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SUSTAINED ELECTRIC SIGNAL OPERATING DEVICE

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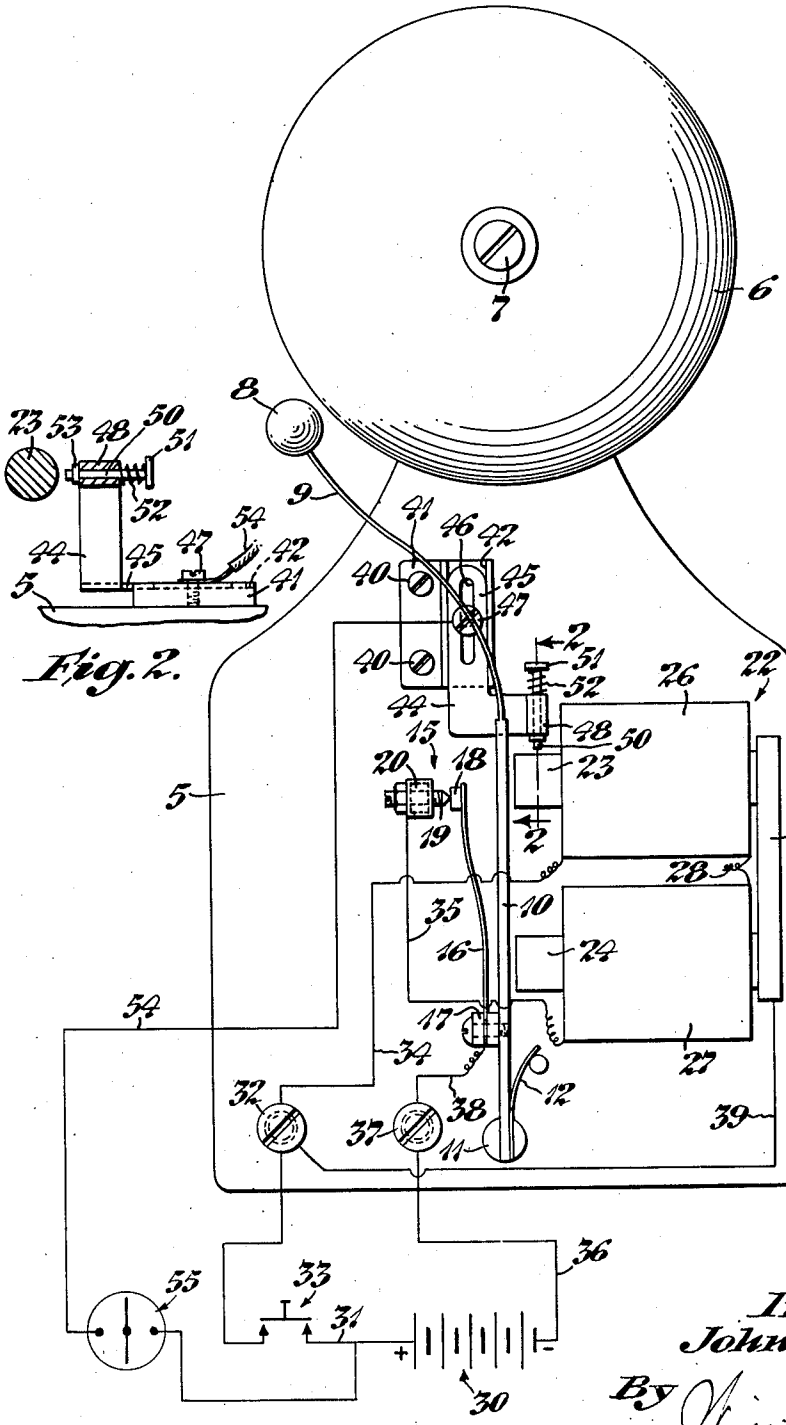


Fig. 2.

Fig. 1.

Inventor:
John W. Ritti

By William L. Hall
Attorney.

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SUSTAINED ELECTRIC SIGNAL OPERATING DEVICE

John W. Ritti, Los Angeles, Calif.

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6 Claims. (Cl. 177—7)

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My invention relates to electric signaling devices, such as electric bells, gongs, and other annunciators, and particularly to improvements in the controlling means therefor.

