Dec. 17, 1940. R. S. EDWARDS 2,225,558

SIGNALING DEVICE

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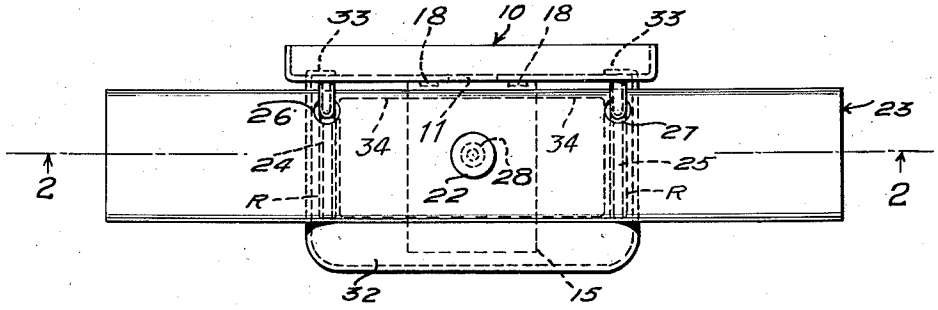


Fig. 1.

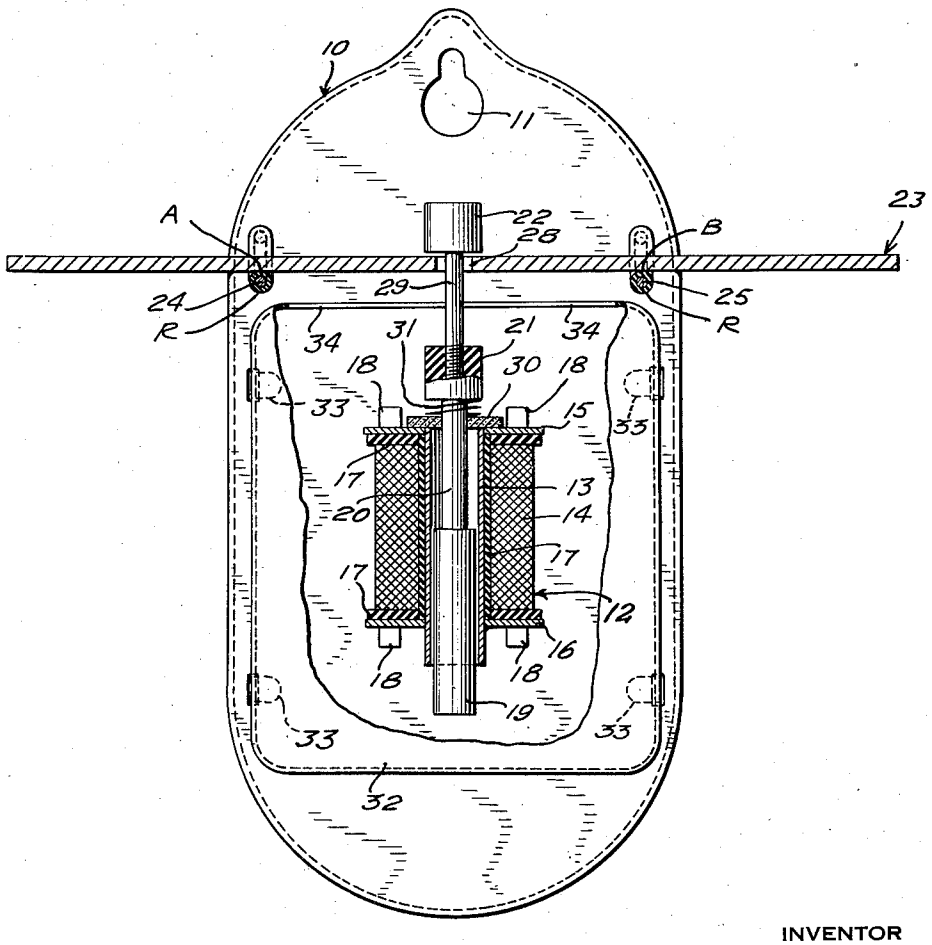


Fig. 2.

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SIGNALING DEVICE

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8 Claims. (Cl. 177—7)

This invention relates to electrical audible signaling devices, more particularly of the kind that are push button controlled, such as for permitting a caller at the door to announce himself.

One of the objects of this invention is to provide a musical signaling device that will be simple and inexpensive in construction and that will overcome in a thoroughly practical and simple way certain shortcomings of signaling devices of this general character as heretofore known and used. Another object is to provide a practical audible signaling device capable of repeating a pleasant tone or sound for a single electrical energization with a sufficient time interval interposed to avoid detracting from good tonal quality. Another object is to provide an electrically actuated chime signaling device that will permit of repetition of the striking of the chime or sounding member with mechanism that will be simple and inexpensive and that will dependably overcome the disadvantages of one-stroke devices heretofore known.

