March 9, 1937. A. J. PARISSI 2,073,587

TELEPHONE SYSTEM

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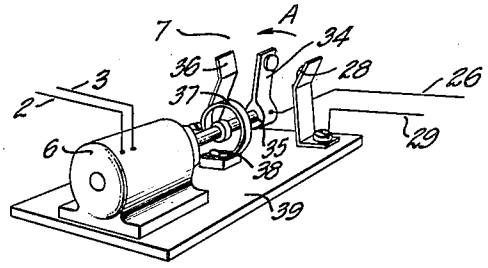


FIG. 2

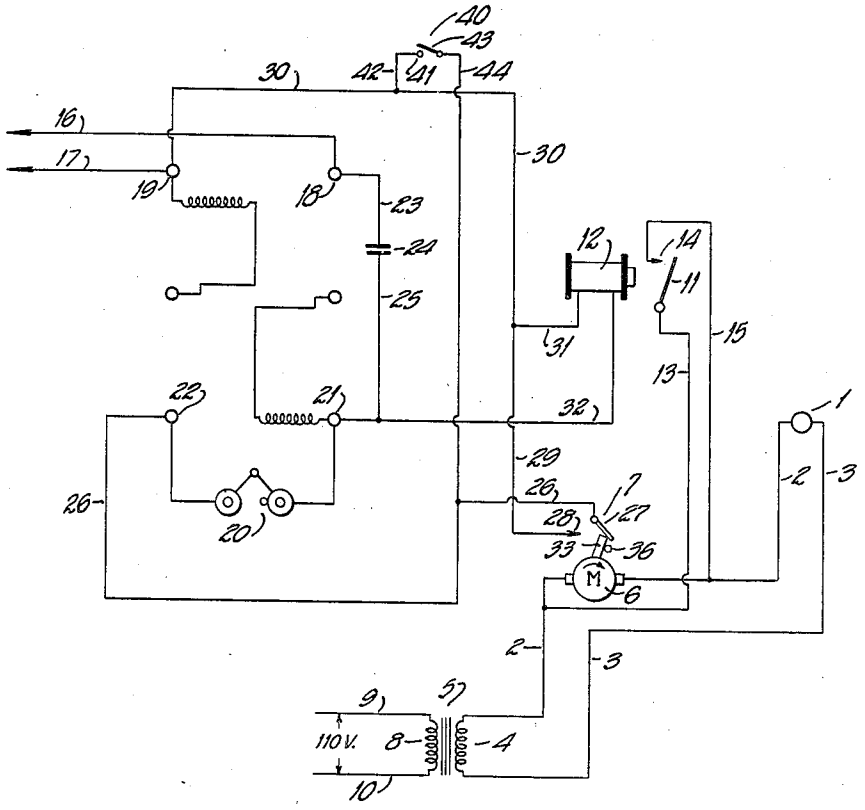


FIG. 1

INVENTOR
ANTHONY J. PARISSI
By
ATTORNEY

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TELEPHONE SYSTEM

Anthony J. Parissi, Cohoes, N. Y.

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11 Claims. (Cl. 179—84)

My invention relates to the signaling or annunciator phase of communicating systems and particularly to a system wherein a visual or "silent" and/or an audible signal is emitted to attract attention at a subscriber's station in response to a flow of signaling current in the associated telephone circuit.

My invention more particularly relates to the association with a telephone circuit of an electric circuit having a separate source of energy and including a visual signaling device which, through the means associating the two circuits, is operated in a predetermined manner when a signaling current energizes the telephone circuit. In view of the fact that the visual signaling circuit is dependent upon a source of energy separate from that feeding the telephone circuit and in order to insure continuity of service, that is, the emission of a signal of one character or another when the telephone signaling circuit is energized, my invention has for a first object the provision of means for effecting an operation of the annunciator in the telephone circuit in the event of a failure of the visual signal or the failure of power in its circuit.

Obviously, a visual signaling device is provided in order that a "silent" signal may be emitted at, for example, a subscriber's station in a telephone system where quietness is desirable. In some instances, circumstances may require intermittent absences of a person from view of the visual signal. Hence, my invention has for another object, the provision of a manual control whereby both the visual and the audible signaling device may be connected to operate simultaneously.

