

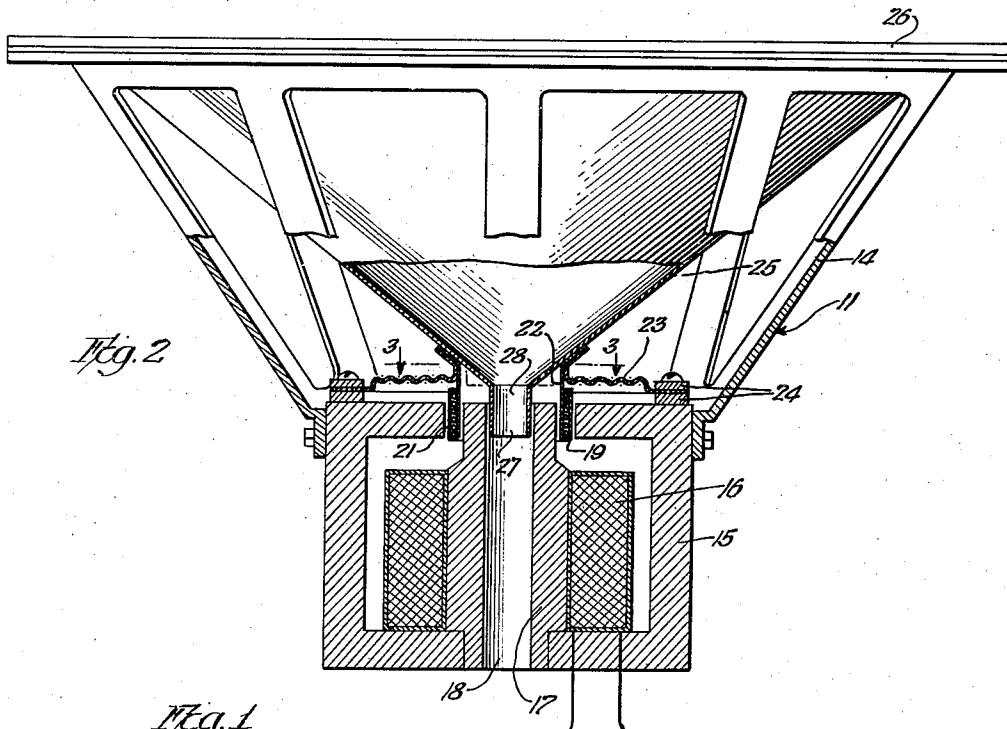
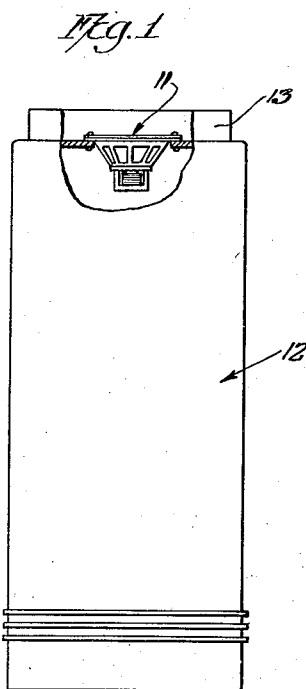
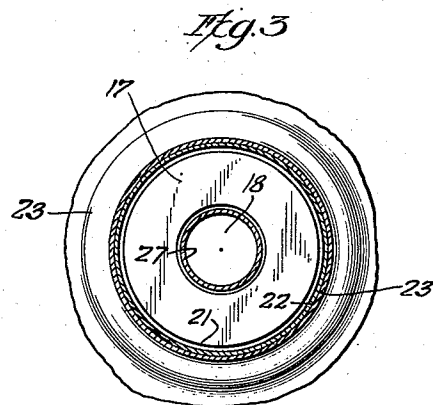
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W. H. HUTTER

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ELECTRODYNAMIC SPEAKER

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Inventor
William H. Hutter
BY
Shoichiro, Davis & Correll
Attys.

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ELECTRODYNAMIC SPEAKER

William H. Hutter, Chicago, Ill., assignor to
Rock-Ola Manufacturing Corporation, Chi-
cago, Ill., a corporation of Delaware

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3 Claims. (Cl. 179—115.5)

This invention relates in general to electrodynamic speakers, and more particularly to improvements for facilitating their use in a vertical position, and for enhancing their tonal qualities.

When a speaker is placed in a vertical position with the larger or open end of the cone at the top, the problem of preventing the accumulation of dirt and other foreign matter at the smaller or lower end of the cone becomes acute. In an attempt to overcome this difficulty, a small convex disc has been placed in the lower or smaller end of the cone with its peripheral edge secured thereto, and a central aperture covered with a thin and porous sheet of felt, or the like, has been provided in the disc as an air relief. However, such an arrangement, while preventing access of anything but extremely fine particles of foreign matter to the space or air gap between the outer surface of the pole piece and the moving voice coil, merely causes the accumulation of all other foreign matter in the lower end of the speaker cone. Furthermore, since the space between the moving voice coil and the pole piece is only a matter of a few thousandths of an inch, any particles of foreign matter, regardless of how small they may be, which are allowed to enter such space will cause distortion and seriously effect the operation of the speaker.

The principal object of this invention, therefore, is to prevent the accumulation of any foreign matter in the smaller end of the cone of a speaker, when the larger end thereof is upwardly disposed, and to prevent the admittance of any foreign matter to the space or air gap between the moving voice coil and the pole piece, by providing means for automatically removing any foreign matter introduced into the speaker cone.

Another important object of the invention is to improve the tonal qualities of a speaker through the use of such foreign matter eliminating means, since the latter increases the area of the speaker cone which is effective to transmit sound waves of high frequency, and provides superior air relief to prevent damping of the low frequencies.

