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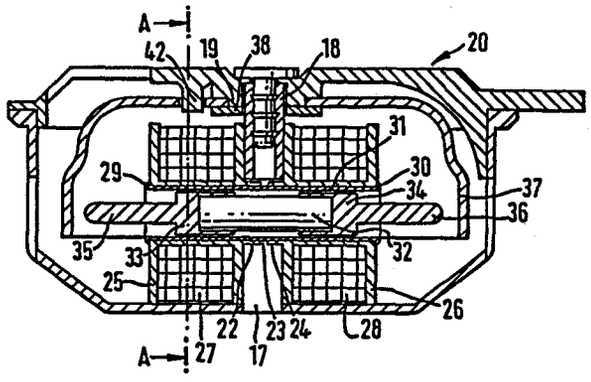
(71) Applicant: **MYCALEX (MOTORS) LIMITED, Love LAne, Cirencester, Glos. GL7 1QY (GB)**

(72) Inventor: **Howitt, Henry Gazeley, Bridge Cottage, Foxley Malmesbury Wiltshire (GB)**

(74) Representative: **Frost, Dennis Thomas et al, WITHERS & ROGERS 4 Dyer's Buildings Holborn, London, EC1N 2JT (GB)**

(54) Telephone Bell.

(57) In an electric bell for use in a telephone handset a pair of strikers (35, 36) are mounted for reciprocatory movement into and out of striking engagement with the inner surface of the bell (37) by the armature (32) of a linear electric motor (25, 26, 27, 28, 32) mounted inside the bell.



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"Electric Bells"

This invention relates to bells having electrically operated strikers and is particularly, though not exclusively, concerned with such bells for use in telephone handsets.

The trend over the years has been towards smaller telephone handsets with a consequent reduction in the amount of space available for the bell and it is a principal object of the present invention to effect a significant reduction in the size of the bell without impairing its overall efficiency.

To this end, according to the invention, the striker is mounted for recipricatory movement into and out of striking engagement with the inner surface of the bell by the armature of a linear electric motor acting within the confines of the bell.

In order to facilitate ready adjustment of the volume of sound emitted, the wall of the bell may be formed with a cam-like irregularity in the region of the striker and provision made for angular adjustment of the bell relative to the striker to vary the gap between the striker and the bell wall.

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

Figures 1, 2 and 3 are external elevations, shown full-size, looking from one end, one side and the other end respectively of an assembled unit;

Figure 4 is a cross-section, on an enlarged scale, through the unit shown in Figs. 1 to 3;

Figure 5 is a section on the line A-A of Fig. 4; and

Figure 6 is an end view, on an enlarged scale, of a preferred form

of bell for use in the unit shown in Figs. 1 to 5.

Referring in more detail to the drawings, an external housing 10 of synthetic plastics material is provided in its outer wall 11 with slots 12 from which project resilient tongues 13 which enable it to be clipped into position in a telephone handset and with apertures 14, 15 and 16, the form and purpose of which will be described in more detail hereinafter with reference to Fig. 5. Internally, the housing 10 is provided with a central flange 17 which extends inward from the wall 11 and terminates in a hollow spigot 18 (Fig. 4) which projects through the open end of the housing and is adapted to enter a hollow boss 19 projecting from the centre of a detachable cover member 20 made of the same material as the housing and provided with a plurality of apertures 21 (Fig. 3). The cover member 20 is secured against axial movement relative to the housing 10 by a fastening device 41 which is a push fit in the spigot 18. The flange 17 supports a linear electric motor comprising two coaxial bobbins 25, 26 (Fig. 4) provided with windings 27, 28 and having their projecting ends 23, 24 received in an aperture 22 in the flange, a liner tube 31 passing through the centres of both bobbins and upset at its ends to retain the bobbins in engagement with opposite sides of the flange 17 and spigot 18, and a magnet 32 guided in the liner tube and provided with pole pieces 33, 34 formed integral with strikers 35, 36. The strikers 35, 36 extend towards opposite sides of a bell 37 which is mounted on the boss 19 in engagement with a stationary washer 38 on the spigot 18. The bell 37 is angularly adjustable relative to the cover between a position in which a pin 42 on the cover passes through an aperture 43 (Fig. 6) in the bell and a position in which the pin passes through an aperture 44 in the bell.

The windings 27, 28 on the bobbins 25, 26 are connected to a source of alternating courrent through the medium of terminal tags which may consist of a pair of spring tags 39 passing through the apertures 14 and 15 in the housing 10 in the manner shown in Figs. 1, 2 and 5 or a pair of spade tags (not shown) passing through the apertures 15, and are connected in series with one another by a U-shaped terminal tag 40 passing through the aperture 6. The connectors are such that when alternating current is passed through the windings 27, 28 the magnet 32 is reciprocated axially in the tube 31 causing the strikers 35, 36 to alternately strike the bell 37.

