LOUD SPEAKER FOR WIRELESS APPARATUS OR THE LIKE

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Fig. 4.

[Diagram of loudspeaker mechanism]
This invention relates to loud-speakers for wireless apparatus or the like and provides a diaphragm of improved construction which combines lightness and rigidity so that it vibrates with high efficiency in response to the oscillations of the electromagnetic unit of the apparatus to which it is attached and gives accurate reproduction.

The improved loud-speaker according to this invention has a composite diaphragm of cellular construction comprising a core of paper or the like, pleated or folded to form radial cavities, and sandwiched between plain sheets of paper or the like which enclose substantially the whole of the core.

One of the plain sheets aforesaid may have attached to it or formed on it a perforated peripheral strip for the attachment of the diaphragm to the loud-speaker frame.

The loud-speaker may be of the moving-coil type, the coil being attached to one of the aforesaid plain sheets at the centre of the diaphragm.

Other features of the invention are concerned with the application of reinforcement to opposite faces of the diaphragm, to the building up of the diaiphragm upon a central hub, and to the support of the diaphragm in an annular frame.

The invention is illustrated by the accompanying drawings, wherein:

Figure 1 is a front view, partly in section, of a pleated diaphragm with a disc on each side and a spider with curved connecting arms.

Figure 2 is a cross-section of Figure 1.

Figure 3 is a cross-section of a diaphragm to which reinforcement is applied according to the invention, the diaphragm being indicated diagrammatically, and

Figure 4 is a half-front view and a half-back view of the apparatus shown in Figure 3.

Referring in the first place to Figures 1 and 2, the diaphragm comprises a core 15 in the form of a disc of paper or like sheet material which is pleated to form radial cavities and is sandwiched between two plain sheets of paper or like material 16, 17, as shown in Figure 2. The three discs 15, 16 and 17 when connected together (e.g. by adhesive) form a light rigid diaphragm in which the core forms with the covering discs a plurality of substantially rigid triangular cells extending radially from the centre of the diaphragm.

For the purpose of securing the periphery of the diaphragm to the frame of the loud-speaker, the disc 16 has attached to its peripheral edge a flat annular strip comprising an inner portion 18 connected to an outer portion 19 by arms 14 between which the strip is apertured. In attaching the diaphragm, the outer portion 19 of the aforesaid strip is clamped between frame-members (not shown), and the apertured form of the strip gives a flexible mounting for the diaphragm.

The instrument to which the invention, as illustrated, is applied is of the moving-coil type, and the coil 4 of the electro-magnetic unit is attached to the centre of the diaphragm. As shown in Figure 2, the coil is wound upon a former 5 which is attached by supporting legs 9, 10 to the covering disc 26 of the diaphragm.

Referring now to Figures 3 and 4 the diaphragm is as before of cellular construction and comprises a core 23 of paper pleated or folded to form radial cavities, sandwiched between two plain discs 21 and 22 which completely enclose the core. The diaphragm is reinforced by the application to each side of it of four superimposed discs, 24—27 on one side and 24'—27' on the other side. These strengthening discs are of diminishing diameter from the innermost disc to the outermost one. The diaphragm is built up upon a central hub constituted by a tube 28 which has its ends flanged over the covering discs 21 and 22 and the strengthening discs 24, 24'.
The discs 25—27 and 25'—27' are fixed over the flanged ends of the tube 28.

The diaphragm is resiliently suspended at or round the peripheral edges of the discs 21 and 22 which edges are clamped between rings 29 and 30 of rubber or other suitable and resilient material and the said rings are gripped by rigid rings 31 and 32 made of iron or preferably aluminum and fixed together with screws 33.

The rigid reinforcing rings 31 and 32 are recessed in their inner peripheries to receive the resilient rings 29 and 30.

The moving coil 34 which is wound on a former 35 oscillates in the magnetic field between the concentric pole pieces 36 and 37 of the electro-magnet 38 which has a coil 39 around its central limb for exciting the field.

The former 35 is fixed to the centre of the diaphragm over the strengthening discs by supports 40 and 41.

A spider with annular or segmental body 42 fitted adjustably on the magnet 38 and with radial arms 43 screwed to the rigid ring 32 enables the diaphragm to be accurately positioned so that the moving coil 34 is maintained in correct relationship to the pole pieces 36 and 37 of the electromagnet 38. The body 42 of the spider may be in segments with hubs 44 secured together by bolts 45 to grip the cylindrical electromagnet 38 at any convenient zone along its length.

Other types of electrical units besides the electro-magnetic type hereinbefore described and illustrated may be employed for generating the vibrations in the diaphragm, such as, for example, those which utilize permanent magnets or vibrating reeds.

I claim:

1. In or for a loud-speaker a composite diaphragm comprising in combination a core of sheet material folded to form radial cavities, two plain sheets applied to opposite sides of the core in such manner as to enclose substantially the whole of the said core, and a perforated peripheral strip attached to one of the aforesaid plain sheets between which the core is sandwiched.

2. In or for a loud-speaker a composite diaphragm comprising in combination a core of sheet material folded to form radial cavities, two plain sheets applied to opposite sides of the core in such manner as to enclose substantially the whole of the said core, a perforated peripheral strip attached to one of the plain sheets aforesaid, and an annular frame in which the aforesaid peripheral strip is clamped.

3. In or for a loud-speaker a composite diaphragm comprising in combination a core of sheet material folded to form radial cavities, two plain sheets applied to opposite sides of the core in such manner as to enclose substantially the whole of the said core, and a plurality of superimposed discs, diminishing in diameter from the innermost to the outermost, applied as a reinforcement to each side of the composite diaphragm.

4. For a loud-speaker a composite diaphragm comprising in combination a core of paper pleated to form radial cavities, a central hub in the form of a sleeve on which said core is mounted, plain sheets of paper applied to opposite faces of the core in order to enclose substantially the whole of it, and flanged ends on the sleeve aforesaid arranged to overlap the aforesaid plain sheets.

In testimony whereof I affix my signature.

GEORGE REX SEARLE.