

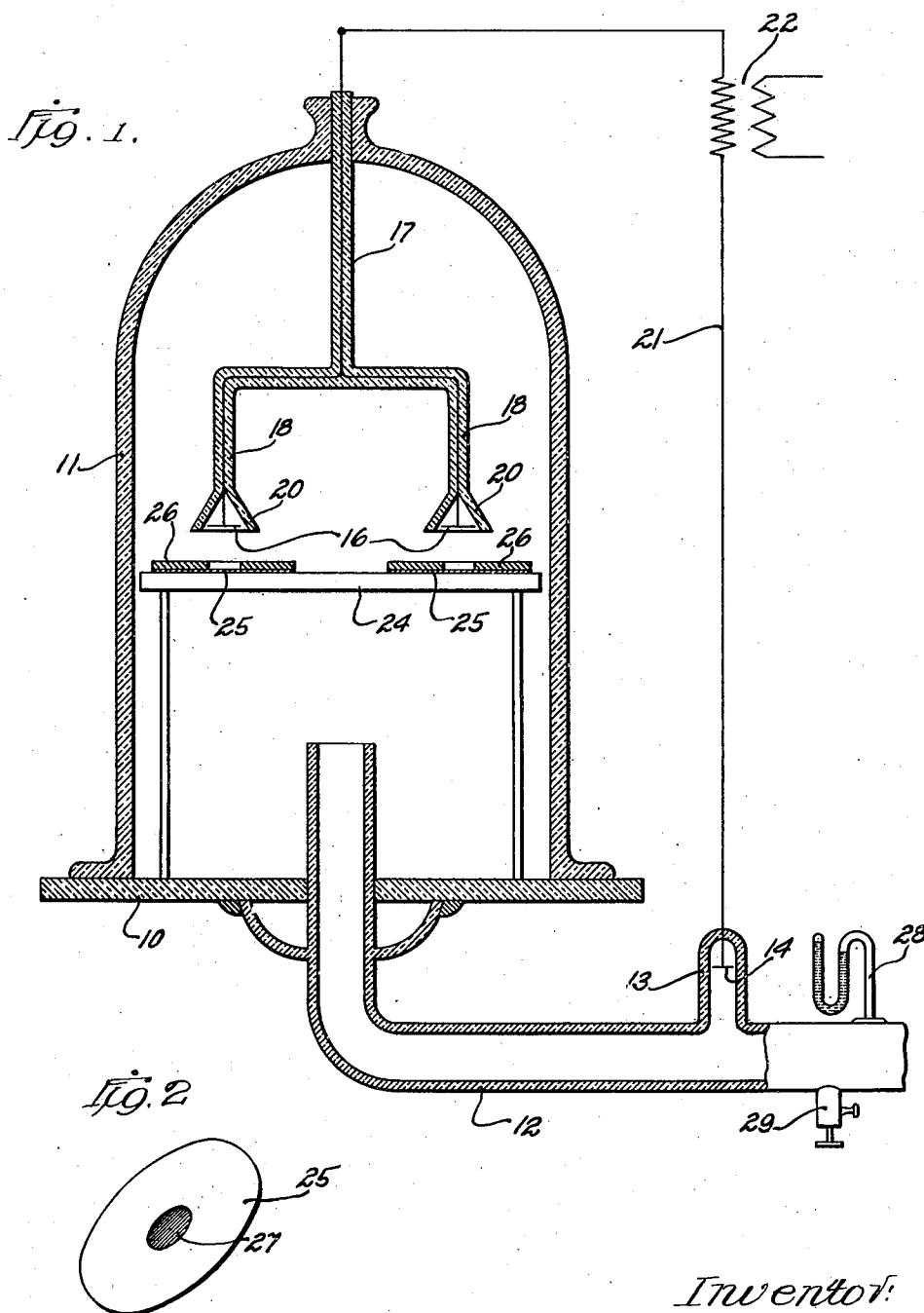
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VIBRATORY ELEMENT AND METHOD OF PRODUCING THE SAME

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UNITED STATES PATENT OFFICE

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VIBRATORY ELEMENT AND METHOD OF PRODUCING THE SAME

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This invention relates to vibratory elements and methods of producing the same, and more particularly to diaphragms intended for use in microphones and telephone transmitters.

