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SIGNALING DEVICE

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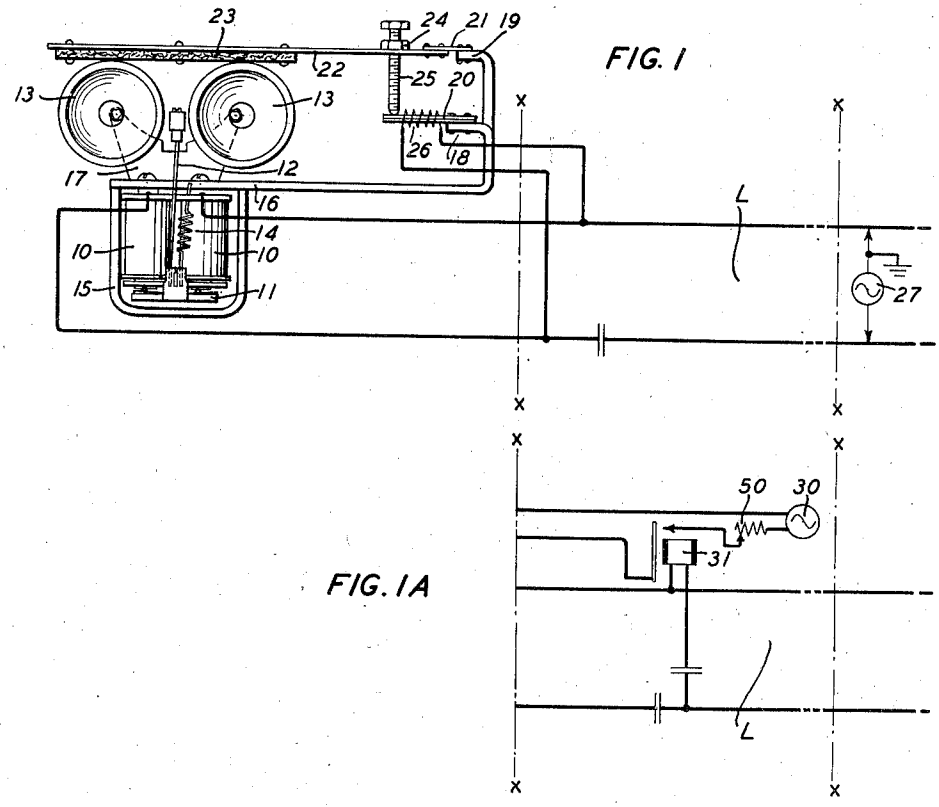

FIG. 1

FIG. 1A

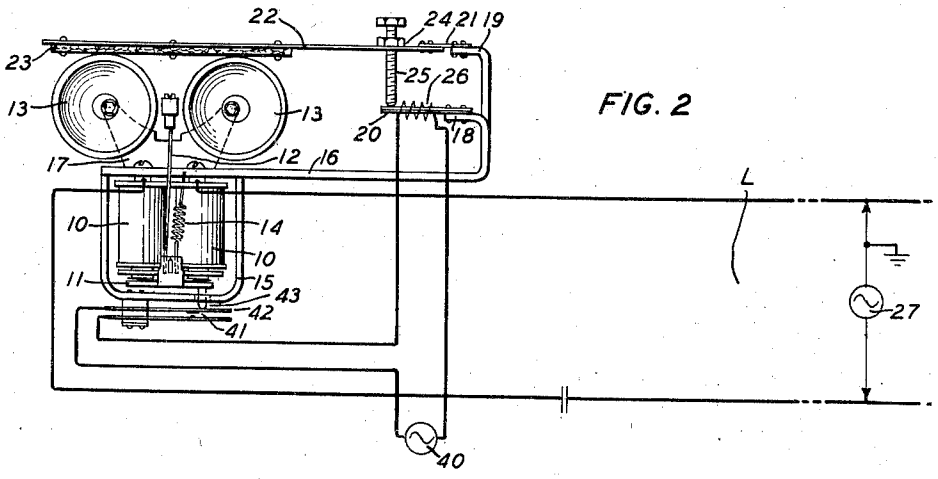

FIG. 2

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SIGNALING DEVICE

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8 Claims. (Cl. 177—7)

This invention relates to audible signals such as telephone signals located at subscribers' stations and particularly to damping devices for use with telephone ringers.