A further object of the invention is the provision in an electrodynamic speaker of means for automatically draining foreign matter from the cone thereof, when the larger end of the latter is disposed upwardly, which comprises a bore extending through the pole piece of the speaker magnet, and a sleeve slidably disposed therein and forming an extension of the smaller end of the cone.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, when taken in connection with the accompanying drawing, discloses a preferred embodiment thereof.

In the drawing,

Figure 1 is a side elevational view of a phonograph or other supporting member with parts broken away to illustrate the positioning therein of a speaker embodying the features of the invention;

Fig. 2 is a side elevation of a preferred form of speaker, with the major portion thereof shown in section; and

Fig. 3 is a detail horizontal section taken substantially on the line 3—3 of Fig. 2.

Referring more particularly to the drawing, reference numeral 11 indicates in general an electrodynamic loud speaker which is mounted in a vertical position, i. e., to transmit sound waves upwardly, at the upper end of a phonograph, resonating column, or other suitable supporting member 12. The speaker 11 may be surrounded by a masking ring 13 for limiting the initial direction of travel of the sound waves transmitted thereby.

The speaker 11 comprises the usual skeleton supporting frame member 14 to the lower end of which an electro-magnet 15 is secured. The magnet 15 is similar in most respects to those of the prior art, and includes the usual winding 16 around the central pole piece 17. The only difference between the present magnet 15 and those heretofore employed is that the instant pole piece 17 is provided with a central bore 18 extending completely therethrough.

The usual voice or moving coil 19 is disposed in the air gap 21 provided between the pole pieces of the magnet 15. The voice coil 19 is secured in any desirable manner to a ring 22 of cardboard, or the like, which is in turn attached to the usual diaphragm 23. The outer periphery of the diaphragm 23 is secured to the electro-magnet 15 by means of the usual clamping rings 24.

A sound wave transmitting cone 25 is anchored at its outer or larger end to an outer flange of the skeleton supporting member 14 by a ring 26. The inner or smaller end of the cone 25 extends interiorly of the ring 22 of the voice coil 19, and is secured with the latter to the inner portion of the diaphragm 23. The smaller end of the cone 25 terminates in a sleeve portion or flange 27 defining a central aperture 28 and extending

slidably into the bore 18 of the pole piece 17 of the electro-magnet 15.

With the above described arrangement, any foreign matter which may find its way into the cone 25 will be permitted to fall freely through the aperture 28 and the bore 18. During operation of the speaker 11, the voice coil 19 will be moved longitudinally of the pole piece 17 in the usual manner to cause the cone 25 to transmit sound waves corresponding to the varying electrical currents introduced to the speaker. This action of the cone 25 which is attached to the moving coil 19, will move any particles of foreign matter deposited therein toward the central aperture 28, when the speaker is disposed in the upright position of Figs. 1 and 2. Consequently, any foreign matter will be automatically drained from the cone 25, and this action will be greatly facilitated by the flow of air through the bore 18 resulting from the operation of the cone 25. The sleeve 27 is extended into the bore 18 a sufficient distance to prevent the sucking up of any foreign matter into the space or air gap 21 between the voice coil 19 and the pole pieces of the magnet 15. This is of paramount importance, because these spaces are normally only a few thousandths, of an inch in width, so that any particles of foreign matter which might be deposited therein would distort the magnetic field and seriously affect the operation of the speaker.

The above described construction has the additional advantage of materially enhancing the tonal qualities of the speaker. In the first place, the central aperture 28 and the bore 18 provide superior air relief from damping the cone 25 when sound waves of low frequency are being transmitted thereby. In the second place, since the surface of the cone is extended inwardly beyond the ring 22, which is not done in those speakers of the prior art having any provision for central air relief, the area at the inner end of the cone which is effective to transmit sound waves of high frequency is materially increased.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a speaker having a magnet with a pole piece, a voice coil mounted in spaced relationship to and surrounding an end portion of said pole piece for movement relative thereto, and a cone connected adjacent its smaller end to said voice coil for movement thereby; means for preventing the accumulation of foreign matter in said cone to enable use of the speaker in a position in which the larger end of the cone is upwardly disposed, comprising a bore extending through said pole piece, and an aperture at the smaller end of said cone in alignment with said bore with a depending flange surrounding the same and slidably extending into the bore.
2. In a speaker having a magnet with a pole piece, a voice coil mounted in spaced relationship to and surrounding an end portion of said pole piece for movement relative thereto, and a cone connected adjacent its smaller end to said voice coil for movement thereby; means for draining foreign matter from said cone, when the larger end thereof is disposed upwardly, comprising a bore extending through said pole piece, an aperture in the smaller end of said cone in alignment with said bore, and a sleeve secured to said cone exteriorly of said aperture and slidably extending into said bore a sufficient distance to prevent the sucking up of foreign matter into the space between said pole piece and said voice coil.
3. In a speaker having a magnet with a pole piece, and a voice coil mounted in spaced relationship to and surrounding an end portion of said pole piece for movement relative thereto; means for improving the tonal qualities of said speaker, comprising a cone having its smaller end portion secured to said voice coil and extending interiorly thereof to increase the area effective to transmit sound waves of high frequency, a bore extending through said pole piece, and an aperture in said cone in alignment with said bore to provide maximum air relief from damping the sound waves of low frequency, the smaller end of said cone terminating in a sleeve surrounding said aperture and extending slidably into said bore to automatically drain foreign matter from said cone when the speaker is disposed with its larger end extending upwardly, and to prevent the admittance of any foreign matter to the space between said pole piece and said voice coil.

WILLIAM H. HUTTER.