

June 11, 1929.

W. G. GALE

1,716,772

LOUD SPEAKER

Filed Aug. 26, 1927

2 Sheets-Sheet 1

Fig. 1.

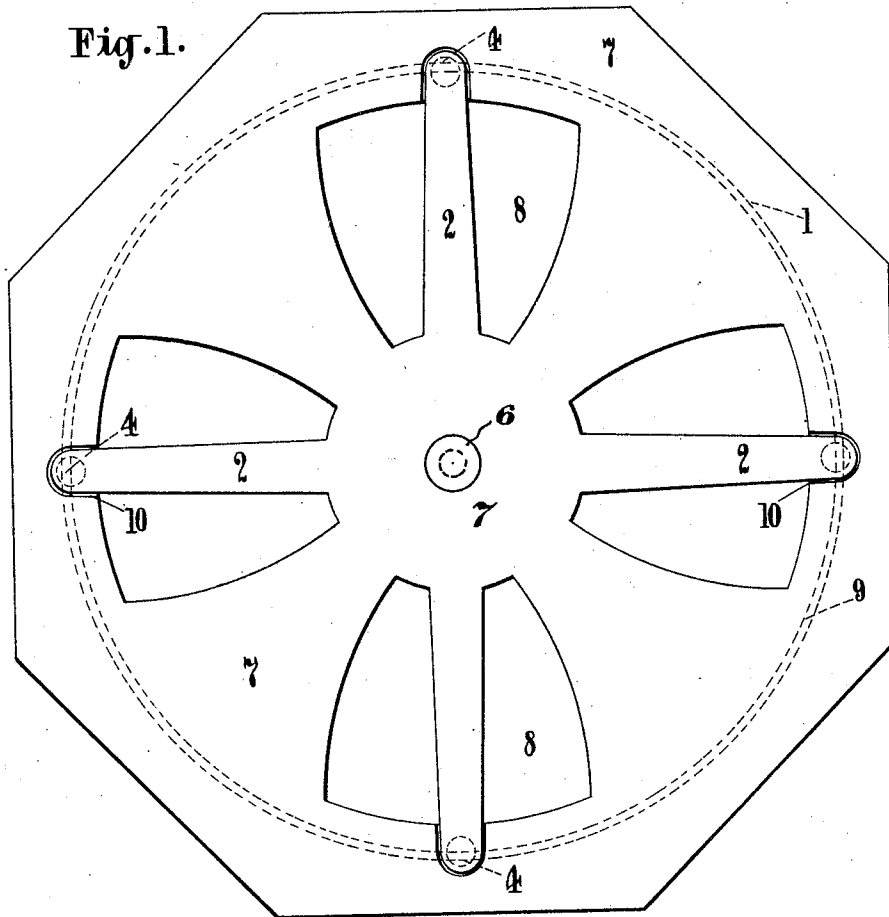
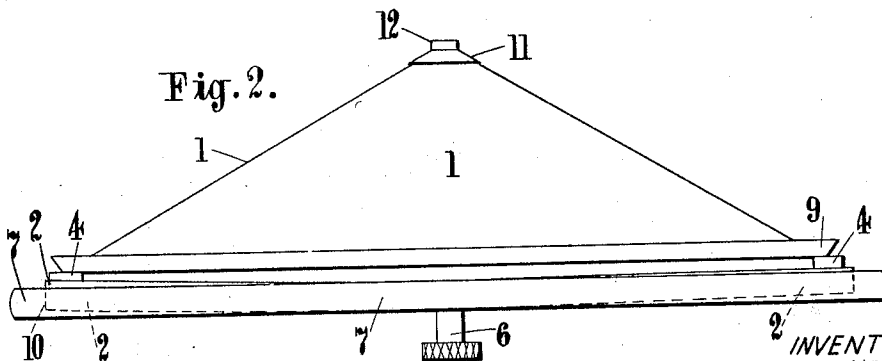


Fig. 2.



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Fig.3.