In order to enable the volume of sound emitted by the unit to be adjusted between zero and a predetermined maximum the bell 37 may be provided, as shown in Fig. 6, with diametrically opposite cam portions 45, 46 for engagement by the strikers 35, 36 respectively and the cover member 20 made angularly adjustable relative to the housing 10 in response to manual operation of a handle 47. Rotation of the cover member 20 operates through the pin 42 to rotate the bell 37, whereby the gap between each striker 35, 36 and the associated cam-like portion of the bell can be reduced or increased with a consequent increase or reduction in the force with which each striker hits the bell.

A two-tone effect may be produced by providing two bells of different diameters mounted in spaced relation on the boss 19, with the smaller bell arranged to be engaged by the shorter of two strikers secured to the ends of the magnet 32 through the medium of pole pieces and having an aperture for the passage of the larger of the strikers which is arranged to engage the larger bell.

CLAIMS:

1. An electric bell comprising a bell member (33) and an electrically operated striker (35, 36), characterised in that the striker is mounted inside the bell member and is reciprocable into and out of engagement with the inner surface of the bell member by the armature (32) of a linear electric motor (25, 26, 27, 28, 32) positioned inside the bell member.

2. An electric bell according to claim 1, wherein the linear electric motor comprises a pair of coaxial bobbins (25, 26) and a magnet (32) slidably mounted in a guide tube (31) passing through the axial centres of said bobbins, the windings (27, 28) on said bobbins being so arranged that upon connection to an A.C. current source the magnet is reciprocated in said guide tube.

3. An electric bell according to claim 2, characterised by the provision of two strikers (35, 36) secured to opposite ends of the armature (32).

4. An electric bell according to claim 2 or 3, characterised by a housing (10) of electrically insulating material which is open at one end for the insertion of the motor and bell member and is closed by a detachable cover member (20) of the same material.

5. An electric bell according to claim 4, characterised in that the housing is provided with an internal motor support (17) extending across the housing from its permanently closed end to its open end, said support being apertured for the passage of the guide tube (31) and provided at the open end of the housing with means (18) for receiving and locating the central portion of the cover member.

6. An electric bell according to claim 5, wherein said means for receiving and locating the cover member is a hollow spigot which enters

a hollow central boss (19) on the cover member and receives a removable fastener (41) for securing the cover member to the housing.

7. An electric bell according to claim 6, wherein the ends (29, 30) of said guide tube (31) are upset into engagement with the outer ends of said bobbins (25, 26) to maintain the inner ends of the bobbins in contact with the opposite sides of the motor support (17) and spigot (18).

8. An electric bell according to claim 6 or 7, wherein the bell member (37) comprises a base portion which is centrally apertured for the passage of the central boss (19) on the cover member (20) and an annular skirt portion which surrounds the motor and is adapted to be engaged by said strikers (35, 36).

9. An electric bell according to claim 8, wherein the skirt portion of the bell member (37) is formed with radially opposite cam portions (45, 46) in line with the strikers (35, 36) and the bell member and the cover member (20) are so connected to one another and to the housing (10) that the bell member may be angularly adjusted by the cover member relative to the housing to vary the gap between the skirt portion and the strikers and thus the volume of sound emitted by the unit.

10. An electric bell according to claim 9, wherein the base portion of the bell member (37) is formed with at least one aperture (43, 44) offset from its central aperture, to receive a pin (42) projecting from the cover member (20) at a point offset from its central boss (19).

11. An electric bell according to claim 10, wherein the bell member (37) is angularly adjustable with respect to the cover member (20) and is provided with two apertures (43, 44) for alternate engagement by the pin (42).

12. An electric bell according to any one of claims 4 to 11, wherein the windings (27, 28) are connected together and to an external circuit through the medium of terminal tags (39, 40) passing through apertures (14, 15, 16) in the housing (10).

13. An electric bell according to any one of claims 4 to 12, wherein the housing (10) is provided with external means (13) for clipping it into its position of use.