Electric signaling devices, such as those referred to above, usually consist of an electro-magnet which, when energized, operates a vibratory armature having a striker or hammer for striking the bell or gong, an electrical make-and-break means being provided for causing intermittent energization of the electro-magnet. It is customary to provide a switch in the circuit for the signal device, such switch usually being of the push-button type and adapted to maintain the circuit closed so long as its actuating button is held depressed. Such devices are used as door-bells for announcing the arrival of a visitor, and devices of the larger gong type are employed in industrial establishments as warning signals and to indicate various conditions. For example, when a person is to be called, the button switch is closed momentarily, and if the person being called does not respond to the call immediately, the button is repeatedly actuated in an effort to arouse that person. It often happens that the bell is located in a place which is particularly noisy, so that these short signals are not readily noticed, and to overcome such a condition various means have been devised for causing the bell to ring continuously, such means being controlled by the operator of the push-button switch. I have found that while it is desirable to provide means for effecting continuous operation of the bell, such means, to be practical, should be controlled by the person receiving the call, so that upon observing the signal he can discontinue the operation of the device. It is therefore an object of my invention to provide an electric signaling device which may be set to ring or buzz, either momentarily or continuously, at the will of the person to be alerted, so that if that person is not apt to hear short rings or buzzes for various reasons, he may initially control the device in a manner to cause it to produce later continuous signals. By this means, after the person has received the audible signal, he can open the circuit to avoid unnecessary or prolonged operation of the device. As a typical example of the utility of control means, if the bell or gong is located in a factory room, industrial garage, or other locality, which is subject to considerable noise, the bell circuit may be adjusted to ring continuously in response to a single momentary actuation of the usual push-button switch so that the signal will be more readily heard. Before answering the call, the bell circuit is deenergized by the person receiving the signal.

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Another object of the invention is to provide a device of the character referred to which, when initially and momentarily energized by the usual push-button switch, will operate continuously without the use of locking relays, secondary batteries, and the like.

Another object is to provide a device of the type indicated having a primary circuit provided with the usual push-button switch and a secondary circuit connected in parallel with the primary circuit, said secondary circuit including an electro-magnetically-operable circuit-closing means adapted, in response to momentary energization of the primary circuit by said switch, to close the secondary circuit, utilizing the core of the bell-operating electro-magnet as a conductor in the circuit, whereby to maintain the primary circuit and electro-magnet energized to effect continuous operation of the signaling device after the push-button switch is opened.

Another object is to provide a device of the type specified which is simple in construction, easy to operate, and one which embodies novel features which may be readily incorporated in existing signaling devices without alteration in their structure.

Further objects are set forth in the following specification, which describes a preferred construction and arrangement of the parts of the device, by way of example, as illustrated by the accompanying drawing.

In the drawing:

Fig. 1 is a front elevation of an electric bell constructed in accordance with my invention; and,

Fig. 2 is a cross-sectional view, taken on line 2—2 of Fig. 1, and illustrating the electro-magnetically-operated means for closing the secondary circuit for the device.

Referring to the drawing in detail, the electric bell therein shown is of a more or less conventional type, but embodying the novel improvements of my invention. The device comprises a metal base member 5 adapted to be secured to a wall, and having a bell element or gong 6 attached to one of its ends by a screw 7. The bell 6 is adapted to be intermittently struck by a hammer or striker 8 carried at the end of a resilient arm 9, which forms an extension of an armature 10. The armature 10 is pivoted at 11 to the base member 5, and normally is pivoted in one direction to engage the striker 8 with the bell under the influence of an electro-magnet, to be later

described, the armature being returned in the opposite direction by means of a spring 12. An electrical make-and-break means 15 is also provided, this means consisting of a spring plate 16 carried by the armature 10 and insulated therefrom by a block 17. The plate 16 has a contact 18 at its free end adapted to engage a contact screw 19 mounted in a boss 20 insulated from the base member 5. The device also includes an electro-magnet 22 having cores 23 and 24 connected by a strip 25, and each surrounded by an electric winding 26 and 27, respectively. The spring plate, contacts, and windings, referred to above, are connected in a conventional primary circuit, which is diagrammatically illustrated in Fig. 1. The circuit may be energized by the battery 30 herein shown, or by a suitable transformer. A line 31 leads from the plus side of the battery 30 to a terminal 32 insulated from the base member 5, and included in this line is a manually operable push-button switch 33, hereinafter referred to as the primary switch, which is located at a point remote from the bell. From the terminal 32, a line 34 leads to one magnetic winding 26 which is connected in series with the other winding 27 at 28. A wire 35 extends from the winding 27 to the contact screw 19. A line 36 leads from the minus side of the battery 30 to a terminal 37 insulated from the base, and a wire 38 connects this terminal and the spring plate 16. A wire 39 is connected between the strip 25 and the terminal 32.

