J. W. OWEN & A. HEWITT.

DIAPHRAGM.

APPLICATION FILED JAN. 25, 1912.

1,118,675. Patented Nov. 24, 1914.

Fig. 1.

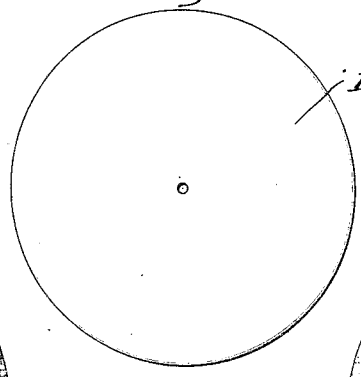


Fig. 2.

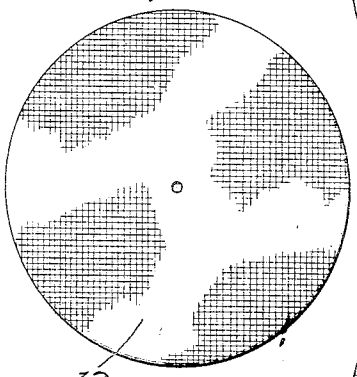


Fig. 3.

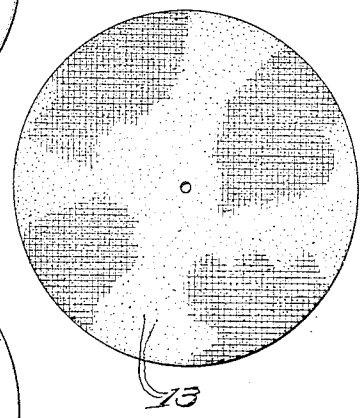


Fig. 4.

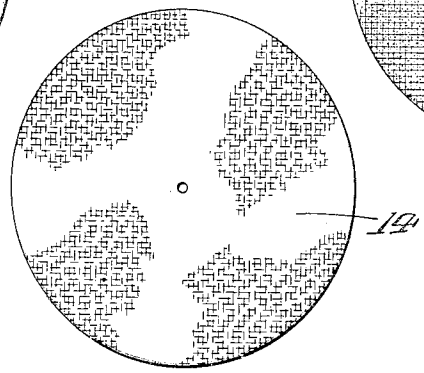


Fig. 5.

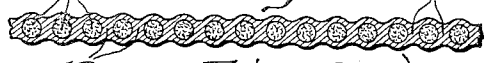


Fig. 6.

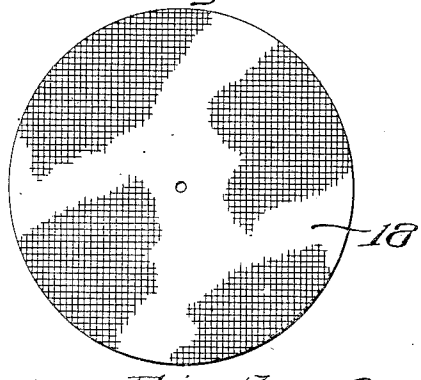
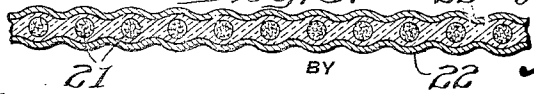


Fig. 7.



Fig. 8.



INVENTORS.

James W. Owen.

Albertis Hewitt.

BY

ATTORNEY

WITNESSES

F. J. Hartmann.

Clifton C. Callowell

UNITED STATES PATENT OFFICE.

JAMES W. OWEN, OF LANSDOWNE, PENNSYLVANIA, AND ALBERTIS HEWITT, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

DIAPHRAGM.

1,118,675. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed January 25, 1912. Serial No. 673,444.

To all whom it may concern:

Be it known that we, JAMES W. OWEN, a citizen of the United States, and a resident of Lansdowne, in the county of Delaware, State of Pennsylvania, and ALBERTIS HEWITT, a citizen of the United States, and a resident of Camden, county of Camden, State of New Jersey, have invented certain new and useful Improvements in Diaphragms, whereof the following is a specification, reference being had to the accompanying drawing.

This invention particularly relates to diaphragms for sound recording and reproducing devices, such as are preferably adapted to talking machine construction.

