

April 15, 1930.

E. W. NILES ET AL

1,754,238

COIN BOX DEVICE

Filed Sept. 24, 1928

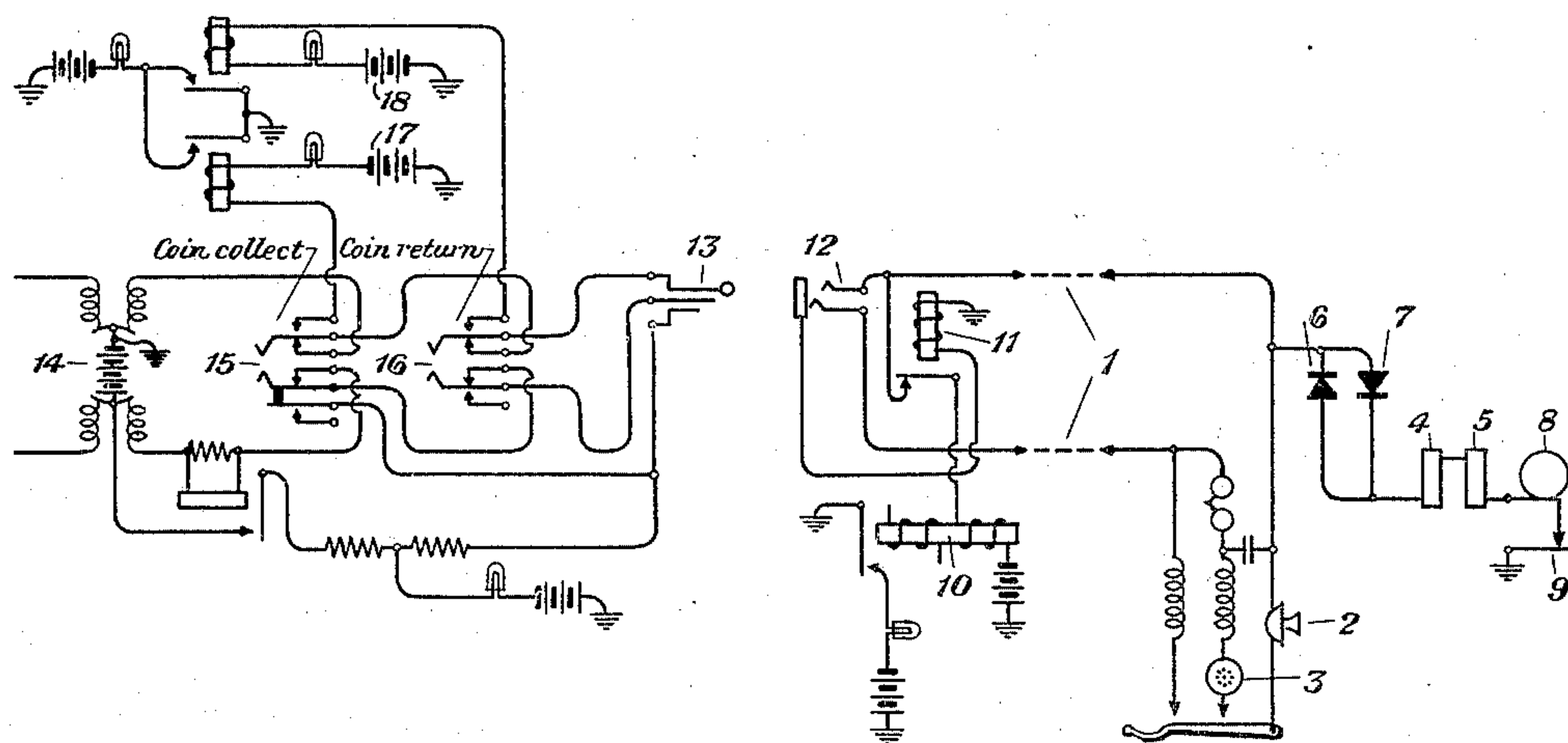


Fig. 1

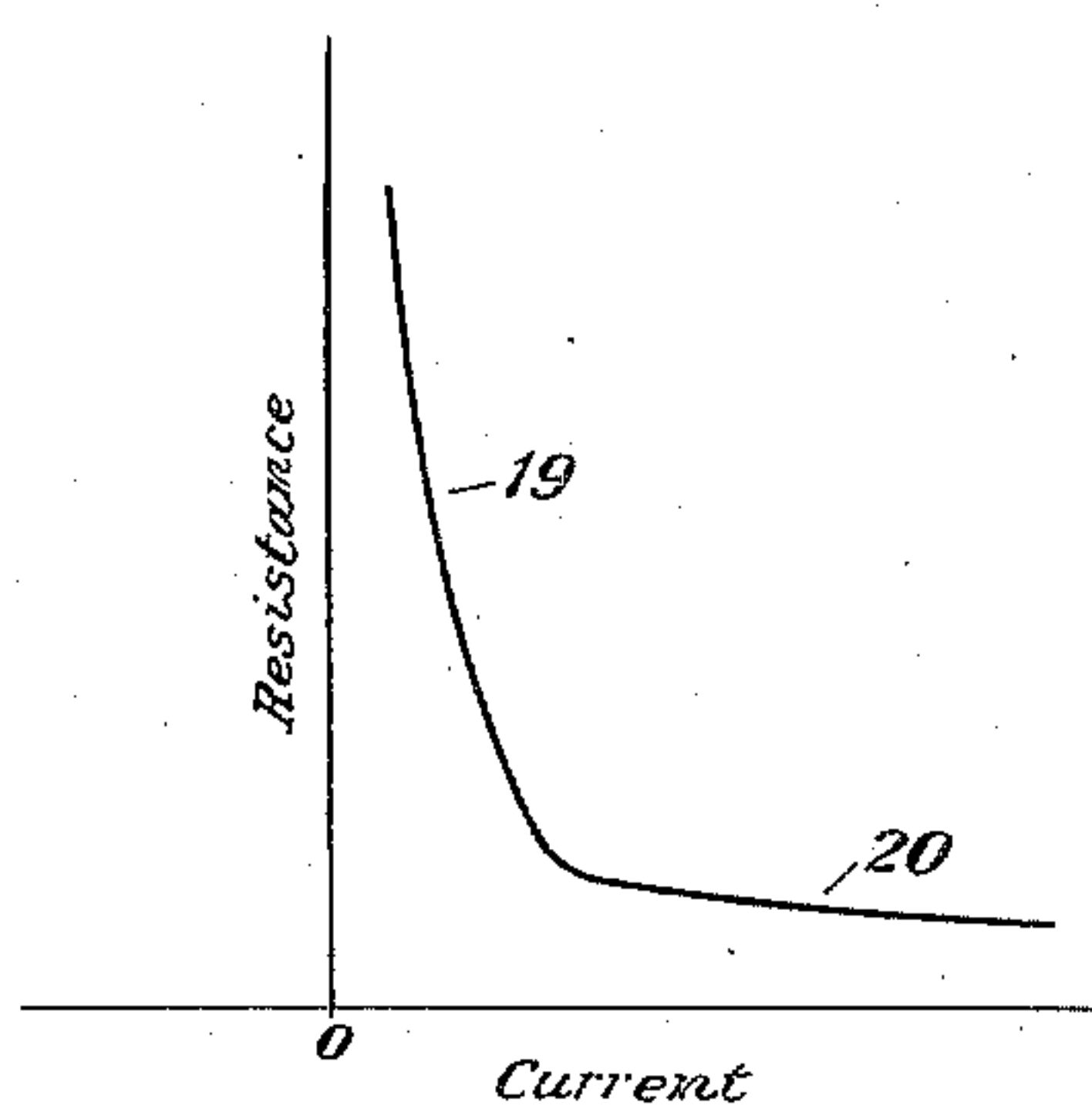


Fig. 2

INVENTORS
E. W. Niles and W. H. Edwards

BY

J. H. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE

ELIOT W. NILES, OF BLOOMFIELD, NEW JERSEY, AND WILLIAM H. EDWARDS, OF BAY-SIDE, NEW YORK, ASSIGNORS TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK

COIN-BOX DEVICE

Application filed September 24, 1928. Serial No. 307,830.

This invention relates to arrangements for regulating the margin of operation of responsive devices whereby false operation thereof may be prevented. The invention is particularly useful in connection with coin collecting devices or register devices.

In coin collector devices utilized in telephone systems, the operating relay of the device is arranged to operate on a voltage of approximately 60 volts, which is the potential obtained at the coin box station from the coin collect or coin refund battery at the central office. On the other hand, the operating relay mechanism of the coin box must be adjusted so that it will not operate on a potential of approximately 40 volts. This latter potential may be obtained during a call from a flow of current to ground through the relay mechanism from the talking battery in shunt with the resistance of one side of the line to ground at the office. This current is frequently augmented by the presence of ground potential. It will be seen that the comparatively high non-operate requirement to prevent false operation of the collector device requires an insensitive adjustment on the collector which limits the loop over which the collector may be operated and increases maintenance of the collectors.

It is the primary object of the invention to provide arrangements whereby the margin between the current on which the collector is required to operate and the current on which the collector is required not to operate will be increased. This is accomplished by connecting in circuit with the operating relay of the coin collector a device which has a negative current-resistance characteristic. Such a device would be one whose resistance would decrease upon an increase in the magnitude of the applied current and whose resistance would increase upon a reduction of the magnitude of the applied current. It has been found that rectifiers of the contact variety, such for example, as a copper oxide rectifier, have negative current-resistance characteristics under certain conditions of polarity and current. In accordance with the arrangements of this invention there will be included in series with the operating relay

of the coin box device one or more rectifiers of the contact variety and these will serve to increase the margin between operating and non-operating currents for the device. Other features and objects of the arrangements of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in the Figures 1 and 2 of which the invention is illustrated. Fig. 1 is a circuit diagram embodying a preferred form of the invention. Fig. 2 is a graphical illustration of certain of the operating details of the invention.

