with source of energy in line under test, and a make and break device for controlling passage of current through said receiver.

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

EDWIN S. LINCOLN.

Witnesses:

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