Jan. 19, 1932. H. E. HERSHEY 1,841,733

TELEPHONE SYSTEM

Filed Nov. 28, 1930

Fig. 1

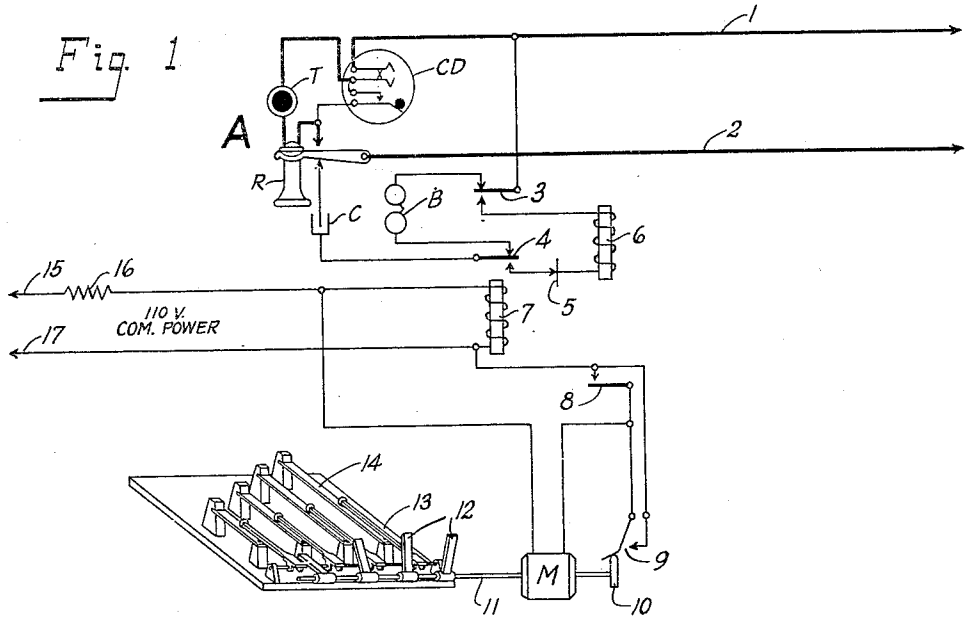
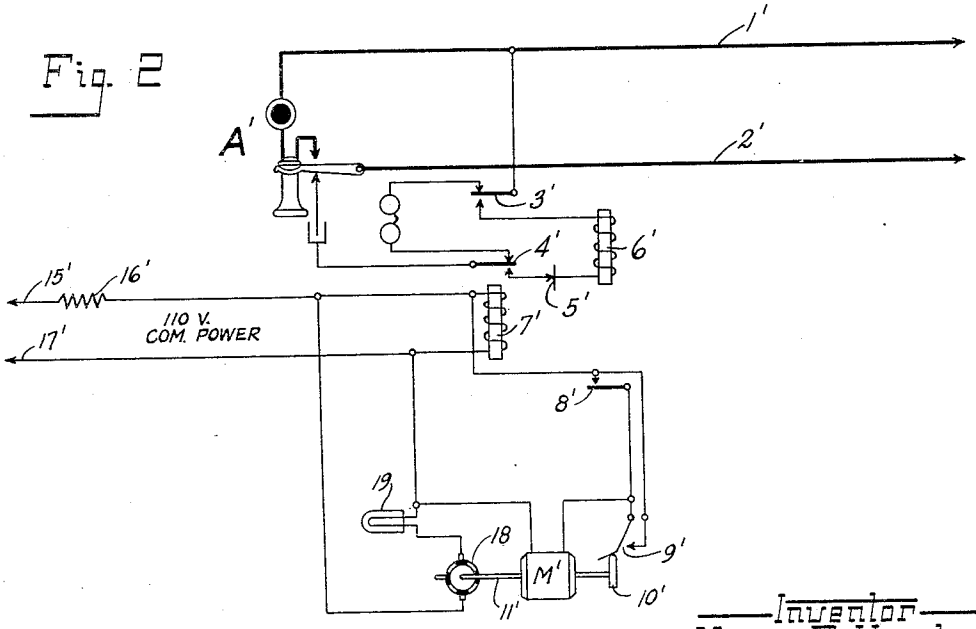



Fig. 2




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# UNITED STATES PATENT OFFICE

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## TELEPHONE SYSTEM

Application filed November 28, 1930. Serial No. 498,628.

This invention relates to telephone systems in general, but relates more particularly to the means for signalling called telephone subscribers.

