No. 855,562. PATENTED JUNE 4, 1907.

T. A. EDISON.

DIAPHRAGM FOR TALKING MACHINES.

APPLICATION FILED MAR. 6, 1907.

Fig. 1

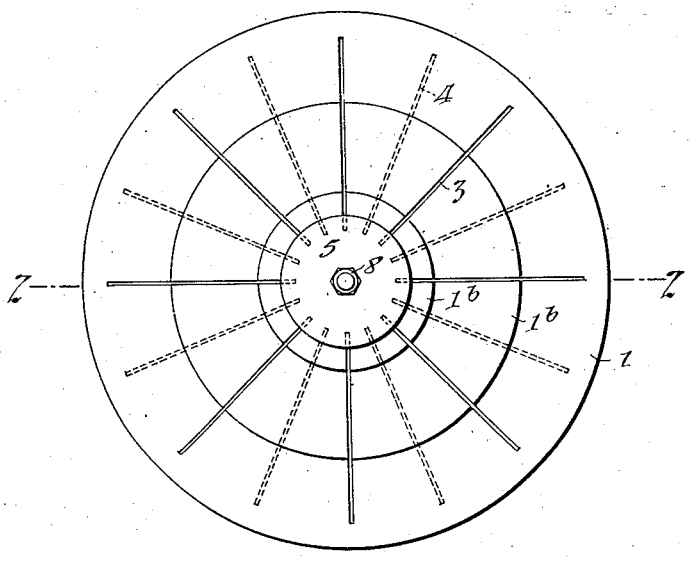
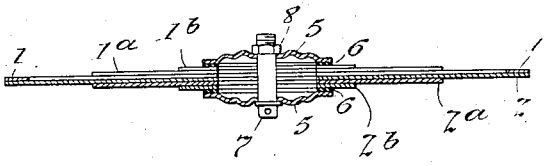


Fig. 2



Witnesses:
Frank D. Lewis
Anna R. Kelm

Inventor:
Thomas A. Edison
by Frank L. Dyer Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

DIAPHRAGM FOR TALKING-MACHINES.

No. 855,562. Specification of Letters Patent. Patented June 4, 1907.

Application filed March 6, 1907. Serial No. 360,936.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Diaphragms for Talking-Machines, of which the following is a description.

My invention relates to improvements in diaphragms for talking machines both for recording and reproducing, and my object is to provide an improved diaphragm that will be readily responsive to vibrations of comparatively great amplitude.

With diaphragms as now made in the form of a continuous disk (or a series of disks of decreasing diameters) clamped rigidly at its edge, the extent of the amplitude to which the diaphragm is capable of vibrating is necessarily very limited, since the material of which it is formed is not only flexed as the diaphragm vibrates on either side of the medial line, but undergoes stretching and contraction as it moves away from or toward the medial line. This limited capacity of the diaphragm to partake of any considerable degree of amplitude, limits in a measure the loudness of the reproduction. If it were attempted to remedy this defect by increasing the diameter of the diaphragm or materially reducing its thickness, the reproduction would not be increased but would become more or less flabby or hollow.

Another difficulty encountered with diaphragms as now constructed is that the resistance to the vibrating effect is not uniform as the diaphragm moves to either side of the medial line, but enormously increases with the amplitude, so that even if such diaphragms were capable of vibrating to a considerable extent, the power available to operate them would be insufficient to effect that result without incurring undue wear on the record surface. To effect a materially increased amplitude, I propose the making of a diaphragm in which these two difficulties are very largely removed, since the diaphragm will be capable of being vibrated to a much greater amplitude than is now possible, while the resistance to the vibration does not materially or objectionably increase within reasonable limits on either side of the medial line.

To this end the invention comprises a duplex diaphragm made of at least two disks, each of which is radially slotted so that each disk will constitute a series of reeds, and the slots of the disks being staggered so that a continuous surface will be presented for actuating the sound waves. Said disks are preferably cemented together by means of an elastic cement, such as a solution of gum rubber, in order to prevent undue resistance in vibrating. If two disks as above described were alone used, each of the reeds would be flexed throughout substantially its entire length, whereas the best results are obtained if the flexure is substantially limited to the base of each reed, so that each reed will substantially vibrate as a whole. To secure this effect I preferably form each section of the duplex diaphragm of a series of disks, say three in number, of gradually reduced diameter, whereby the vibration will be practically limited to the thinnest or outer portion. Having constructed a diaphragm of two disks or series of disks as explained, the central opening formed therein is closed by a pair of light corrugated disks seated on rubber gaskets and with which connection is made to the recording or reproducing stylus.

In order that the invention may be better understood attention is directed to the accompanying drawing forming part of this specification, and in which—

Figure 1 is a plan view of the improved diaphragm, and Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

In both of these views the same parts are represented by corresponding reference numerals.

As shown, the diaphragm in its preferred form is composed of two disks, 1 and 2, and supplemental disks 1^a, 1^b and 2^a and 2^b. The disks forming the section 1, 1^a, 1^b and the section 2, 2^a and 2^b are first cemented together as in the manufacture of ordinary laminated diaphragms, said disks being each formed preferably of mica about one-thousandth of an inch thick. After each of the laminated sections is thus constructed, a cen-

tral opening as shown is punched through the same, and radial slots 3 and 4 are formed therein by any suitable cutting tool or die. The slots 3 of the section 1, 1^a and 1^b are staggered with reference to the slots 4 of section 2, 2^a and 2^b, and the sections are then preferably cemented together, for instance, by rubber cement.

To properly cover the central opening formed in the diaphragm in such a way that the free vibration of the reeds formed by slotting the same, may not be interfered with, I make use of a pair of light metal disks 5—5, corrugated as shown so as to be as stiff as possible, and made preferably of aluminium or metallic magnesium, and these disks are seated on rubber gaskets 6 and are held together by a very small bolt 7 and nut 8. With the bolt 7 the usual connection to the recorder or reproducer diaphragm may be made.

Having now described my invention what I claim as new therein, and desire to secure by Letters Patent is as follows:

1. A diaphragm for talking machines formed of two sections, each having radial slots and the slots of one section being staggered with relation to the slots of the other section, substantially as and for the purposes set forth.

2. A diaphragm for talking machines comprising two sections cemented together, each section being radially slotted and the slots of one section being staggered with relation to the slots of the other section, substantially as and for the purposes set forth.

3. A diaphragm for talking machines comprising two laminated sections, each formed with radial slots and the slots of one section being staggered with relation to the slots of the other section, substantially as and for the purposes set forth.

4. A diaphragm for talking machines formed with radial slots so as to result in the production of a series of reeds, and means for closing said slots without materially affecting the vibrating capacity of said reeds, substantially as and for the purposes set forth.

5. A talking machine diaphragm provided with radial slots so as to form a series of reeds and a disk secured to the diaphragm and closing said slots without materially affecting the vibrating capacity of the reeds, substantially as and for the purposes set forth.

6. A talking machine diaphragm provided with a central opening and a series of radial slots, of a disk secured to the diaphragm so as to cover the central opening, substantially as and for the purposes set forth.

7. A talking machine diaphragm provided with a central opening and a series of radial slots, of a disk secured to the diaphragm so as to cover the central opening, said disk being seated on an elastic gasket, substantially as and for the purposes set forth.

8. A talking machine diaphragm formed with a central opening and a series of radial slots, of a pair of metallic disks connected together and engaging the opposite faces of the diaphragm and covering said opening, substantially as and for the purposes set forth.

This specification signed and witnessed this 23rd day of February 1907.

THOS. A. EDISON.

Witnesses:
FRANK L. DYER,
FRANK D. LEWIS.