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ELECTRO-ACOUSTIC TRANSDUCER HAVING
A RESONATOR CAVITY DAMPED
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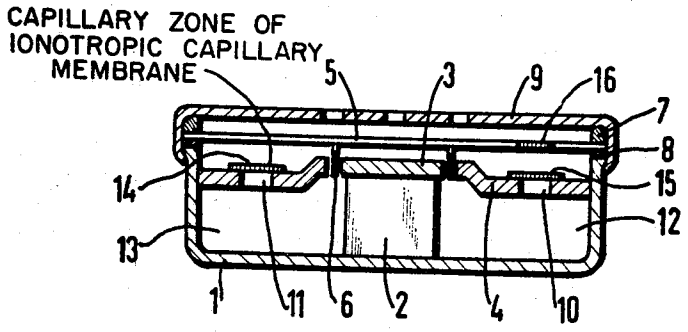

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ELECTRO-ACOUSTIC TRANSDUCER HAVING A RESONATOR CAVITY DAMPED

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ABSTRACT OF THE DISCLOSURE

Electro-acoustic transducer having at least one resonator chamber with at least one opening provided with a damping cover, said cover comprising the capillary zone of an ionotropic membrane.

This invention concerns an electro-acoustic transducer, and more particularly, such a transducer having a resonator cavity provided with a coupling opening having a damping cover. Such covers are used, for example, to improve the oscillation behavior of the diaphragm of a transducer such as by compensation for the resonance of the diaphragm.

In the past, cloth discs, usually silk, have been used for such damping covers. However, the characteristics of cloth which determine its damping resistance are themselves dependent on various factors, such as the roughness of the fiber, the diameter of the fiber, the fiber separation, and also on the process used in the production of the cloth, including the stresses to which the finished cloth is subjected, as by stretching. Experience has shown that cloths used for damping covers have such great differences in these characteristics that it is very difficult to obtain cloths of the same required characteristics.

It is an object of this invention to avoid these disadvantages of cloth damping covers and to provide covers of uniform repeatable characteristics, which are readily controlled in the manufacturing process.

The objects of the invention are achieved through use of the capillary zone of an ionotropic membrane as a damping cover. Such a membrane can be produced by ionic diffusion into polyelectrolytes in accordance with processes such as those described in German Patents Nos. 1,011,853 and 1,108,665 in the name of Dr. Heinrich Thiele. Such process is also disclosed, inter alia, in British Patent No. 918,626.

As indicated in German Patents 1,011,853 and 1,101,665 ionotropic membranes are formed employing polyuronides as polyelectrolytes and polyvalent ions such as lead, copper, cadmium and calcium. The polyvalent ion is permitted to diffuse into the polyelectrolyte to form straight, parallel and uniform capillaries as the polyelectrolyte coagulates into a membrane.

In the production of such membranes, there is first formed a dense primary membrane upon which a drop-like separating zone is formed, with an adjoining capillary zone then formed. The diameters of the capillary tubes can be controlled by variation of the chain length and concentration of the polyelectrolyte, as well as the radius and valence of the diffused ion. The capillary zone of the membrane can be separated and stabilized by, for instance, introducing an artificial material into the walls thereof.

The utilization of such capillary zones as damping covers for coupling openings of resonator chambers in electro-acoustic transducers has the advantage that the covering repetitively demonstrates the characteristics causing the desired damping, practically free of tolerance differences. Further, it has the equally important advantage that the size of the pores or capillary tubes can be controlled in the desired manner during the production of the membranes so that the characteristics of the membrane determining the desired damping can thus be adapted to the prevailing conditions in a given case.

In the case of electro-acoustic transducers having at least one resonator chamber closed off on one side by a vibratory diaphragm, with the resonator chamber coupled to the outer chamber of the diaphragm through at least one opening provided in the diaphragm, a damping cover according to the invention can be achieved in a particularly simple fashion. In such case, the vibrating diaphragm itself can be formed by an ionotropic capillary membrane, with the previously mentioned dense primary membrane forming the main body of the diaphragm but being removed from the capillary zone thereof over a portion of the membrane corresponding to the coupling opening. The exposed capillary zone then forms the damping cover of the coupling opening, as before. At the same time, another advantage is realized, since an ionotropic capillary membrane possesses a very desirable structure for use as a vibratory diaphragm, because of the complete uniformity of its construction and because of the low weight thereof due to the large number of capillary tubes therein.

The invention will now be more fully described in conjunction with an illustrative embodiment thereof shown in the accompanying drawing.

In the drawing, the single figure is a cross-sectional view of a dynamic microphone constructed in accordance with the invention.

The microphone includes a casing **1** mounting a permanent magnet **2** carrying a central pole plate **3** which is radially inward of an annular pole ring **4** fixed to the casing. A vibration diaphragm **5** carries the usual moving coil **6** and is clamped between spacing rings **7** and **8**, covered by perforated lid or cover **9**.

The annular pole ring **4** has a pair of openings or passages **10** and **11**, therethrough, to provide for acoustic coupling to the resonator cavities **12** and **13**, respectively. These passages are provided with respective damping covers **14** and **15**, the damping covers being formed by the capillary zones of ionotropic capillary membranes.

The diaphragm **5** is similarly provided with a coupling opening **16** which couples the outer chamber between the cover **9** and diaphragm **5** with the inner chamber including resonator cavities **12** and **13**. As indicated above, the vibratory diaphragm **5** may itself be an ionotropic capillary membrane with the dense primary membrane facing the cover **9**, but with a portion of that primary membrane removed to form the coupling opening or passage **16**. Then, the remaining capillary zone of the membrane forms the damping cover for such passage.

It will be obvious that the invention is applicable to other forms of transducers than that specifically shown and described herein. Accordingly, the invention should not be considered limited to such showing, but rather only by the appended claims.

I claim:

1. In an electro-acoustic transducer having a resonator chamber coupled to a sound source by an opening through a wall thereof, a damping cover for such opening formed by the capillary zone of an ionotropic capillary membrane.

2. An electro-acoustic transducer having a resonator chamber and a vibratory diaphragm forming a wall of said chamber and provided with an acoustic passage therethrough for coupling the chamber to a sound source, the diaphragm being an ionotropic capillary membrane having a dense primary membrane layer at one side thereof and a capillary zone at the opposite side, the acoustic passage

being formed by a portion of the capillary zone not covered by said primary membrane layer.

3. A dynamic microphone including a casing having a perforate cover thereon for acoustic coupling inward thereof, a permanent magnet, means defining a magnetic circuit for said permanent magnet with a cylindrical air gap therein, a vibratory diaphragm mounted adjacent said cover in said casing and carrying a moving coil extending into said cylindrical air gap to develop a voltage thereacross in response to vibration of the diaphragm, said diaphragm being an ionotropic capillary membrane having a dense primary membrane layer next adjacent said cover and a capillary zone at the opposite side thereof, and an acoustic passage through said diaphragm formed by a portion of the capillary zone not covered by said primary membrane layer.

4. The apparatus of claim 3 in which said means defining a magnetic circuit includes an annular pole ring mourted in said casing and having at least one acoustic passage therethrough for sound coupling purposes, said passage being covered by the capillary zone of an ionotropic capillary membrane.

No references cited.

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179—180, 181; 181—31