

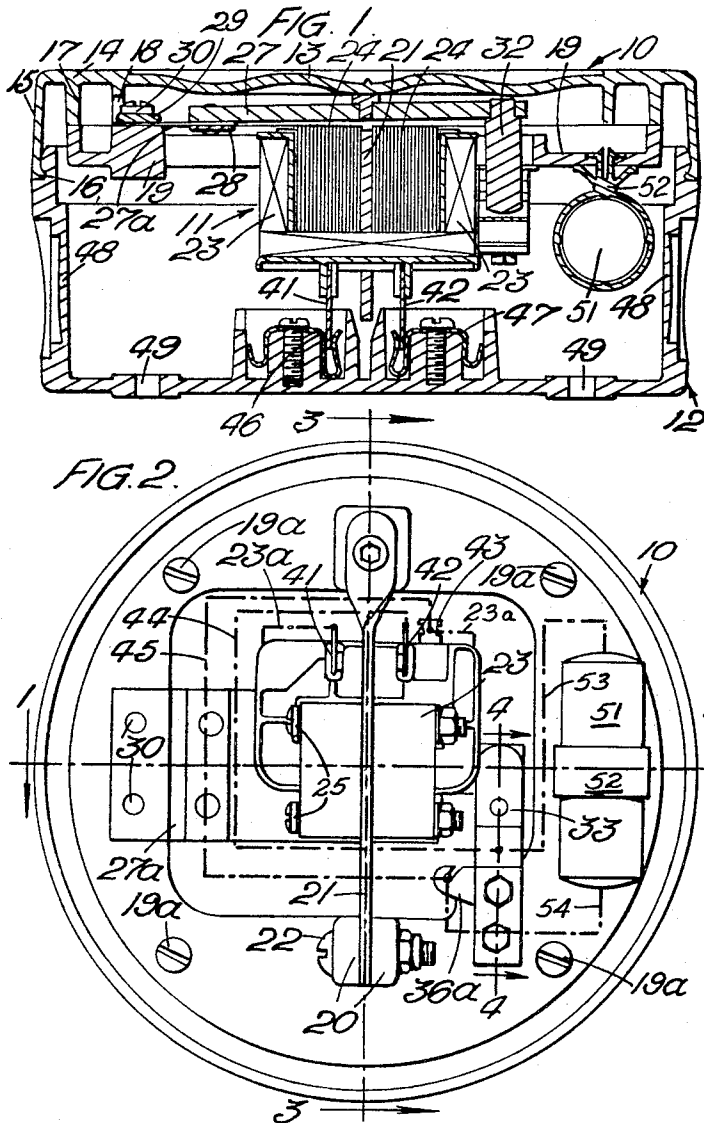
Oct. 29, 1968

J. DOGGART ET AL
SOUND SIGNALLING DEVICE HAVING DIAPHRAGM
AND STRIKER APPARATUS

3,408,645

Filed Oct. 7, 1965

2 Sheets-Sheet 1



INVENTORS
JOHN DOGGART
GEOFFREY ROY LAWTON
BY
Baron & Thomas
ATTORNEYS

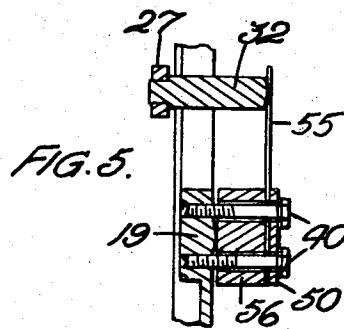
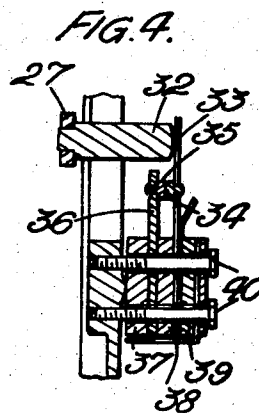
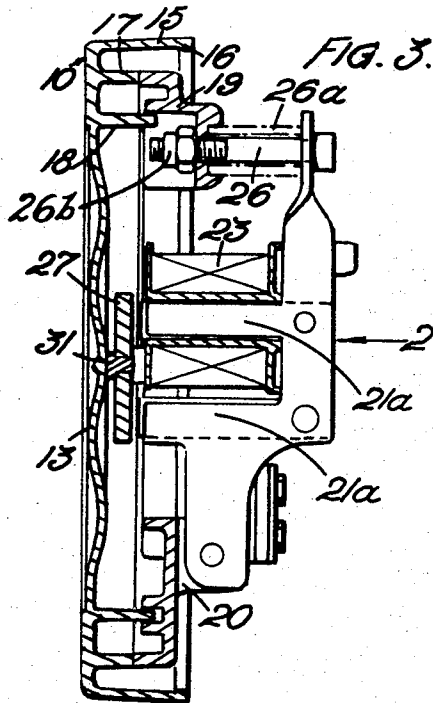
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GEOFFREY ROY LAWTON
BY
Bacon & Thomas
ATTORNEYS

