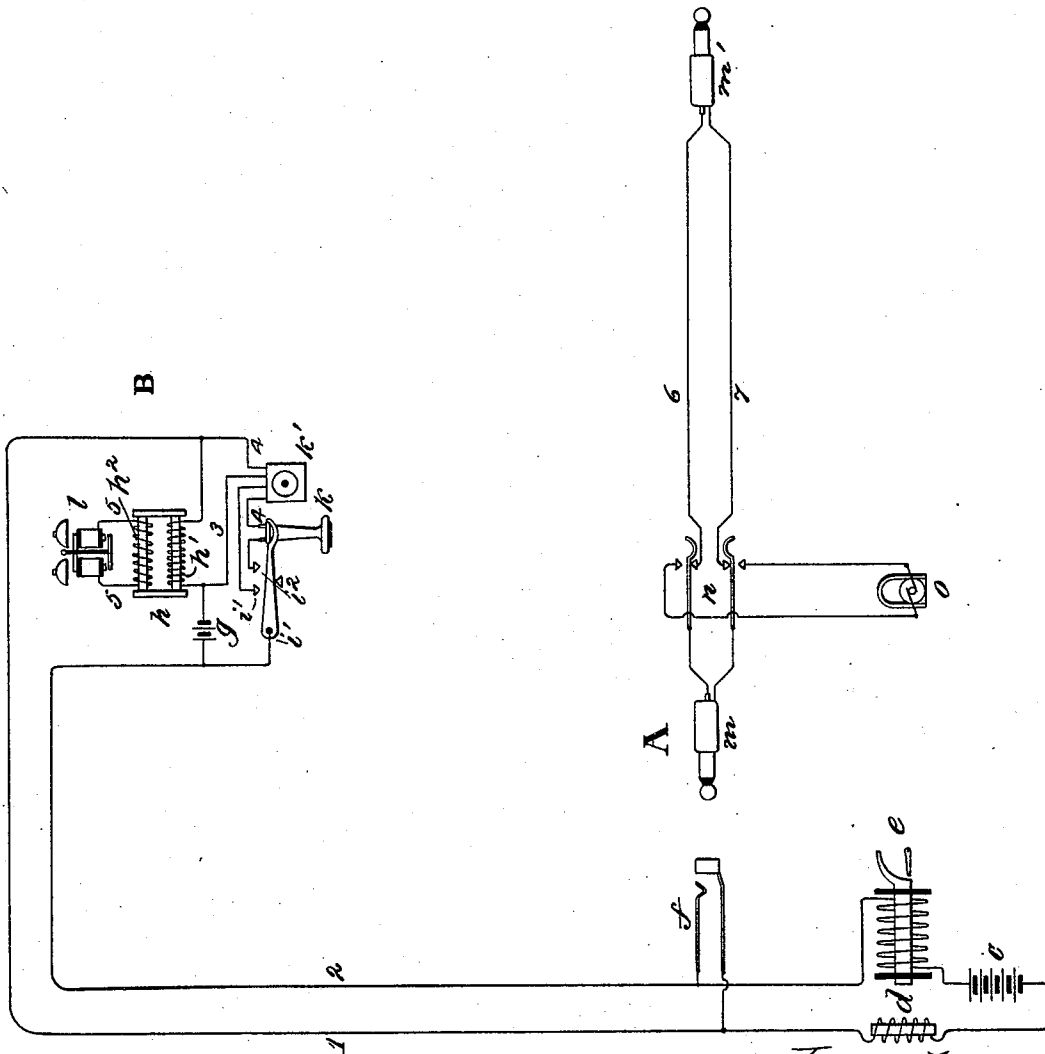


(No Model.)

C. E. SCRIBNER & F. R. McBERTY.
SIGNALING APPARATUS FOR TELEPHONE LINES.

No. 574,225.

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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, AND FRANK R. MCBERTY, OF DOWNER'S GROVE, ILLINOIS, ASSIGNORS TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

SIGNALING APPARATUS FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 574,225, dated December 29, 1896.

Application filed August 17, 1895. Serial No. 559,615. (No model.)

To all whom it may concern:

Be it known that we, CHARLES E. SCRIBNER, residing at Chicago, in the county of Cook, and FRANK R. MCBERTY, residing at Downer's Grove, in the county of Du Page, State of Illinois, citizens of the United States, have invented a certain new and useful Improvement in Signaling Apparatus for Telephone-Lines, (Case No. 404,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

Our invention concerns the operation of polarized signal-bells on circuits carrying continuous currents, particularly on telephone-lines carrying current for charging local storage batteries at the substations.

In some exchange systems each substation is provided with a storage battery for operating the substation transmitting-telephone, which is charged during the idleness of the telephone by a current from a source of supply permanently connected with the telephone-line at a central station. In such apparatus it is found in practice that the polarized signal-bell usually provided at the substation cannot be operated in a satisfactory manner by the alternating signaling-current impressed upon the line at the central station, because a continuous current in the line-circuit imparts sufficient magnetism to the bell to retain it permanently in one position or at least to seriously interfere with its vibration.