It will be apparent from the above that when the switch 33 is closed the primary circuit is energized through wires 31, 36, post 37, wire 38, plate 16, contacts 18, 19, wires 35, 34, and post 32, and current will flow through the windings 26 and 27 to create a magnetic field which draws the armature 10 toward the cores 23 and 24 to cause the hammer 8 to strike the bell 6. At this juncture, the contacts 18 and 19 will separate to open the primary circuit and deenergize the electro-magnet 22, whereupon the spring 12 will act to swing the armature in the opposite direction to again close the circuit through the contacts 18 and 19, this intermittent operation effecting vibration of the armature and ringing of the bell 6 as long as the push-button switch 33 is held closed. Obviously, when the switch is opened, the operation of the bell is arrested.

The construction and operation of the electric signal device, as thus far described, is similar to conventional types of bells, gongs, and buzzers commonly employed to momentarily transmit an audible signal to a point remote from the operating switch. The present invention contemplates the provision of means for effecting continuous operation of the bell, even though the primary switch is opened, this means being as next described.

Secured to the base member 5 by screws 40 is a guide member 41 constructed from insulating material and formed with a guiding groove 42. A bracket 44 has a foot 45 adapted to slide in the groove 42 and provided with an elongated opening 46 for receiving a screw 47, which is screwed into the member 41 to secure the bracket in adjusted position. The bracket 44 projects upwardly from the foot 45 and has a bearing 48 at its upper end for receiving a soft iron plunger 50 which is slidable therein. One end of the plunger 50 is disposed in close proximity to the core 23 of the electro-magnet 22 while its other end has a head 51. Surrounding the plunger 50, between its head 51 and the side of the bearing 48, is a spring 52 normally operative to move the plunger in a direction to withdraw it from the core 23, a stop shoulder 53 on the plunger serving to limit such movement.

A line 54 is connected between the wire 31 and the screw 47 of the bracket 44, and included in the line is a manually operable snap-switch 55. The line 54 and switch 55 form part of a secondary circuit which, when the electro-magnet 22 is energized, acts to draw the plunger 50 into contact with the core 23, thereby causing current to flow from the plus side of the battery 30 through the line 54 to the bracket 44, plunger 50, core 23, strip 25, and wire 39 to the terminal 32, from which point the current flows through the wire 34 of the primary circuit to cause continuous intermittent energization of the electro-magnet 22 and vibration of the armature 10. The secondary switch 55 is located near the bell and thus remote from the primary switch 33.

Assuming that it is desirable to change the device from one of a momentary ringing type to one of a character capable of effecting continuous ringing, it is only necessary for the person located in the room or area where the bell is disposed to close the secondary snap-switch 55. The secondary circuit thus is closed as far as the plunger 50, which, due to the action of the spring 52, is held out of engagement with the core 23. The button of the primary switch 33 is then depressed and may be immediately released. During the period in which the switch 33 is temporarily closed, the windings 26 and 27 are energized to create a magnetic field which tends to draw the plunger 50 into engagement with the core 23. Upon engagement of the plunger 50 with the core 23, the secondary circuit, which is connected in parallel with the primary circuit, is completely closed, it being noted that the current flows through the core 23, strip 25, and line 39 to the terminal 32, from which point it flows to and through the windings 26 and 27, by way of the line 34, to continuously operate the bell, even though the primary switch is open. In other words, the secondary circuit, which is shunted around the primary switch 33, takes over the energization of the bell-operating electro-magnet 22, and because the snap-switch 55 remains closed the bell continues its operation. When it is desirable to disrupt the operation of the signal device, the secondary switch 55 is opened by the person to whom the signal was directed to deenergize the electro-magnet, and when the magnetic field is thus broken, the spring 52 restores the plunger to the initial inoperative position, shown in the drawing. The secondary switch 55 may be opened and then closed immediately, if desired, to reset the bell circuit for a subsequent continuous operation.

While the present invention is herein shown as embodied in an electric signaling device, it will be apparent that the improved controlling means, that is, the means for maintaining a first normally temporarily closed circuit closed by means of a second parallel circuit including the core of the electro-magnet of the first circuit and a plunger operated by the core may be incorporated in other types of electric vibrator devices, and the secondary switch may be disposed either close to or remote from the primary switch.

If, for any reason, it becomes desirable or necessary to limit the operation of the signaling device to temporary ringing, as in conventional electric bells, it is only necessary to loosen the screw 47 and slide the bracket 44 in a direction

to remove the tip end of the plunger **50** from the magnetic field of the core **23**, thereby rendering the control means **55**, **54**, **44**, **50**, etc., inoperative.

It will be observed from the foregoing that my invention provides a simple yet highly efficient and practical means for controlling the operation of electric signaling and analogous electrical devices. By means of the invention, the usual armature-vibrating circuit may be maintained closed indefinitely. As a feature of the invention, the electrical device may be cause to operate either temporarily or conitnuously by the simple act of closing and opening a secondary switch. Another important feature resides in the fact that the core of the usual electro-magnet is utilized for maintaining the usual circuit closed after the latter has been once energized, such an arrangement being broadly novel, so far as I am aware.