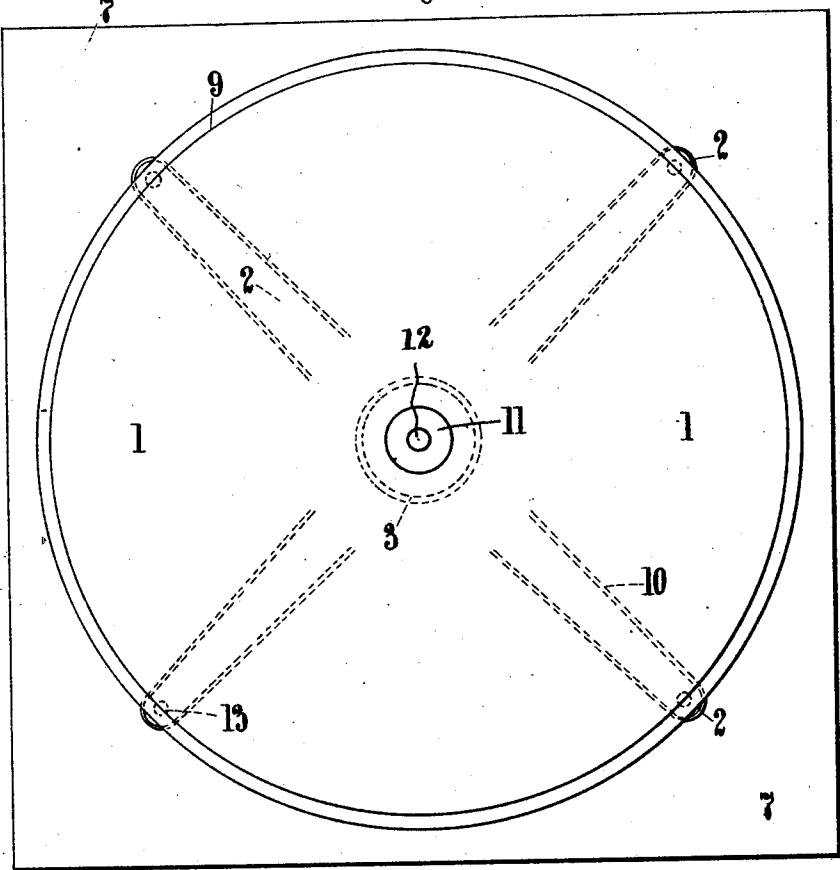
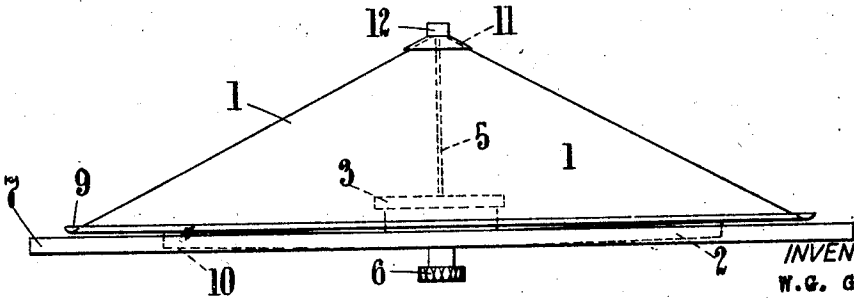


Fig.4.



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UNITED STATES PATENT OFFICE.

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LOUD-SPEAKER.

Application filed August 26, 1927, Serial No. 215,543, and in Great Britain August 30, 1926.

This invention relates to improvements in the construction of loud speaking telephone devices known as loud speakers, as used in the reception of radio telegraphy and telephony.

5 The invention is particularly applicable to loud speakers of the type having the usual resilient armature and electro-magnetic system coupled with a diaphragm which if of conical shape, as is frequently the case, is attached to the armature at its apex.

10 Such conical diaphragms usually consist of a compound cone built up of two or more cones of any suitable material as paper, parchment, metal foil, thin wood and the like in such a manner that the apices of the several
15 cones are on a common axis the bases being in a common plane and the circumferences of the cones being secured together, the whole forming a shell or braced structure, or they
20 consist of spiral or concentric hoops or bands interwoven with radial ribs the framework thus formed being covered with thin paper, parchment, oiled silk or the like.

25 The periphery of the cone diaphragm has been clamped in supporting frames or rings or the cone has been supported at the apex only, the conical surface being self-supporting by reason of the framework or bracing of the diaphragm.

30 It has however been found that the use of such framework tends to cause distortion due to parasitic vibrations in the frame while the various shell type cones tend to overdevelop certain frequencies in the musical register and
35 power losses occur due I believe to the inertia of the diaphragm, and an apparent time lag as between the apex and the base of the cone resulting in loss of volume.

40 Moreover it is evident that a conical diaphragm which is self-supporting without framework and which is also so formed as to reduce to a minimum the time lag of the base of the cone relative to the apex will amplify efficiently and accurately.

45 According to this invention the conical diaphragm of a loud speaker is supported by a number of resilient or flexible fingers or strips formed by making parallel or divergent cuts in the thickness of the plane surface or wall of the cabinet, so that the said
50 fingers or strips are integral with such plane surface or wall and are coupled at or near their free ends to the base or periphery of the diaphragm.