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SOUND SIGNALLING DEVICE HAVING DIAPHRAGM AND STRIKER APPARATUS

John Doggart and Geoffrey Roy Lawton, Macclesfield, Cheshire, England, assignors to V. & E. Friedland Limited, Macclesfield, Cheshire, England, a British company
Filed Oct. 7, 1965, Ser. No. 493,819

Claims priority, application Great Britain, Oct. 7, 1964, 40,952/64

5 Claims. (Cl. 340—388)

ABSTRACT OF THE DISCLOSURE

A sound signalling device including a sound emitting diaphragm forming one side of an enclosure. A striker is fixed upon an armature mounted within the enclosure and normally biased in contact with the diaphragm by a spring. An electrical coil wound upon a magnetic core fixed within the enclosure is selectively energized to attract the armature and move the striker away from the diaphragm. Each time the armature moves a predetermined distance away from said diaphragm a peg attached to the armature opens a pair of normally closed contacts in the coil power circuit to allow the striker to hit the diaphragm.

This invention relates to sound signalling devices and has a particularly useful but not exclusive application in warning horns for use on ambulances and police cars as an emergency warning device.

According to this invention there is provided a sound signalling device comprising a moulding providing a combined diaphragm and rigid diaphragm surround, the surround having mounted thereon an electromagnetic vibrator unit including a core, a coil mounted on the core, and a vibratory armature, the vibratory armature either itself striking the diaphragm, or carrying a striker element which strikes the diaphragm, as the armature vibrates in operation of the unit.

The diaphragm may be flat, but it is preferred that it should have one or more annular ripple formations therein.

According to a preferred feature of the invention the electromagnetic vibrator unit is mounted on a rigid base plate which is in turn mounted on the rigid diaphragm surround.

The diaphragm surround may have one or more stiffening ribs projecting transversely to the general plane of the diaphragm. In one such construction the diaphragm surround has two such stiffening ribs disposed concentrically with each other and extending round the diaphragm, and a plurality of internally threaded hollow bosses are formed each integrally with both of these ribs which bosses receive screws extending through the base frame.

The device preferably further comprises a cover member with which the diaphragm surround is a snap fit and which, with the moulding forms a housing for the unit.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a sectional elevation of the device on the line 1—1 of FIGURE 2,

FIGURE 2 shows the device with the rear cover member removed as viewed in the direction of the arrow 2 in FIGURE 3,

FIGURE 3 is a sectional side view in the direction of the arrows 3—3 in FIGURE 2,

FIGURE 4 is a part view showing the make and break contacts, and

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FIGURE 5 shows a modification for adoption when the device is to be connected to an A.C. supply.

The device comprises three principal parts, a moulding 10 which provides a combined diaphragm and rigid diaphragm surround, an electromagnetic vibrator unit 11, and a rear cover part 12 by which the device can be mounted on a supporting structure.

The moulding 10 is made from a hard plastics material, and provides a central diaphragm 13 which has an annular ripple formation therein as shown and a diaphragm surround 14 formed with a dependent skirt 15. The moulding may be of acetal resin, high impact polystyrene, polycarbonate such as is sold under the trade names Makrolon and Lexan, acrylonitrile-butadiene-styrene, or other synthetic plastics materials giving a hard metallic sound when struck. The skirt 15 has a small inwardly projecting ridge 16 on its edge which ridge extends round the periphery of the skirt and engages in a channel in the rear cover part 12 to form a weather-proof joint. The surround 14 is stiffened by two annular concentric ribs 17, 18 which project transversely to the general plane of the diaphragm. Four hollow bosses (not shown) are disposed between and integrally with ribs 17, 18 at equally spaced locations round the diaphragm surround. A base plate 19 is secured to the diaphragm surround by four self-tapping screws 19a which extend through the base plate into the respective bosses on the diaphragm surround 14.

Base plate 19 has a pair of lugs 20 which project away from the diaphragm and one end of an arm 21 is disposed between the lugs and is secured and pivoted thereto by a bolt 22 extending through aligned holes in the arm and lugs. The arm is made from strong sheet metal and extends from lugs 20 diametrically across the base plate and has two projections 21a extending towards the diaphragm. A pack 24 of U-shaped electromagnet core laminations is disposed on each side of the arm 21 with the legs of the laminations extending along the projections 21a, and bolts 25 extend through aligned holes in the laminations and arm to hold the core laminations to the arm. A coil 23 is disposed on one leg of the laminated core. The base plate has a large central aperture in which the core and coil are disposed. The end of arm 21 opposite the lugs 20 has a twist in it and a screw 26 extends through a hole in the twisted portion and through a tapped hole in the base plate 19 and carries a lock nut 26b on its end. A compression spring 26a encircles screw 26 and urges the arm away from the base plate. Screw 26 enables the ends of the core laminations 24 to be adjusted nearer to or further away from a mild steel armature plate 27 which extends parallel to the general plane of the diaphragm between the diaphragm and the core laminations. One end of the armature plate 27 has one end of a broad leaf spring 27a clamped to it by two rivets extending through a pressure bar 28. The other end of the spring is clamped between a pressure bar 29 and the base frame 19 by screws 30. A striker element 31 made from plastics material is secured to the armature plate at a position such that when the armature plate is vibrated element 31 strikes the centre of the diaphragm. Leaf spring 27a loads the armature plate to hold striker element 31 resiliently against the diaphragm.