In Fig. 1 is shown a subscriber's line 1 with which would be associated coin box apparatus. Of the coin box apparatus only the relay with coils 4 and 5 is shown. This relay, in response to current of different polarities, will tilt an armature in different directions either to collect or return the coin 8. The coin 8 will close a contact 9 to ground after it is inserted in the coin box. The operation of the coin box apparatus is well known in the art. The subscriber's station would also include apparatus well known in the art, such as the transmitter 2 and the receiver 3. The subscriber's line would terminate at a central office in a jack 12. Signaling relays such as 10 and 11 are shown associated with the line at the central office. A connection may be made by the plug 13 at the central office with the subscriber's line. The plug 13 may be a portion of apparatus such as an operator's cord circuit. This circuit would include the talking battery 14, the coin collect key 15 and the coin return key 16. Key 15 will connect battery of one polarity, such as battery 17, to the tip conductors of the cord and line to operate the coin box apparatus in one manner. Key 16 will connect oppositely poled battery 18 to the tip and ring conductors of the cord and line to operate the coin box apparatus in another manner.

The relay with coils 4 and 5 of the coin box apparatus is constructed to operate on current from a voltage, for example, of 60 volts

supplied from the batteries 17 and 18. This relay must also be constructed so that it will not operate on current from approximately 40 volts. Current for falsely operating the relay might be obtained during a call from the flow of current to ground from the talking battery 14 in shunt with the resistance of one side of the line. Furthermore, this current is often augmented by the presence of ground potential. Accordingly, there will be inserted in series with the relay coils 4 and 5 a device, such as the copper oxide rectifier having a negative current-resistance characteristic. Two rectifiers oppositely poled, are used in parallel to readily transmit the oppositely poled currents from batteries 17 and 18 utilized for coin collecting and coin returning purposes.

In Fig. 2 is shown a curve 19 and 20. This curve illustrates the resistance current characteristics of the combination of rectifiers 6 and 7. It is pointed out that when the current is relatively low the rectifier combination will present a relatively high resistance, as shown by portion 19 of the curve. When the current increases it will be seen that the rectifier combination will present a relatively low resistance, as shown by portion 20 of the curve. Accordingly, the utilization of a device such as the rectifier combination which has a negative current-resistance characteristic will tend to increase the margin between the currents which should operate the coin box device and those which should not operate the coin box device. By connecting one or more rectifier units in series with each other instead of a single rectifier unit such as 6 or such as 7, various marginal adjustments may be obtained. While rectifier devices of the contact variety have been illustrated, it is pointed out that other devices having negative current-resistance characteristics, such for example as a ballast lamp, might also be utilized in combination with the coin box apparatus.

While the arrangements of the invention have been shown in connection with telephone coin box apparatus, it is pointed out that they might be utilized in connection with many other types of relay controlled apparatus, such, for example, as message register apparatus. Accordingly, while the invention has been disclosed as embodied in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A subscriber's line terminating at a central office, a responsive device connected to said line, a source of current at said central office of a certain voltage, a second source of current at said central office of a lower volt-

age, and a device having a negative current-resistance characteristic connected in said line in series with said responsive device and said sources of current.

2. A subscriber's line terminating at a central office, a responsive device connected to said line, relay means in said responsive device adjusted to operate on current of a certain voltage and not to operate on current of a lower voltage, a source of current at said central office of a voltage suitable for operating said relays, a source of current at said central office below the voltage value of said first source, and a device having a negative current-resistance characteristic connected in said line in series with said responsive device.

3. A subscriber's line terminating at a central office, a responsive device connected to said line, relay means in said responsive device adjusted to operate on current of a certain voltage and not to operate on current of a lower voltage, a source of current at said central office of a voltage suitable for operating said relays, a source of current at said central office below the voltage value of said first source, and a rectifier of the contact variety connected in said line in series with said responsive device.

4. A subscriber's line terminating at a central office, a responsive device connected to said line, relay means in said responsive device adjusted to operate on current of a certain voltage and not to operate on current of a lower voltage, a source of current at said central office of a voltage suitable for operating said relays, a source of current at said central office below the voltage value of said first source, and a combination of rectifiers of the contact variety arranged in parallel and poled in opposite directions connected in said line in series with said responsive device.

In testimony whereof, we have signed our names to this specification this 22nd day of September, 1928.

ELIOT W. NILES.

WILLIAM H. EDWARDS.