While I have herein shown and described the control means, as embodied in a preferred form of construction and applied to use in a particular maner, by way of example, it will be obvious that various modifications may be made therein without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. An electric signaling device, comprising: a bell element; a vibratory armature adapted to strike said bell element; a primary electric circuit including a manually-operable primary switch and an electro-magnet having a core and a winding, said electro-magnet being energized, upon closing of said primary circuit in response to closing of said primary switch, to actuate said armature; electrical make-and-break means in said primary circuit for effecting intermittent energization of said electro-magnet; a secondary electric circuit connected in parallel with said primary circuit and including a manually-operable secondary switch for selectively closing and opening said secondary circuit; and electromagnetically-operable means included in said secondary circuit and operable, in response to energization of said winding by said primary circuit and after said secondary switch is closed, to contact said core to complete said secondary circuit through said core, said secondary circuit being connected to said primary circuit in such a manner that said winding remains intermittently energized to effect continuous vibration of said armature after said primary switch is opened and until said secondary switch is subsequently opened.

2. An electric signaling device, comprising: a bell element; a vibratory armature adapted to strike said bell element; a primary electric circuit including a manually-operable primary switch and an electro-magnet having a core and a winding, said electro-magnet being energized, upon closing of said primary circuit in response to closing of said primary switch, to actuate said armature; electrical make-and-break means in said primary circuit for effecting intermittent energization of said electro-magnet; a secondary electric circuit connected in parallel with said primary circuit and including a manually-operable secondary switch for selectively closing and opening said secondary circuit; and an electromagnetically-operable plunger included in said secondary circuit and operable, in response to energization of said winding by said primary circuit and after said secondary switch is closed, to contact said core to complete said secondary

circuit through said core, said secondary circuit being connected to said primary circuit so that flow of current through said core energizes said primary circuit to effect continuous vibration of said armature after said primary switch is opened and until said secondary switch is subsequently opened.

3. An electric signaling device, comprising: a base; a bell element mounted on said base; a vibratory armature pivoted on said base and adapted to strike said element; an electro-magnet on said base and having a core and a winding, said electro-magnet being adapted to actuate said armature; a primary electric circuit for energizing said winding, said circuit including a primary manually-operable switch; electrical make-and-break means on said base and included in said primary circuit, said means being adapted to effect intermittent energization of said winding; an insulating plate mounted on said base; a bracket adjustably connected to said plate, said bracket including a bearing; a plunger slidable in said bearing and having an end disposed within the magnetic field of said electro-magnet and adapted to be attracted thereby into engagement with said core when said primary circuit is closed; spring means for withdrawing said plunger from engagement with said core upon deenergization of said electro-magnet; a secondary electric circuit connected in parallel with said primary circuit and including a secondary manually-operable switch for selectively closing and opening said secondary circuit, said secondary circuit including said bracket, said plunger, and said core, and connected to said primary circuit in such a manner that, when said secondary switch is closed, said winding remains intermittently energized to effect continuous vibration of said armature after said primary switch is opened and until said secondary switch is subsequently opened.

4. An electric signaling device as defined in claim 1, in which said primary switch is located at a point remote from said bell element, electro-magnet, and armature, and in which said secondary switch is located relatively close to said bell element, electro-magnet, and armature.

5. An electrical device for vibrating an object, comprising: a vibratory armature operatively connected to the object; a primary circuit including a manually-operable primary switch and an electro-magnet having a core and a winding, said electro-magnet being energized, upon closing of said primary circuit in response to closing of said primary switch, to actuate said armature; electrical make-and-break means in said primary circuit for effecting intermittent energization of said electro-magnet; a secondary electric circuit connected in parallel with said primary circuit and including a manually-operable secondary switch for selectively closing and opening said secondary circuit; and an electro-magnetically-operable plunger included in said secondary circuit and operable, in response to energization of said winding by said primary circuit and after said secondary switch is closed, to contact said core to complete said secondary circuit through said core, said secondary circuit being connected to said primary circuit in such a manner that said winding remains intermittently energized to effect continuous vibration of said armature after said primary switch is opened and until said secondary switch is subsequently opened.

6. In combination with an electrical device

having a vibratory armature, an electro-magnet for vibrating the armature and a primary circuit including a primary switch for momentarily energizing the electro-magnet; a secondary circuit connected in parallel with the primary circuit and including a secondary switch, said secondary circuit also including a core of said electro-magnet; and a movable plunger included in said secondary circuit and adapted to be moved into contact with said core, upon energization of said electro-magnet by the closing of said primary switch, to complete said secondary circuit and to maintain said electro-magnet energized as long as said secondary switch remains closed.

JOHN W. RITTI.

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