A still further object resides in the provision of a device embodying the circuit of the above character which is simple in construction, has a comparatively low cost of manufacture and may be easily installed and adapted to existing telephone subscriber's installations.

With these and other objects in view my invention includes the novel elements and the combinations and arrangements thereof described below and illustrated in the accompanying drawing in which—

Fig. 1 is a wiring diagram of my invention in its preferred form; and

Fig. 2 is a perspective view of a motor operated switch representative of one of the elements incorporated in my device.

Referring to the drawing and particularly to Fig. 1, 1 indicates an incandescent lamp which is connected through legs 2 and 3 to the secondary 4 of a transformer 5, the motor 6 of a motor-operated switch, indicated generally at 7 and hereinafter more fully described, being interposed in leg 2 of the lamp circuit. The primary 8 of transformer 5 is connected directly across the mains 9 and 10 which connect with a suitable source of electrical energy, preferably the ordinary, commercial, 110 volt supply. The motor 6, which, it will be noted, is in series with the lamp 1, is designed to draw such a small wattage that the lamp remains normally unilluminated.

In order to produce an illumination of the lamp 1, the armature 11 of a relay 12 is connected through a conductor 13 to one side of motor 6 and a contact 14 of relay 12, with which armature 11 is adapted to engage, is connected through conductor 15 to the other side of motor 6. When relay 12 is energized, armature 11 thereof engages contact 14 and, it is evident, shunts out motor 6 and effects an illumination of lamp 1.

The circuit, above described, comprises those means which are subjected to a commercial lighting supply of electrical energy. It should be here noted that transformer 5 could be dispensed with but that due to the inadvisability of carrying comparatively high voltage, e. g., 110 volt, lines in telephone line conduits, I prefer to use a step-down transformer as indicated at 5 which supplies at its secondary approximately 24 volts.

The coil of relay 12 is connected in the telephone circuit with which the incandescent lamp circuit, above described, is associated. Conductors 16 and 17 represent the telephone trunk lines and are shown terminating at the terminals 18 and 19, respectively, of the subscriber's station. The receiving and transmitting sets are not shown and only that portion of the telephone circuit including the annunciator or bell is illustrated which is deemed necessary in order clearly to show the interconnection and arrangement of the circuits of my invention and the relative disposition of the electrical devices therein. The manner of connecting the receiver and transmitter to the terminals illustrated is well known in the art.

The telephone annunciator or bell 20 is connected between the terminals 21 and 22. Terminal 18 is connected through conductor 23, condenser 24 and conductor 25 to terminal 21 and terminal 22 is connected through conductor 26 to a movable contact arm 27 of the motor-operated switch 7. A fixed contact 28 of switch 7 with which arm 27 is adapted to engage, as hereinafter described, is connected through conductors 29 and 30 to terminal 19. In Fig. 1, the motor-operated switch is illustrated diagram-

matically and a projection 33 is shown which is secured to the shaft of motor 6 and is adapted to urge the arm 27 out of engagement with contact 28. Switch 7, however, is illustrated in more detail in Fig. 2. When arm 27 lies in engagement with contact 28, the bell 20 is connected across the telephone trunk lines 16 and 17 and, assuming a signaling current flows in said trunk lines, an audible signal is emitted. Relay 12 is also connected across the telephone trunk lines 16 and 17. One end of the coil thereof is connected through conductor 31 to conductors 29 and 30 and the other end is connected through conductor 32 to terminal 21. Hence, relay 12 is energized when signaling current flows in the trunk lines and the armature 11 thereof is picked up and engages contact 14 thereby shunting out the motor 6 and effecting an illumination of the incandescent lamp 1.