It is the object of this invention to provide a subdued audible ringing signal at a location, such as a telephone subscriber's station, which increases gradually in sound intensity until the signal is answered.

It is desirable, in accordance with the practice of telephone operating companies, to provide the telephone subscriber with a ringing signal of such sound intensity as to be readily heard by the subscriber when located at a reasonably great distance from the signal device. In obtaining this desideratum it has been found that the telephone ringers in present day usage emit a signal of such sound intensity as to be startling to the subscriber when situated close to the signal or when the telephone is located in a small confined area such as a private office. Devices, such as gong dampers or sound resonators, which have been developed heretofore to overcome the harshness of the telephone signal have been found to render the signal inaudible to the subscriber located at a distance from the signal when a telephone call arrives at the subscriber's station.

In accordance with a feature of the present invention the objectionable characteristics of the present day telephone ringer are overcome by providing a ringing signal of variable intensity which, during the beginning of the ringing signal gives forth a subdued pleasant sound, the intensity of which gradually increases until a signal of maximum intensity is obtained. More specifically, the telephone ringer is normally damped so that when first actuated it emits a subdued pleasant sound. Continued application of ringing current to the telephone line causes the heating of a bimetallic heater element which functions to gradually lessen the damping of the signal and to ultimately render the signal undamped so that a variable signal, ranging from a soft pleasant sound to a clear undamped audible signal, is obtained.

Another feature of the invention resides in connecting the heater element in circuit relation with the telephone line so that the ringing current is utilized both to actuate the signal and to control the damping device.

These and other features of the invention will be readily understood from the following detailed description made with reference to the accompanying drawing in which:

Fig. 1 is a side elevation of the ringer and damping mechanism and a schematic circuit representation illustrating one method of controlling the damping device;

Fig. 1A is a fragmentary circuit representation illustrating a modification of the control method shown in Fig. 1; and

Fig. 2 is a representation similar to that shown in Fig. 1 and in which a further modification of the control method is shown.

In Fig. 1 there is shown a well-known type of audible signal, such as a telephone ringer, comprising coils 10, armature 11, clapper 12, gongs 13, armature restoring spring 14, yoke piece 15, cross-bar 16 and mounting bracket 17. These elements and the manner in which they cooperate to produce an operative ringer structure are well known to those skilled in the art so that a detailed description thereof is believed unnecessary.

The cross-bar 16 is extended to the right and given a bracket-like formation so as to provide seats 18 and 19. Mounted on the seat 18, in any suitable manner, is a thermostatic element 20 consisting of two strips of dissimilar metals, which when subjected to heat moves its free end upwards. Secured to the seat 19 is a reed type hinge 21 to which a metal rod or strip 22 is secured in such a position as to overhang the ringer gongs 13. On the underside of the strip 22 immediately over the ringer gongs, a pad 23 of felt or other similar material is secured in any suitable manner. A nut 24 carried on the strip 22 near its hinged end accommodates an adjusting screw 25, the free end of which is in engagement with the bimetallic strip 20 near its outer end.

The strip 22 and its associated felt pad 23 constitute a damper for the gongs 13. The screw 25 is normally adjusted to maintain the damper in contact with the gongs 13 when the bimetallic strip 20 is in its normal unheated condition with sufficient pressure to insure a subdued signal tone when the coils 10 of the ringer are energized and the clapper rod 12 actuated.

The ringer coils 10 are shown bridged across the line L, which may be a telephone line circuit. Also connected across the line L in parallel with the ringer coils is a heater coil 26 which is wound around the thermostat 20. At 27 is shown a source of signaling current which, in telephone practice, is located at a central office and which is connected to the line by an operator, in the case of a manual system, or automatically in an automatic system, to cause the actuation of the ringer at a subscriber's station as a ringing signal.

Application of current from source 27 to the

line L causes current to traverse the ringer coils 10 and the heater coil 26. The ringer accordingly functions and due to the close association of the damper and gongs a subdued pleasant tone emanates from the gongs 13. As the current traverses the heater coil 26 the thermostat 20 heats up and causes a gradual upward movement of the adjusting screw 25 which gradually relieves the pressure between the felt pad 23 and the gongs 13 causing the sound intensity of the signal to increase gradually. Continued heating of the thermostat ultimately causes the disengagement of the damper from the gongs so that the ringer gives forth a clear undamped signal of maximum sound intensity.