An object of this invention is to provide an improved method for applying to a diaphragm an electrode consisting of a thin metallic coating of even thickness which shall thoroughly adhere thereto without any tendency to separate therefrom.

To accomplish the above and other objects, an electrode is applied to a diaphragm in the form of a thin coating by a cathodic sputtering process, whereby the coating is so hammered into the metal of the diaphragm that it is extremely adherent at all points and does not tend to separate therefrom, since no electrolytic action takes place between the metals of the diaphragm and of the electrode.

The invention will be more fully understood from the following description, taken in conjunction with the appended drawings, in which

Fig. 1 diagrammatically illustrates an apparatus for use in coating diaphragms in accordance with the invention, and

Fig. 2 is an enlarged perspective view of a vibratory element formed in accordance with the invention.

In the drawings, which illustrate a preferred form of the invention without limiting it, the reference numeral 10 designates a base upon which is supported a bell jar or other suitable vacuum chamber forming means 11. An exhaust tube 12 leads from the vacuum chamber to a vacuum pump (not shown) and is provided with an arm 13 in which is mounted an anode 14.

A plurality of cathodes 16, preferably consisting of a noble metal, such as gold, platinum, etc., to be deposited on the diaphragms, are supported in the vacuum chamber in spaced relation by means of an insulating member 17, having arms 18 terminating in conical shields 20 which overlie the cathodes. The cathodes are connected to anode 14 by means of an electric circuit 21 which includes the secondary of

a transformer 22. While only two cathodes are shown in the drawings, it will be understood that any desired number may be used within the limits of the space available within the vacuum chamber.

Within the vacuum chamber is positioned a support 24 for the diaphragms 25 to which the electrodes are to be applied, and plates 26, which may be of flat annular form, protect those parts of the diaphragm to which the coating is not to be applied. The pressure within the vacuum chamber is indicated by a gauge 28 and may be controlled by a manually operated bleeder valve 29. It will be understood that when a suitable vacuum, corresponding to .1 mm. of mercury or thereabouts, is produced in the chamber, and the transformer 22 is energized, current will flow therefrom to cathodes 16 and thence through the exhausted atmosphere to anode 14 in the known manner, carrying with it particles of the metal forming the cathodes 16 and depositing such particles upon any objects which may lie in their path, thus coating the exposed or central portion 27 of the diaphragms. In order to prevent reversal of this action, the total surface area of cathodes 16 is made several times greater than that of anode 14, although the same result may be obtained by inserting a rectifier in the circuit 21. The coating process continues for such time as is found by experience to be necessary to produce an electrode of the desired thickness, whereupon the diaphragms are inverted and electrodes applied to their opposite faces, provided that both faces are to have electrodes thereon.

Diaphragms having electrodes secured thereto in accordance with this invention have excellent mechanical and acoustic properties, and their useful life is increased by the close adherence of the electrodes to the diaphragms. The process disclosed herein also makes possible the use of such materials as glass and mica in diaphragms, which materials could not be successfully plated with electrodes heretofore.

Various changes may be made in the method and apparatus shown and described

without departing from the spirit of the invention as defined in the following claims.

What is claimed is:

1. The method of applying a metallic microphonic electrode member to another member which consists in depositing thereon by cathodic sputtering a coating of the metal to form the metallic member.

2. The method of applying a metal electrode to a telephone diaphragm which consists in exposing a portion of the diaphragm to the action of metal-carrying cathode rays.

3. The method of producing a vibratory element which consists in cathodically sputtering a noble metal upon a predetermined portion of a diaphragm to form an electrode thereon.

4. A vibratory element consisting of a diaphragm having an electrode produced thereon by cathodic sputtering.

5. A vibratory element for use in microphones and telephone transmitters, consisting of a diaphragm having on at least one of its faces a noble metal electrode deposited by cathodic sputtering.

6. A vibratory element consisting of a base metal diaphragm having on one of its faces a noble metal electrode deposited by cathodic sputtering.

7. A vibratory element consisting of a metal diaphragm having on at least one of its faces a gold electrode deposited by cathodic sputtering.

In witness whereof, I hereunto subscribe my name this 19th day of December, A. D. 1928.

HAL FREDERICK FRUTH.

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