The principal objects of this invention are, to provide a diaphragm that will respond with perfect clearness to the most delicate vibrations, irrespective of any atmospheric changes, and that will accurately record and reproduce both the high and low tones and the included range with equal effect; and to provide a diaphragm which not only has the characteristics essential to the best reproduction of clear, loud and distinct tones, but combines therewith durability and stability, together with cheapness of manufacture in any desired quantities.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawing, Figure 1 is a front elevational view of the simplest form of this invention; Fig. 2 is a front elevational view of a diaphragm formed of fine woven fabric; Fig. 3 is a view similar to Fig. 2, showing the fabric treated with an electrically conductive material; Fig. 4 is a view similar to Figs. 2 and 3, showing the fabric diaphragm having an integument of metal; Fig. 5 is a fragmentary transverse sectional view of the diaphragm shown in Fig. 4; Fig. 6 is a front elevational view of a diaphragm similar to the diaphragm shown in Fig. 2, but of a relatively coarser fabric; Fig. 7 is a fragmentary transverse sectional view of the diaphragm shown in Fig. 6 showing its interstices provided with a filling, and Fig. 8 is a fragmentary transverse sectional view similar to Fig. 7, showing a dermatoid metallic integument formed therewith.

It is well known that in the production of diaphragms formed of mica, considerable waste is necessary in producing such diaphragms of the proper size and thickness, and in diaphragms formed of sheet metal it is difficult to produce diaphragms of absolutely uniform thickness and tension; whereas diaphragms constructed in accordance with the present invention, by an electrolytic process, may be produced with absolute uniformity.

It has been found by extensive experiment that diaphragms formed by electro-deposition produce a tone of superior quality, which may be by reason of the fact that the plating operation does not produce a difference of tension at different regions or upon opposite sides of the diaphragm, or in other words the strains, if any, are equally distributed.

The simplest form of this invention is shown in Fig. 1 of the drawing, wherein the diaphragm 10 is formed of electrically deposited metal *per se*, preferably nickel, which is produced by electroplating a polished surface, and then stripping the electrically deposited metal therefrom, thus forming a thin uniform diaphragm which is wholly composed of integrated particles of metal coalesced by electrical deposition.

The form of this invention shown in Figs. 2 to 5 inclusive comprises a composite diaphragm which is preferably formed of a silk fabric body or base 12, shown in Fig. 2, which may be immersed in water or other suitable adherent, and coated with a powder of an electro-conductive material which although indicated by the speckles 13 in Fig. 3, may be of a very fine powder or even liquid. The silk diaphragm body or base thus coated may then be immersed in an electroplating bath, preferably nickel, and provided with a dermatoidal electroplating 14 of the metal desired, the plating on the opposite faces being preferably united in integral relation through the interstices between the threads 15 of the woven body or base, as shown at 16, as best shown in Fig. 5.

The form of this invention shown in Figs. 6 to 8 inclusive comprises a diaphragm formed of a relatively coarse fabric 18, as shown in Fig. 6, which may be treated with silicate of soda (water glass) or other suitable material, for providing a filling 20 for

the interstices between the adjacent threads 21 forming the fabric, after which a coating of electrically conductive material is provided and the composite diaphragm thus formed plated with nickel 22, or any desired material which is suitable for the purpose desired, and which is especially adapted to be substantially unaffected by atmospheric changes.

It will be obvious from the foregoing description that diaphragms formed in accordance with this invention may be both flexible and light and capable of responding to any and all vibrations, and quickly regaining its equilibrium, yet be exceedingly stable.

In view of the numerous forms of diaphragms which may be produced in the manner above set forth, it is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is believed that various modifications may be made without departing from the essential features of the invention as defined in the appended claims.

Having thus described our invention, we claim:

1. A diaphragm for sound recording and reproducing machines embodying in its construction a non-metallic base and a sheet of electrodeposited metal intimately united thereto.

2. A diaphragm for sound recording and reproducing machines embodying in its construction a sheet of non-metallic material having an electroplating of nickel formed thereon and substantially covering a face thereof.

3. A diaphragm for sound recording and reproducing machines embodying in its construction a textile fabric base, and an integument of electrodeposited metal united thereto.

4. A diaphragm for sound recording and reproducing machines comprising in its construction, a textile fabric base, and a sheet of electrodeposited metal intimately united thereto.

5. A diaphragm for sound recording and reproducing machines comprising in its construction a textile fabric base, and a sheet of electrodeposited metal unitarily secured thereto and covering one side thereof.

6. A diaphragm for sound recording and reproducing machines, comprising a fabric base, and an electro-plate of metal united thereto.

7. A diaphragm for sound recording and reproducing machines, comprising in its construction a textile fabric plated with metal.

8. A diaphragm for sound recording and reproducing machines, embodying in its construction a textile fabric having an electroplate of metal joined through its interstices.

9. A diaphragm for a sound recording and reproducing machine embodying in its construction a sheet of non-metallic material and a sheet of electrodeposited metal unitarily secured thereto.

In witness whereof, we have hereunto set our hands this 22nd day of January, A. D. 1912.

JAMES W. OWEN.
ALBERTIS HEWITT.

Witnesses:
FRANK B. MIDDLETON, Jr.,
JOHN D. MYERS.