Relay 12 comprises the means employed to associate the telephone circuit and the commercial lighting circuit whereby an energization or flow of signaling current in the telephone circuit effects a predetermined operation of the lighting circuit. However, it is desirable that one form of signal or another be emitted at all times. In other words, in order to insure the emission of an audible signal, that is, an operation of bell 20, in the event of a failure of operation of the visual signal, that is, lamp 1 or its associated circuit, I have provided means comprising the motor-operated switch 7. It will be noted that motor 6 derives energy from the lighting service mains and in the normal, energized position, assuming motor 6 rotates in a clockwise direction, the projection 33 permits arm 27 to remain out of engagement with contact 28, thereby maintaining the circuit to bell 20 open. It is to be understood that the rotor of motor 6 is designed to return to a predetermined position when unenergized and in such position urges arm 27 in engagement with contact 28. Hence, motor 6, being normally energized in the lamp signaling circuit, maintains the bell 20 disconnected from the telephone circuit so that, upon an energization of said circuit, no audible signal will be emitted but relay 12 will be energized to shunt motor 6 thereby effecting an illumination of lamp 1.

My invention is primarily adapted for use with automatic telephone systems that is, systems wherein a ringing current supply is automatically connected in circuit with the subscriber's station when the connection has been completed between the calling and the called parties. The ringing or signaling current is supplied from the central station, it being understood that a commutator is there provided and interposed between the source of supply and common, ringing current, bus bars whereby an intermittent signaling current is transmitted over the telephone trunk lines. This current would, of course, if the bell 20 were not maintained in open circuit by the motor-operated switch 7, effect an intermittent ringing of the bell. On the other hand, it effects an intermittent energization of the relay 12 whereby the motor 6 of switch 7 is intermittently shunted and lamp 1 is intermittently illuminated. Due to the design of the commutator at the central station, the signaling current is supplied for approximately two seconds and cut off for approximately four seconds. Relay 12, therefore, is energized for two seconds and deenergized for four seconds and the motor 6 is shunted during the two second period. It will be remembered that the rotor of motor 6 is designed to return to a predetermined position when unenergized and in such position urges arm 27 in contact with contact 28. Hence, when motor 6 is shunted, the rotor thereof starts its return movement. However, it is so designed that the period of time required by the rotor to return from its energized position and effect a closure of the switch 7 is greater than two seconds or the period during which said motor is shunted.

A suitable design for the motor-operated switch 7 is illustrated in Fig. 2 wherein the projection 33 and arm 27 are shown as combined in the form of a contact arm 34 which is secured to and movable by the motor shaft 35. Arm 34 is shown in a position intermediate and spaced from the contact 28 and stop 36 for clearness of illustration. One end of a spiral spring 37 is also secured to shaft 35 and the other end thereof is secured at 38 to the base 39 upon which the elements of the switch are mounted. The motor is adapted to rotate upon energization in the direction of the arrow A against the resistance offered by spring 37 and moves arm 34 until it engages the stop 36. When power is cut off to motor 6, spring 37 rotates shaft 35 in the opposite direction until arm 34 engages contact 28. The arm 34, obviously, is insulated from shaft 35 because it controls a circuit which is connected to the telephone lines whereas motor 60 is supplied from the electric service mains. Furthermore, spring 37 is designed slowly to return the arm 34 in the direction of contact 28 and the period of time required thereby to move arm 34 from stop 36 to contact 28 is greater than two seconds. Hence, assuming that the energized motor 6 is shunted by an operation of relay 12, the relay will become deenergized before arm 34 engages contact 28 and the bell circuit will not be completed. It should also be noted that motor 6 is designed to produce only a relatively small torque and spring 37 is designed in accordance therewith so that the desired, timed operation of the switch arm 34 is effected.

It is to be understood that equivalent mechanisms may be employed to perform the same function as motor-operated switch 7 such, for example, as a delayed relay or other suitable, electrical device and, therefore, I do not wish to limit this element of my invention to the exact means disclosed.

In order to permit the subscriber to connect the bell in circuit in the event he so desires, I have provided the switch 40, the contact 41 of which is connected through conductor 42 to conductor 30 and the arm 43 of which is connected through conductor 44 to conductor 26. It will be evident, by tracing the circuit, that switch 40 comprises a manual means for connecting the bell 20 across the mains 16 and 17 which, of course, may likewise be accomplished by a deenergization of motor 6 and a closure of switch 7. Switch 40 may be closed when, for example, the subscriber intends to go where the visual signal cannot be seen and when the switch is so closed, both a visual and an audible signal emission will be simultaneously effected.