55 The aforesaid plane surface may be the

surface or frame employed to support the electro-magnetic system such as the inner or outer wall of a cabinet or box or any wall plaque or frame and the diaphragm consists of a hollow cone of paper, metal foil, thin
60 wood, silk or the like or a combination of the like materials attached in the usual manner at a point at or near the apex of the cone to the vibratory body, the periphery of the cone resting on the plane surface which is so
65 cut or formed or built as to have a number of the resilient strips on which the periphery of the cone may rest or to which the said cone may be attached and the said resilient strips are formed as described of the
70 material of the said surface by making parallel or diverging cuts in the thickness of the frame, the said cuts being preferably so placed as to form outwardly radiating fingers extending from a point at or near the
75 centre of the base of the cone to the periphery of the cone.

The circumference of the cone may be strengthened by pleating or folding and the periphery of the cone may be attached to the
80 flexible fingers by any suitable means. In this manner the cone is suspended between the armature and the flexible strips and has no framework in contact with the conical surface and the flexibility of the said fingers
85 diminishes the effect of time lag previously referred to. In order that the periphery of the cone may not be in direct contact with the plane surface or the flexible fingers, which tends to cause distortion of the reproduced
90 sounds a rim or band of felt, cloth, rubber or the like may be fixed to the periphery of the cone or to the plane surface where contact with the cone is made or the periphery of the cone may be coated with hair or flock,
95 by means of an adhesive, or felt or other material in small pieces may be attached to the periphery of the cone or to the plane surface or both.

It will be obvious that the flexible strips
100 may be arranged in an ornamental design and that they may be formed in any manner other than radially extended from the centre.

A method of carrying out the invention is illustrated in the accompanying drawings
105 wherein:—

Figure 1 is a plan of the member hereinbefore referred to as the plane surface seen from the underside of Figure 2.

Figure 2 is an elevation of an apparatus
110

or device constructed in accordance with or embodying the present invention.

Figures 3 and 4 are plan and elevation respectively of the device or apparatus showing the attachment of the cone diaphragm to the sound post.

Referring to the drawings it will be seen that the saw cuts 10, in the thickness of the plane surface 7, are so arranged as to form flexible fingers 2, and a method of combining the fingers so formed and the sound apertures 8 into an ornamental design is indicated in Figure 1.

The cone 1 is attached to the sound post 5 at or near to the apex by suitable means, cone washers 11 and clamping nuts 12 being preferred as shewn in Figures 2 and 4 and the sound post 5 is attached in any appropriate manner to the armature or other vibratory body.

The circumference of the cone may be strengthened by means of a rib or fold 9 in order to assist in maintaining circular shape.

The electro-magnetic system 3 may be housed between the plaque or member 7 and the cone 1 but may be also situated opposite the apex of the cone and outside the cone and where the electromagnetic system is housed as shown in the drawings the adjustment means 6 may protrude.

Damping spacers of felt, wool or hair or the like 4 may be placed between the cone 1 and the fingers 2, or the periphery of the cone may be coated with flock or rest on a felt or the like band, or the damping spacers 4 may be placed at intervals round the edge of the cone or on the plane surface or member 7.

The cone may be attached to the members 2 at any point but is preferably secured at the

end of the flexible fingers 2 as shown by means of screws 13 or by the use of an adhesive or other suitable means.

In Figures 2 and 4 the fingers are shown raised above the plane of the member 7, by reason of initial tension applied to the cone before securing the apex to the sound post 5 by means of nuts 12 but this is not essential to the efficient operation of the device.

What I claim is:—

1. In loud speakers the combination with a plane surface supporting the electro-magnetic system, of a conical diaphragm and a plurality of resilient fingers formed in the said plane surface and coupled by their free ends to the periphery of the diaphragm.

2. In a loud speaker the combination with a conical diaphragm, coupled at its apex to an armature, of a base supporting said armature and a series of flexible fingers integral with said base and coupled by their free ends to the periphery of the diaphragm.

3. In loud speakers the combination with a plane surface supporting the electro-magnetic system, of a conical diaphragm, a plurality of resilient fingers formed in the said plane surface and coupled by their free ends to the periphery of the diaphragm, and damping means interposed between said diaphragm periphery and said plane surface.

4. In a loud speaker the combination with a conical diaphragm, coupled at its apex to an armature, of a base supporting said armature, a series of flexible fingers integral with said base and coupled by their free ends to the periphery of the diaphragm, and a series of damping spacers on said base between said free ends and said periphery.

In testimony whereof I affix my signature.
WALTER GEORGE GALE.