In some instances, a subscriber may desire to be informed in a novel or distinctive manner that they are being called on the telephone; that is, while they do not object to the sound of the usual telephone ringers or bells they would prefer a musical or visual indication that they are being called.

The object of the invention is to provide a novel arrangement readily attached to any existing telephone substation for signalling a called telephone subscriber in a distinctive manner.

One of the features of the invention relates to the use of the commercial power for signalling the called subscriber in response to the usual telephone ringing current which is transmitted to the called line.

Another feature relates to the means whereby if the commercial power fails the subscribers are signalled by the substation bells in the ordinary manner by the telephone ringing current.

These and other features will be apparent from the drawings comprisings Figs. 1 and 2 which show two different types of signalling means for signalling a called subscriber in accordance with this invention.

In Fig. 1, A represents an automatic telephone subscriber's apparatus comprising the usual transmitter T, receiver R, ringer bells B, condenser C, and calling device CD. The subscriber's line is connected to the telephone exchange over the line conductors 1 and 2. 5 represents a dry-plate rectifier placed in series with the polarized relay 6 to prevent the relay 6 from operating during dialling. Relay 7 is bridged across conductors 15 and 17 which extend to a source of commercial power such as is supplied by the power companies. M represents a small motor which operates a shaft 11 to which is connected a cam 10 and striking arms 12. The motor when operated rotates the shaft 11 to cause the cam 10 to close its associated springs 9 and to cause the arms 12 to raise the strikers 13 and release the same so that the strikers drop on the vibrating reeds 14. The arms 12 can be arranged on the shaft to vibrate the reeds 14 in any desired sequence of operation to sound different distinctive tones, such as "attention" or other well known tones.

Fig. 2 is similar to Fig. 1 with the exception that a visual indication is given to the called subscriber in place of the musical chime arrangement when the subscriber is called. The lamp 19 is flashed by the interrupter 18 which is in turn rotated by the motor M'.

In order to describe the operation it will first be assumed that relay 7 is normally energized over conductors 15 and 17 extending to the commercial current source. At armatures 3 and 4 relay 7 disconnects the substation bells from the subscriber's lines 1 and 2 and connects polarized relay 6 in bridge of said lines. Now when subscriber A is being called, the telephone ringing current will extend from the telephone generator over conductor 1, armature 3, and its working contact, winding of relay 6, dry-plate condenser 5, working contact of armature 4 and said armature, condenser C, resting contact of the switch-hook spring and said switch-hook, and over line conductor 2 to the telephone exchange. Polarized relay 6 energizes over the above traced circuit responsive to the ringing current and at armature 8 closes a circuit for operating the motor M as follows: from commercial power source, conductor 15, resistance 16, motor M, armature 8, and by way of conductor 17 back to the commercial power source. The motor M operates over the above traced circuit and rotates the shaft 11 to cause the cam 10 to close springs 9 to maintain the motor circuit independent of armature 8 so as to insure a complete revolution of the shaft 11 and also to insure that the motor will stop when its circuit is opened in the same relative position. The rotation of the shaft 11 causes the arms 12 to raise the strikers 13 and later release the same as the shaft continues to rotate to cause the strikers 13 to drop on the vibrating reeds 14. The vibrating reeds 14 are tuned to transmit distinctive tone notes or

chimes. The subscriber A upon hearing the chime notes transmitted by the vibrating reeds 14 knows that he is being called. Responsive to the removal of the receiver by subscriber A the switch-hook opens the circuit of relay 6 which deenergizes, and the telephone ringing current is automatically disconnected from the conductors 1 and 2 at the telephone exchange in a well known manner. Relay 6, upon deenergizing, at armature 8 opens the initial operating circuit of the motor M but since cam springs 9 are now closed in shunt of said armature spring the motor continues to rotate the shaft until the cam 10 opens the motor circuit at springs 9, whereupon the motor is stopped in its normal position.

After the conversation subscriber A replaces his receiver R on the switch-hook and again prepares the circuit for polarized relay 6.

As will be observed in the foregoing description subscriber A is normally signalled by a musical device somewhat similar to dinner chimes to inform him that he is being called by another telephone subscriber. It may happen, however, that due to some trouble or repairs the commercial power may be turned off for a length of time. In this event the relay 7 will deenergize and at armatures 3 and 4 connect the usual ringer bells B to the subscriber's line 1 and 2 so that the subscriber may be signalled by the bells in response to telephone ringing current.