The operation of my device is as follows. Assuming the electric service mains 9 and 10 are energized, motor 6 is energized, maintaining switch 7 open and the incandescent lamp 1 is extinguished. Assuming also that switch 40 is open and a signaling current flows through the telephone trunk lines 16 and 17, the bell is in open circuit due to the fact switch 7 is open and no audible signal will, therefore, be given. The

relay 12, however, will be energized by the signaling current and armature 11 thereof will be picked up and engage contact 14 thereby shunting motor 6 and effecting an illumination of lamp 1. As hereinbefore indicated, the signaling current of automatic telephone systems is intermittent and relay 12 will, therefore, be periodically energized. Furthermore, the period of time required for motor 6 to close switch 7 is greater than that during which signaling current flows. The bell or audible signaling device, will not, therefore, be actuated and the lamp will "flash" or become periodically illuminated in response to the intermittent flow of current in the telephone circuit. In the event of a power failure in the electric service mains or should the lamp 1 be removed or become burned out, no current, obviously, will flow through the lamp circuit and motor 6 will become deenergized thereby closing the switch 7 and connecting bell 20 across the telephone trunk lines 16 and 17. Hence, if, for any reason, the visual signaling device is rendered inoperative, the audible signaling device will be operated and the emission of one character of signal or another is insured.

From the foregoing description of my invention in its preferred form, it is evident that a visual signal may be effected in response to an energization of a telephone circuit, or, at the will of the subscriber, a simultaneous emission of both an audible and visual signal may be effected. As hereinbefore disclosed, the visual signal transpires when lamp 1 is intermittently illuminated. Furthermore, the visual signal is effected in response to the usual telephone signaling current and, obviously, when the subscriber answers the signal or the calling party hangs up, the signaling operation of the lamp is automatically terminated in the same manner as the bell is silenced in the present automatic telephone systems. In addition, my invention, though employing a separate source of supply for the incandescent lamp from that supplying the telephone circuit, insures through the medium of the motor-operated switch 7, an operation of the bell in the event the lamp fails to function or its circuit is defective. This latter feature of my invention is very desirable inasmuch as the maintenance of a continuous and uninterrupted service is of prime importance where telephone circuits and apparatus is concerned.

It is to be understood that I am not limited to the various electrical means illustrated and described as incorporated in the circuits of my invention nor to the precise circuits disclosed in order to form an operative device of the character described, but equivalent means and circuits may be substituted for those illustrated with comparable results. While I have, therefore, described my invention in its preferred embodiment, it is to be understood that the specific means disclosed together with the arrangement of the circuits embodying the same are merely illustrative and that the words which I have used are descriptive rather than limitative. Hence, changes within the purview of the appended claims may be made without departing from the true scope and spirit of my invention in its broader aspects.

What I claim is:

1. In a telephone system, a first electric circuit comprising telephone trunk lines and an audible signaling device connectible therewith, a second electric circuit including a visual signaling device and means connected in series therewith for normally maintaining said audible signaling device in open circuit, and means connected in said first mentioned circuit and operable in response to an energization thereof for controlling an operation of said visual signaling device; said first mentioned means being operable upon a failure of current flow in said second mentioned circuit to connect said audible signaling device in said first mentioned circuit.

2. In a telephone system, a first electric circuit comprising telephone trunk lines and an audible signaling device connectible therewith, a second electric circuit including an incandescent lamp and means connected in series therewith for normally maintaining said audible signaling device in open circuit, and means connected in said first mentioned circuit and operable in response to an energization thereof for controlling an operation of said incandescent lamp; said first mentioned means being operable upon a failure of current flow in said second mentioned circuit to connect said audible signaling device in said first mentioned circuit.

3. In a telephone system, a first electric circuit comprising telephone trunk lines having a source of signaling current and an audible signaling device connectible therewith, a second electric circuit having a source of energy separate from that of said trunk lines and including a visual signaling device and means connected in series therewith for normally maintaining said audible device in open circuit but operable upon a failure of current flow therethrough to connect said audible signaling device in said first mentioned circuit, and means connected in said first mentioned circuit and operable in response to an energization thereof for controlling an operation of said visual signaling device.