When the ringing current is cut off from the line, either at the central office or as a consequence of the called subscriber removing the receiver from its switchhook, in accordance with well-known practice, the coils 10 and 26 are deenergized. The signal is accordingly silenced and as the thermostat 20 cools and returns to its normal position the damper again contacts the gongs 13.

The arrangement disclosed in Fig. 1A provides a local source of energy 30 for heating the thermostat 20. Application of ringing current to the line L from the source 27 causes the operation of relay 31 which, at its armature and front contacts connects the source 30 to the heater winding 26. The source of current 30 may be either alternating current or direct current. A variable resistance 50 is included in series with the current source 30 in order to permit the subscriber to readily adjust the time during which the gongs are damped.

Fig. 2 shows an arrangement for supplying a local supply of low voltage alternating current 40 (or direct current) for the heater coil 26 under control of an auxiliary contact 41 on the ringer mechanism. In this modification, when ringing current from the source 27 causes the operation of the ringer, the armature 11, which is in contact with the upper spring 42 through the medium of stud 43, vibrates and causes the rapid repeated closure of contacts 41 which connects the source 40 to the heater coil 26.

In each of the embodiments disclosed the ringing signal received at the subscriber's station is highly damped for a period of time depending on the design of the bimetallic strip 20 and its power supply. When enough heat has been stored in the heater element, mechanical movement thereof removes the damping mechanism and the signal increases in sound intensity until no damping at all is provided.

Though the invention is disclosed as particularly applicable to the audible signaling devices employed at telephone subscribers' stations, it is to be understood that it may be employed in any signaling system utilizing an audible signaling device.

What is claimed is:

1. In combination, a line circuit, an audible signal associated therewith, damping means for said signal, and means responsive to signaling current on said line for actuating said signal and for progressively rendering the damping effect of said damping means ineffective.

2. In combination, a line circuit, a source of signaling current, a ringer associated with said line and responsive to current from said source in producing an audible signal, damping means associated with the gongs of said ringer for controlling the sound intensity of the signal produced by said ringer, and other means responsive to current from said source for progressively removing said damping means from said gongs whereby said ringer emits a sound signal of progressively varying intensity.

3. In combination, a line circuit, a source of signaling current, a ringer associated with said line and adapted to be actuated by current from said source, a damping device normally tensioned against the gongs of said ringer, and means responsive to a prolonged application of current from said source to said line for gradually relieving the tension on said damping device and ultimately disengaging said damping device from the gongs of said ringer.

4. In combination, a line circuit, a source of signaling current, a ringer associated with said line having a clapper controlling armature and a pair of gongs, said ringer operating in response to an application of current from said source to said line to cause the clapper to strike the gongs thereof, damping means for the gongs of said ringer, thermostatic means controlling said damping means, a second source of current, and means controlled by the armature of said ringer for connecting said second source of current to said thermostatic means upon the application of current from said first source to said line to progressively actuate said damping means.

5. In combination, a line circuit, a normally damped audible signal associated therewith and operating upon the application of signaling current thereto, and means responsive to signaling current on said line for progressively diminishing the damped condition of said signal, said means functioning automatically upon the cessation of signaling current on said line to restore said signal to its normal damped condition.

6. In combination, a line circuit, a source of signaling current, a ringer associated with said line, a damping device normally tensioned against the gongs of said ringer, and means responsive to the application of current from said source to said line for operating said ringer, and means also responsive to the application of current from said source to said line for gradually relieving the tension on said damping device and ultimately disengaging said damping device from the gongs of said ringer, said means also functioning upon the cessation of current from said source to restore said damping device to its normal position against the gongs of said ringer.

7. In combination, a line circuit, a source of signaling current, an audible signal associated with said line and adapted to be actuated by current from said source, a damping device for said signal, a thermostatic control for said damping device and means comprising a heater winding connected across said line responsive to the application of current from said source to cause said thermostatic control to progressively actuate said damping device and correspondingly increase the sound intensity of said signal.

8. In combination, a line circuit, a source of signaling current, an audible signaling device operating on current from said source, a damping device normally tensioned against said device, means responsive to the application of signaling current from said source to said line for a predetermined period of time for disengaging said damping means from said device and means for controlling the damped period of said device.

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