The free end of the armature plate carries a peg 32 made from plastics material which projects away from the diaphragm and the end of which engages a leaf spring 33 carrying a contact 34. When the armature plate is in engagement with the core, peg 32 moves spring 33 and contact 34 away from a contact 35 carried by a fixed contact arm 36. Arm 36 and spring 33 (see FIGURE 4) are clamped to the base frame 19 by two screws 40 but are insulated from the base frame and each other by insulating blocks 37, 38, 39.

Two upstanding electrical contacts blades 41, 42 and a further contact blade 43 are mounted on the bobbin of coil 23. Blades 41, 43 have the two ends 23a of the coil respectively connected to them, and from blades 42 and 43 conductors 44, 45 respectively extend to the spring 33 and to a lateral projection 36a of the arm 36 which respectively carry the moving and fixed contacts 34, 35. Two connectors 46, 47 are secured by screws to the rear cover member 12, which is made from plastics and consequently insulates the connectors, and these connectors provide spring sockets into which blades 41, 42 fit. Cover member 12 has thin wall parts 48 either of which can be punctured to enable the main supply leads to be led into the housing for connection as by soldering to the connectors 46, 47.

Thus, coil 23 and contacts 34, 35 are connected in series across the mains supply. A condenser 51 is secured by a stiff but resilient plastic clip 52 to the base plate 19 and is connected across the contacts 34, 35 by conductors 53, 54. The condenser serves to reduce or prevent sparking when the contacts 34, 35 are moved apart.

In fixing the device to a supporting structure, the rear cover member 12 is first secured, for example by screws extending through holes 49, into the supporting structure, the mains connections to connectors 46, 47 are made, and the diaphragm and diaphragm surround moulding 10 with the vibrator unit already secured to it is clipped into position by engagement of ridge 16 in the channel in cover member 12.

In positioning the moulding, contact blades 41, 42 engage connectors 46, 47.

When contacts 34, 35 are closed, the coil becomes energised and attracts armature plate 27 to it against the force of spring 27a. This in turn causes peg 32 to move leaf spring 33 to break contacts 34, 35 so that the coil becomes de-energised and so that spring 27a moves the armature plate towards the diaphragm, causes striker 31 to strike the diaphragm, and remakes contact between contacts 34, 35. Thus, when the unit 11 is energised, the striker repeatedly strikes the diaphragm, and the diaphragm vibrates and emits a note.

If desired, the striker may be omitted and the armature plate itself may strike the diaphragm. For this purpose a pip may be formed centrally on the diaphragm to project towards the armature plate.

The arrangement of FIGURES 1 to 4 is designed for use with a D.C. supply. FIGURE 5 illustrates in part how the device is modified if there is an A.C. supply. In this case, peg 32 engages the free end of a leaf spring 55, the other end of which is clamped to the base frame by screws

40, a clamping plate 50 and a clamping block 56. Leaf spring 55 serves to reduce the loading effect of spring 27a on the armature plate. In this modified construction the condenser is omitted.

We claim:

1. A sound signalling device comprising
 - a base member having an outer periphery formed with a channel therein;
 - a plastic diaphragm;
 - a closed skirt having an upper edge fixed to the bottom of said diaphragm near the outer periphery thereof and a lower edge formed with an inwardly projecting ridge adapted to removably engage the channel in said base to form a weather proof joint;
 - an armature of magnetic material disposed beneath said diaphragm;
 - resilient means attached to said skirt for normally biasing said armature into contact with said diaphragm; and
 - electromagnetic means for selectively moving said armature out of contact with said diaphragm.
2. A sound signalling device as described in claim 1 wherein said electromagnetic means includes
 - a core of magnetic material mounted upon a support member suspended from said skirt;
 - an electrical coil wound upon said core;
 - circuit means for energizing said coil from a power source; and
 - switch means for selectively de-energizing said coil.
3. A sound signalling device as described in claim 2 wherein said switch means includes a pair of normally closed contacts in series with said circuit means and peg means attached to said armature for opening said contacts as said armature moves a predetermined distance away from said diaphragm.
4. A sound signalling device as described in claim 3 further including a striker fixed upon the upper side of said armature.
5. A sound signalling device as described in claim 4 wherein said diaphragm is a circular plate having annular ripples formed therein.

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JOHN W. CALDWELL, *Primary Examiner*.

H. I. PITTS, *Assistant Examiner*.