Another object is to provide an audible signaling device of the above-mentioned character in which improved results and action are achieved without costly structural features or complications. Another object is to provide a device of the above-mentioned character in which the individual parts are simple and inexpensive to manufacture and may be quickly and dependably assembled. Another object is to provide a signaling device capable of striking the sounding element more than once and that will be compact in construction and dependable in action. Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which is shown one of the various possible embodiments of my invention;

Figure 1 is a plan view, and

Figure 2 is a vertical sectional view as seen along the line 2—2 of Figure 1, certain parts, however, being shown in elevation and broken away.

Similar reference characters refer to similar parts throughout the several views of the drawing.

Referring to the drawing I provide a suitable base or support 10 preferably in the form of a sheet metal stamping, suitably flanged rearwardly, and provided with appropriate means for securing or mounting it onto a support, such as a wall or the like, as by way of the hole 11 to engage over a screw or nail to permit the device to be hung in position. To the front side of the base 10 is positioned a solenoid structure 12 and it is preferably secured to the base 10. The solenoid structure 12 may comprise a tube 13, preferably of a non-magnetic metal like brass, about which extends or is wound an energizing winding 14, terminals of which lead to suitable binding posts (not shown), or the like, whereby the winding may be connected to an appropriate circuit, usually of low voltage, to be energized as, for example, when a push button switch controlling the circuit is actuated.

Adjacent the ends of the tube 13 are provided sheet metal end plates 15, 16, preferably secured to the tube 13, in any suitable manner, the winding 14 being insulated from the metal parts 15, 13 and 16 in any suitable way, as by the insulating members 17. The solenoid structure thus forms a compact unit ready to be secured in position and where it is to be secured to the base plate 10, I may provide the end sheet metal members 15 and 16 with ears or lugs 18 for connection to the base 10, in any suitable manner, as by spot welding, it being noted that the mounting of the solenoid structure 12, in the illustrative example, is such that its axis is vertical.

Within the solenoid tube 13 is the core 19, of a suitable magnetic material like steel, and it has a length preferably about the same as the axial length of the winding 14, fitting in the tube 13 relatively loosely so that sliding relative to the latter may freely take place without substantial friction.

Its upper end is provided with a shank or extension 20 of suitable length and along the axis of the core 19 are arranged, in spaced relation, two striker heads 21 and 22, preferably in dumb-bell-like fashion and preferably at the end of the shank or extension 20. The extension 20 may be and preferably is of a non-magnetic material like brass.

The sounding element may take any suitable form and preferably and illustratively is in the form of a metal chime plate 23 of suitable length and breadth and material to give the desired pitch or note when set into vibration. It may, for example, be metallic. This plate I preferably suspend transversely of the axis of the solenoid core 19 and preferably also so that that axis intersects the plate, preferably midway between two nodal points.

In the illustrative embodiment the member 23

has two nodes along transverse lines at points A and B and the axis of core 19 is in a plane that intersects the sounding element 23 midway between the nodes A and B. Preferably, also, it is at the nodes A and B that the bar-like sounding element 23 is supported or suspended in any suitable way.

This support may comprise two small rods or wire-like members 24 and 25 covered with a suitable yielding non-metallic material, such as rubber tubing R, and suitably secured to the base or support 10, to form rests on which the member 23 may be engaged at the nodes A and B. Any suitable means may be employed to hold the member 23 against displacement and illustratively and conveniently such means may comprise apertures 26 and 27 along the inner longitudinal edge of the member 23 and through which the supporting members 24 and 25 pass from underneath the member 23, being appropriately bent. The apertures 26 and 27 are preferably somewhat larger than the rubber tubing R. Also, by this mounting the sounding element 23 can be easily assembled to its supports 24 and 25, simply by holding it with its plane transverse to the supports and sliding it along the latter so they enter through the apertures 26 and 27, whence the plate 23 is then swung downwardly to bring the short vertical bent portion of the supports into the apertures 26 and 27.

The preferred arrangement for making the striker heads 21 and 22 operative upon the sounding element 23 is like that shown in the drawing. Substantially at the midpoint between the rods A and B, I provide a hole or aperture 28 in the sounding element 23 and preferably this hole is also positioned on the longitudinal center line of the plate 23. The heads 21 and 22 are spaced along a rod-like extension 29 which passes through the hole 28, the latter being materially larger than the former, so that up and down movement of the member 29 is free from engagement with the sounding element 23. Thus, head 22 is positioned to one side of the sounding element 23 and head 21 to the other side.