Our invention aims to avoid the interference with the bell arising from such a cause; and it consists in interposing between the bell and the line-circuit a repeating-coil or transformer, the primary helix of the transformer being included in the line-circuit in the path of the continuous current and the secondary helix of the transformer being placed in a local circuit with the bell. With this arrangement the presence of a continuous current in the line-circuit in no wise affects the bell at the substation. This continuous current may be so strong that the generator of signaling-current applied to the line for operating the bell may not produce a reversal of the cur-

rent; but in any event the fluctuations created in the line-circuit, being inductively repeated through the transformer, will operate the bell.

We find it preferable to construct the primary helix of the transformer to have high resistance and impedance and the secondary helix of comparatively low resistance, in which case the bell at the substation also may have a low resistance.

An application of our invention is shown in the accompanying drawing.

In this diagram the telephone-line 1 2 is shown extending from a central station A to a substation B. At the central station its circuit is closed through a battery *c*, which may in practice be common to a large number of lines in the exchange, an impedance-coil *d* being interposed in line conductor 1 and a signaling instrument or annunciator *e* in line 2. The contact-pieces of a spring-jack *f* in a telephone-switchboard are connected with the line conductors.

At the substation line conductor 2 is permanently closed through a local storage battery *g* and the primary helix *h'* of the transformer *h*. Conductor 2 is also connected with the switch-lever of a telephone-switch *i*, having two contact-anvils, against which it closes when relieved from the weight of the receiving-telephone. Contact-piece *i'* constitutes a terminal of a wire 3, which includes the transmitter and the primary helix of the usual induction-coil, being a portion of a local circuit containing, together with these instruments, the local storage battery *g*, and controlled by the switch-lever. The other contact-anvil *i''* is the terminal of a wire 4, which includes the receiving-telephone *k* and the secondary helix of the induction-coil in transmitter *k'*.

The usual polarized signal-bell *l* is located at the substation, but it is connected in a local circuit 5 with the secondary helix *h''* of transformer *h*.

When the primary helix of the transformer is connected permanently across the line-circuit, as shown herein, it should have a high resistance—as much as one thousand ohms—and should be characterized by high im-

dance. The helix h^2 may have a resistance of one hundred ohms, the magnet-coils of bell l having in that case an equal resistance.

At the central station the usual plugs m and m' are shown for the use of the operator in switching lines into connection with each other. In the plug-circuit 6 7 is included a calling-key n , which is adapted, when operated, to disconnect the plug m from its mate m' and to connect its terminals to the poles of a generator o of alternating current. The operator's telephone and the keys controlling it, together with the other appliances usually found associated with pairs of connecting-plugs, have been omitted from the drawing, since they do not enter into the invention.

During the disuse of the telephone at substation B current flows continuously from battery c through annunciator e , line conductor 2 to the substation, and there through the local storage battery g and through helix h' , returning by line conductor 1 through impedance-coil d . This current is in the proper direction to charge battery g . Under ordinary circumstances a current of two one-hundredths or three one-hundredths of an ampere may be sufficient for this purpose.

Obviously the flow of this steady current in helix h' does not affect the bell l .

In signaling to the substation B the operator may insert the plug m into the spring-jack f and depress the plunger of key n . The action of generator o will be to create in the line-circuit a varying or pulsatory current, alternately increasing the current already existing in the line and diminishing it to zero, or, if the generator have sufficient strength, perhaps even reversing the current in the line-circuit. This pulsatory current, finding circuit through the helix h' , induces in the helix h^2 an alternating current which operates the polarized bell l and thus gives the signal.

The removal of the substation-telephone from its switch-hook permits the closing of the local circuit of battery g through the transmitter and the primary helix of the induction-coil and the closing of the line-circuit through the telephones. The apparatus is then in condition for use in telephonic communication in the ordinary manner.

We claim as new and desire to secure by Letters Patent—

1. In combination with a telephone-line, a source of continuous current permanently connected in the line-circuit at a central station, a transformer at the substation having one of its helices in the line-circuit, a polarized bell at the substation in circuit with the other helix of the transformer, a source of alternating current at the central station, and means for connecting it with the telephone-line to operate the signal-bell, as described.

2. In combination with a telephone-line, a source of continuous current permanently connected in a line-circuit at the central station, means for producing undulations in the current therefrom a local storage battery in the circuit at the substation adapted to be charged by the current in the line, a transformer at the substation having its primary helix connected with the line-circuit, and a polarized electric bell in a local circuit with the secondary helix of the transformer, as described.

3. In combination, a telephone-line circuit, a transformer having a primary helix of high impedance and resistance permanently connected across the line-circuit at the substation, a polarized signal-bell in a local circuit with the secondary helix of the transformer, a local storage battery in the line-circuit, a telephone-transmitter and the primary helix of an induction-coil in a normally open local circuit of the storage battery, and means for closing the local circuit, a receiving-telephone and the secondary helix of the same induction-coil in a bridge of the line-circuit, a source of charging-current permanently connected with the line at the central station, a source of alternating signaling-current, and means for connecting the said source of current with the telephone-line to operate the bell, as described.

In witness whereof we hereunto subscribe our names this 12th day of July, A. D. 1895.

CHARLES E. SCRIBNER.
FRANK R. McBERTY.

Witnesses:

ELLA EDLER,
MYRTA F. GREEN.