Since Fig. 2 is somewhat similar to Fig. 1 it is believed that a full description of Fig. 2 is unnecessary and that it will suffice to say that when the motor M′ is operated the shaft 11′ rotates the circuit interrupter 18 to cause the lamp 19 to flash over an obvious circuit. The flashing of the lamp 19 indicates to the subscriber A′ that he is being called by another telephone subscriber.

Having described the invention what is considered new and is desired to have protected by Letters Patent will be pointed out in the following claims:

What is claimed is:

1. In a telephone system, a subscriber's line, a set of musical chimes associated with said line, a motor associated with said line for operating the musical chimes of said set, a source of commercial current for operating said motor, means responsive to the connection of ringing current to the conductors of said line for connecting said source to said motor to operate the same, and a shaft having arms rotated by the operation of said motor for striking the chimes of said set in a predetermined sequence to notify the subscriber that he is being called.

2. In a telephone system, a subscriber's line, a set of musical chimes associated with said line, a motor associated with said line for operating the musical chimes of said set, a source of commercial current for operating said motor, means responsive to the connection of ringing current to the conductors of said line for connecting said source to said motor to operate the same, means controlled by the operation of said motor for maintaining said motor connection for a predetermined period independent of said first means, and a shaft having arms rotated by said motor for striking the chimes of said set in a predetermined sequence to notify the subscriber that he is being called.

3. In a telephone system, a subscriber's line, a lamp associated with said line, a motor, a source of commercial power for operating said motor, means controlled by said source for operatively associating said motor with said line, a circuit including said source for operating said lamp, means responsive to the connection of ringing current to the conductors of said line for connecting said source to said motor, a circuit interrupter included in said circuit rotated responsive to the operation of said motor for intermittently opening and closing said circuit to flash said lamp to give the subscriber a visual indication that he is being called, ringer bells individual to said line and operatively disassociated from the conductors of said line by said first means, and said first means operative in case said source fails for operatively associating said ringer bells with the conductors of said line and for disassociating said motor, lamp, and interrupter whereby said bells are operated in response to ringing current instead of said motor and lamp.

4. In a telephone system, a subscriber's line having line conductors, a motor associated with said line, a source of commercial power for operating said motor, a normally energized relay bridged across said source, ringer bells associated with said line, contacts on said relay for disconnecting said ringer bells from said conductors, a circuit for operating said motor including said source, a second relay, a circuit for said second relay including said conductors and said contacts, said second relay energized over its circuit responsive to ringing current transmitted to the line conductors when the subscriber is called, means controlled by the energization of said second relay for closing said motor circuit to operate the motor, and a set of musical chimes operated responsive to the operation of said motor for signalling the subscriber in place of the ringer bells.

5. In a telephone system, a subscriber's line having line conductors, a motor associated with said line, a source of commercial power for operating said motor, a normally energized relay bridged across said source, ringer bells associated with said line, contacts on said relay for disconnecting said ringer bells from said conductors, a circuit for operating said motor including said source, a second

relay, a circuit for said second relay including said conductors and said contacts, said second relay energized over its circuit responsive to ringing current transmitted to the line conductors when the subscriber is called, means controlled by the energization of said second relay for closing said motor circuit to operate the motor, and an indicating device operated responsive to the operation of said motor for signalling the subscriber, and said normally energized relay deenergizing in response to the failure of said source for operating said contacts to disconnect said second relay from the line conductors and to connect said ringer bells in place thereof whereby said bells are operated responsive to said ringing current in place of said device.

6. In a telephone system wherein ringing current is transmitted to a subscriber's substation when the subscriber thereat is being called, two signalling devices at said substation, one of said devices normally connected for use and the other normally disconnected whereby only one device at a time can be operated, a source of commercial power for operating said one device and for maintaining said one device connected up for use, means operative in response to the failure of said source for disconnecting said one device and for operatively connecting the said other device for use, and means responsive to the transmission of signalling current for operating only the device which at the time is connected up for use.

7. In a telephone system, a subscriber's line, a set of musical chimes and a motor for operating the same, a source of commercial current for operating said motor, means dependent upon said source for operatively associating said chimes and motor with said line, ringer bells individual to said line but normally disconnected therefrom by said means, said means operatively in response to the failure of said source for operatively disassociating said motor and chimes from said line and for operatively connecting said ringer bells to said line, and means responsive to the transmission of signalling current to the conductors of said line for operating either said ringer bells or said motor and chimes dependent upon the condition of said associating means.

In witness whereof, I hereunto subscribe my name this 22d day of November, A. D. 1930.

HARRY E. HERSHEY.