4. In a telephone system, a first electric circuit comprising telephone trunk lines having a source of signaling current and an audible signaling device connectible therewith, a second electric circuit having a source of energy separate from that of said trunk lines and including an incandescent lamp and means connected in series therewith for normally maintaining said audible device in open circuit but operable upon a failure of current flow therethrough to connect said audible signaling device in said first mentioned circuit, and means connected in said first mentioned circuit and operable in response to an energization thereof for effecting an illumination of said lamp.

5. In a telephone system, a first electric circuit comprising telephone trunk lines having a source of signaling current and an audible signaling device connectible therewith, a second electric circuit having a source of energy separate from that of said trunk lines and including a visual signaling device and means connected in series therewith for normally maintaining said audible device in open circuit but operable upon a failure of current flow therethrough to connect said audible signaling device in said first mentioned circuit, and means connected in said first mentioned circuit and operable in response to an energization thereof for shunting said first mentioned means whereby an operation of said visual signaling device is effected.

6. In a telephone system, a first electric circuit comprising telephone trunk lines and an audible signaling device connectible therewith, a second electric circuit including a visual signaling device and means connected in a series circuit there-

with adapted to draw current of a magnitude insufficient to effect an operation of said visual signaling device, said device being operable to maintain said audible signaling device in open circuit but operable upon a failure of current flow in said second circuit to connect said audible signaling device in said first mentioned circuit, and means connected in said first mentioned circuit and operable in response to a flow of signaling current therein for effecting an operation of said visual signaling device.

7. In a telephone system, a first electric circuit comprising telephone trunk lines and an audible signaling device connectible therewith, a second electric circuit including an incandescent lamp and means connected in circuit therewith adapted normally to render said lamp extinguished and maintain said audible signaling device in open circuit, and means connected in said first mentioned circuit and operable in response to a flow of signaling current therein for effecting an illumination of said lamp; said first mentioned means being operable upon a failure of current flow in said second mentioned circuit to connect said audible signaling device in said first mentioned circuit.

8. In a telephone system, a first electric circuit comprising telephone trunk lines connected to a source of intermittent, signaling current and having an audible signaling device connectible therewith, a second electric circuit including a visual signaling device and means connected in circuit therewith adapted normally to maintain said audible signaling device in open circuit but operable upon a failure of current flow therethrough to connect said latter device in said first mentioned circuit, and means connected in said first mentioned circuit and operable in response to the flow of signaling current therein intermittently to shunt said first mentioned means whereby an intermittent operation of said visual signaling device is effected; the time required by said first mentioned means after deenergization to connect said audible signaling device in said first mentioned circuit being greater than that elapsing during a flow of signaling current.

9. In a telephone system, a first electric circuit comprising telephone trunk lines and an audible signaling device connectible therewith, a second electric circuit including a visual signaling device and means connected in series therewith for normally maintaining said audible signaling device in open circuit but operable upon a failure of current flow therethrough to connect said audible signaling device in said first mentioned circuit, means connected in said first mentioned circuit and operable in response to an energization thereof for controlling an operation of said visual signaling device and manually operable means for connecting said audible signaling means in said first mentioned circuit whereby a simultaneous audible and visual signal emission is effected in response to an energization of said first mentioned circuit.

10. In a telephone system comprising a subscriber's station, the combination with an audible signaling device and a visual signaling device, said visual signaling device being operatively associated with the telephone circuit and adapted to emit a visual signal when signaling current flows in said telephone circuit, of means connected in series with said visual device adapted operatively to associate said audible device with said circuit upon a failure of operation of said visual device.

11. In a telephone system comprising a subscriber's station, the combination with a bell and an incandescent lamp, said lamp being operatively associated with the telephone circuit and adapted to emit a visual signal when signaling current flows in said telephone circuit, of means connected in series with said lamp adapted operatively to associate said bell with said circuit upon a failure of illumination of said lamp when signaling current flows in said telephone circuit.

ANTHONY J. PARISSI.