Interposed between the head 21 and a suitable stationary part of the device, such as the upper end plate member 15 of the solenoid structure 12, I provide suitable cushioning or resilient means that preferably comprises a washer 30 of felt, or the like, and a spiral helical spring 31, so proportioned and tensioned that, with only the weight of the moving parts to be sustained, the upper head 22 just about clears the upper face of the sounding element 23. The parts are so proportioned that, with the just stated relationship, the core 19 is at rest or positioned to one side, downwardly (as seen in Figure 2) of the magnetic center of the winding 14.

A casing-like cover 32 may be provided to close over the solenoid and related parts, and cover 32 may be in the form of a sheet metal stamping provided with ears 33 that pass through suitable slots in the supporting plate 10 and that are bent over on the rear face of the member 10. The upper end wall of the cover 32 may be cut out as at 34 so as to expose to the interior of the enclosure a substantial area of the sounding element 23, thus also not interfering with the location and path of movement of the parts actuated by the solenoid core 19.

If the winding 14 is now energized, the magnetic field produced thereby quickly draws the core 19 upwardly and its velocity and force of movement are sufficient to cause the lower striker head 21 to give the sounding element 23 an energetic blow, setting the element into vibration and causing it to emit its inherent pitch or note. If the energization of winding 14 is of very short duration, the movable parts are gravity-actuated in reverse direction and, being of sufficient mass or weight, acquire sufficient velocity or momentum now to cause the upper striker head 22 to strike the sounding element 23, causing it again to emit an accentuated or loud volume note or tone, spring 31 being compressed during this retrograde stroke and, upon the dissipation of the energy of movement in the blow of head 22 on the plate 23, spring 31 then expands promptly to lift the moving parts and hence to lift the striker head 22 above and out of contact with the sounding element 23 so that the second note of the latter is not dampened.

If, however, the energization of winding 14 is of substantial duration, as, for example, if the push button switch is held depressed for several seconds or so, the first blow is struck as above described but complete retrograde movement of the moving parts is prevented because of the continued presence of the magnetic field or flux of the winding 14 which acts to hold the core 19 in mid position but still in substantially raised position. When the energization ceases, as by release of the push button switch or other interruption of the circuit, the holding action of the winding 14 ceases, and the core 19 with its related parts is actuated downwardly by gravity, whence the second blow is delivered to the sounding element 23, now by the striker head 22, much in the same manner as above described.

With the above-described arrangement, the sounding element, where it is in the form of a bar or plate, is struck each time midway between nodes, thus insuring maximum amplitude of vibration and maximum sound. Though the sounding element is apertured for the passage therethrough of the element that connects the two heads, quality and quantity of sound production are not interfered with. Where the mounting of the sounding element 23 employs apertures, like the apertures 26 and 27, at the nodes, the provision of an aperture 28 at the midpoint balances the increased bendability or elasticity of the member 23 at those nodes, by providing a commensurate increased bendability or elasticity intermediate of the nodes. Thus, for a given thickness and other characteristics of the member 23, greater amplitude of vibration results and greater sound and increased efficiency.

A preferred construction and method of assembly of the parts is like that shown in the drawing where the striker head 21 is secured in any suitable way to the rod extension 20 of the core 19 and the rod 29 and striker head 22 are preferably assembled as a unit separate and distinct from the rest of the apparatus. Accordingly, the cover 32 is put in place and the sounding element 23 mounted, all, however, without the unit that comprises the rod 29 and striker head 22. After such assembly this unit is assembled to the rest, the rod 29 being passed through the hole 28 and its lower end secured to the head 21, preferably by threading them together, the head 21 being provided with a threaded hole and the lower end of the rod 29 being threaded to enter the threaded hole, as shown. The striker heads may be made of any suitable non-metallic material, such as fiber, hard rubber, or the like, the material of which lends itself not only to threading but also provides a

certain degree of yieldability whereby the threading together of the metal and non-metallic parts may be achieved with tightness and security.

Thus, it will be seen that there has been provided in this invention a signaling device in which the several objects above noted, together with many thoroughly practical advantages, are successfully achieved.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore set forth, or shown in the accompanying drawing, is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. A signaling device comprising a sounding element in the form of an elongated plate or bar having apertures at at least two nodal points and means coacting with said apertures for supporting said element for sound-emitting vibration, said element having an aperture substantially midway between said nodal points, two striker elements, one on each side of said sounding element and connected together by means passing through said aperture at said midpoint, said sounding element extending substantially horizontally, a solenoid winding having a movable core connected to said striker elements to effect movement of the latter upwardly upon energization of said winding, thereby to cause the lower of said striker elements to give said sounding element a blow and to raise the upper of said striker elements above said sounding element, retrograde movement of said core under its own weight effecting downward movement of said striker elements to cause the upper one to strike said sounding element, and resilient means compressible upon downward movement of said striker elements to permit said upper one to impact said sounding element and under its resiliency to cause a sufficient upward movement of said striker elements to remove said upper one from contact with said striker element so as not to dampen the vibration thereof.