14. A telephone handset incorporating an electric bell according to any preceding claim.

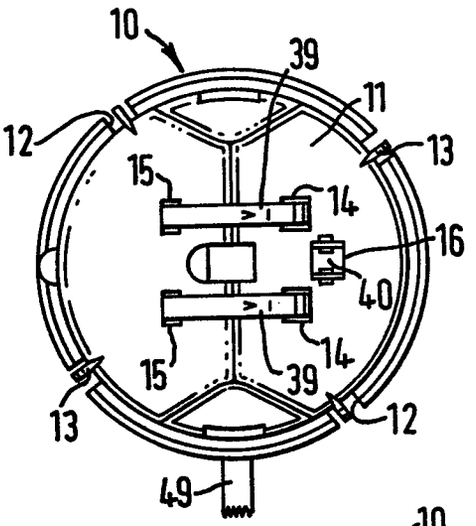

FIG.1

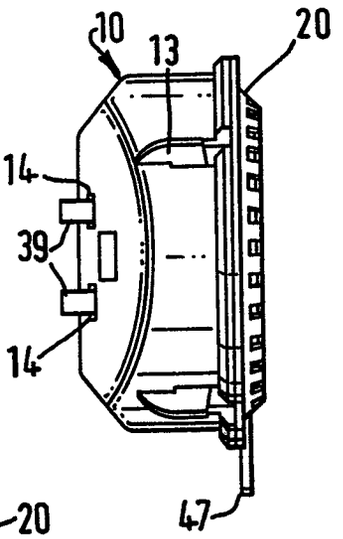

FIG.2

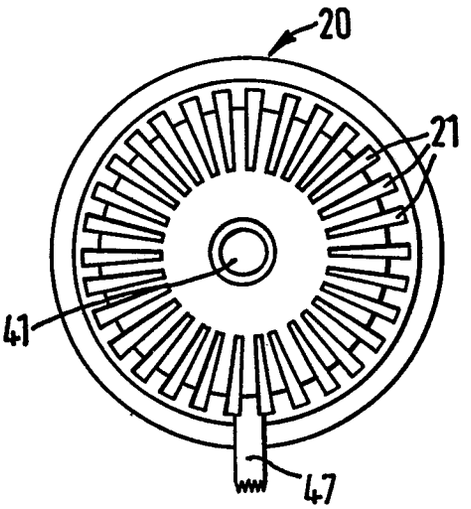

FIG.3

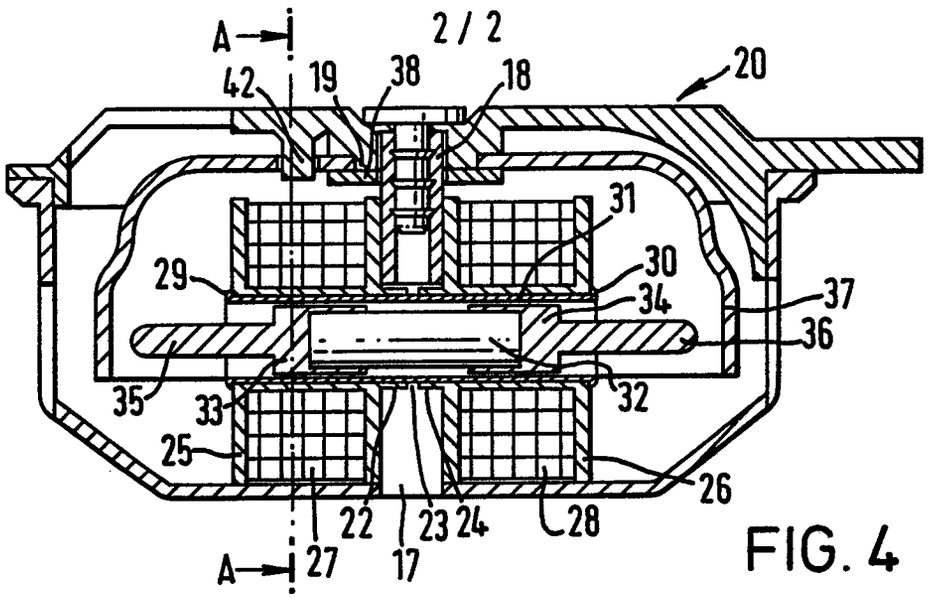

FIG. 4

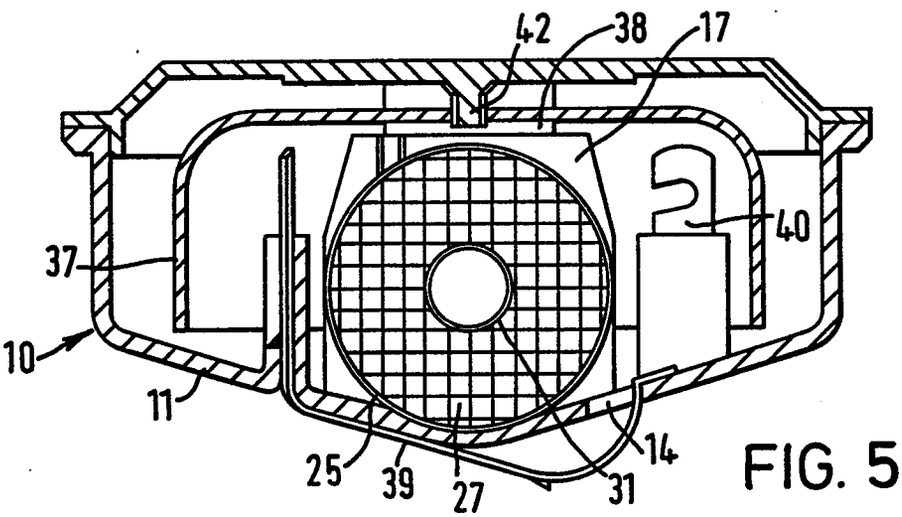

FIG. 5

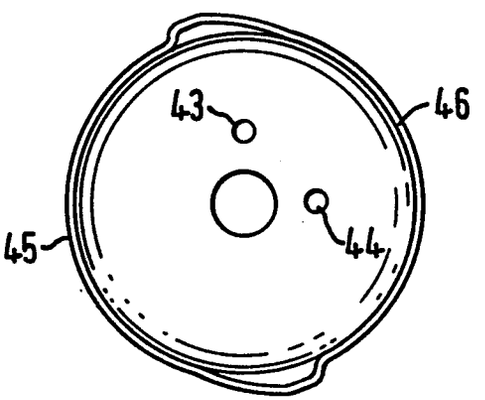

FIG.6