2. A signaling device comprising a sounding element in the form of an elongated plate or bar, means supporting said sounding element for sound-emitting vibration, said sounding element having therein an aperture substantially midway between two nodal points therein, two striker elements, one on each side of said sounding element and connected together by means passing through said aperture at said midpoint, said sounding element extending substantially horizontally, a solenoid winding having a movable core connected to said striker elements to effect movement of the latter upwardly upon energization of said winding, thereby to cause the lower of said striker elements to give said sounding elemount a blow and to raise the upper of said striker elements above said sounding element, retrograde movement of said core under its own weight effecting downward movement of said striker elements to cause the upper one to strike said sounding element, and spring means coacting with said striker elements and core to hold them, when at rest, in such position that said upper striker element is just above and out of contact with said sounding element, whereby upon said downward movement taking place, said spring means is compressed sufficiently to permit said upper striker element to strike said sounding element and upon expansion thereafter move said upper striker element out of contact with said sounding element.

3. A signaling device comprising a sounding element in the form of an elongated plate or bar, means supporting said sounding element for sound-emitting vibration, said sounding element having therein an aperture substantially midway between two nodal points therein, two striker elements, one on each side of said sounding element and connected together by means passing through said aperture at said midpoint, means mounting said connected striker elements for to and fro movement to bring first one striker element into striking engagement with said sounding element and then the other, operating means for effecting a cycle of to and fro strokes, and means effective at the end of the last stroke to move and hold said striker elements into a position to bring that striker element last to strike the sounding element out of engagement with the latter, thereby to avoid damping action thereon.

4. A signaling device comprising a sounding element in the form of an elongated plate or bar, means supporting said sounding element for sound-emitting vibration, said sounding element having therein an aperture substantially midway between two nodal points therein, two striker elements, one on each side of said sounding element and connected together by means passing through said aperture at said midpoint, means normally effective to move and hold said connected striker elements in a position in which one of said striker elements is closed to but out of contact with said sounding element, thereby to position the other striker element relatively remotely from said sounding element and in readiness for movement toward it to strike it, and controllable means for overcoming said last-mentioned means to move said connected striker elements in a direction to cause said other striker element to strike said sounding element and thereafter to permit said means to give said connected striker elements a retrograde movement to cause said one striker element to strike said sounding element.

5. A signaling device comprising a sounding element in the form of an elongated plate or bar, means supporting said sounding element for sound-emitting vibration, said sounding element having therein an aperture substantially midway between two nodal points therein, two striker elements, one on each side of said sounding element and connected together by means passing through said aperture at said midpoint, and means including electromagnetic means for effecting to and fro strokes of movement of said connected striker elements to cause the latter successively to strike said sounding element.

6. A signaling device comprising a sounding element capable of sound-emitting vibration, means supporting said sounding element to permit it to vibrate for sound emission, said sounding element having therein an aperture at a location therein suitable for said element to receive a vibration-producing blow, two striker elements, one on each side of said sounding element and connected together by means passing through said aperture, and means including an energizable winding and means movable thereby for effecting to and fro strokes of movement of said connected striker elements to bring first one of the latter and then the other into striking engagement with said element.

7. A signaling device comprising a casing having mounted therein actuating means having a

movable part, said movable part carrying a striker and said casing having an aperture to permit said movable part, upon one stroke of its movement, to project said striker through said aperture, a sounding element mounted externally of said casing and having therein a hole juxtaposed to said casing aperture, whereby said striker upon actuation may strike said sounding element upon said one stroke of movement, a second striker, and means passing through said hole and said aperture for connecting said second striker to said first striker whereby upon retrograde stroke of said movable part said second striker strikes said sounding element.

8. A signaling device comprising a sounding element adapted to be set into sound emitting vibration when struck, two strikers one on each side of said sounding element and having means mechanically connecting them together and spaced from each other by a substantial distance so that one striker is effective to strike said sounding element from one side thereof upon a substantial range of movement in one direction of said means and the other is effective to strike it upon the other side upon a substantial range of movement of said means in reverse direction, and a solenoid having a winding and a movable core, the latter having mechanical connection with said two spaced connected strikers, and capable, upon energization of said winding, of effecting movement of said core and of said spaced strikers throughout a distance at least as great as the spacing between said two strikers and in one direction, thereby to cause one of said strikers to give said sounding element a blow and to position the other of said strikers spaced from said sounding element, means effective upon deenergization of said winding to effect retrograde movement of said core and two spaced strikers to cause said other striker to give said sounding element a blow, and spring means coacting with said striker elements and core to hold them, when at rest, in such position that said other striker is held spaced from and out of contact with said sounding element whereby, upon said retrograde movement taking place, said spring means is compressed sufficiently to permit said other striker element to strike said sounding element and upon expansion of said spring means thereafter move said other striker out of contact with said sounding element and thereby to avoid damping action thereon.

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