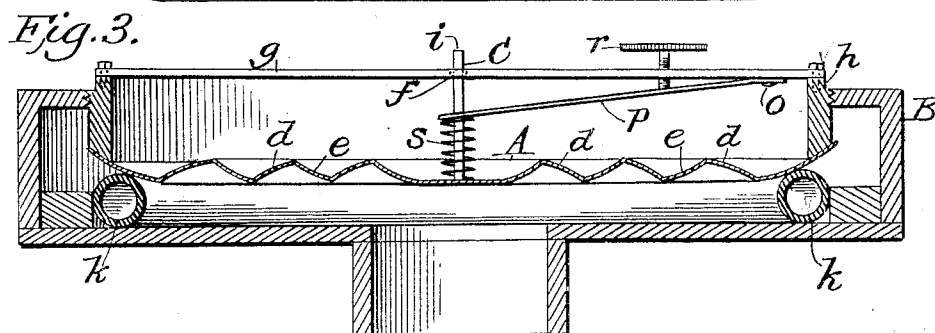
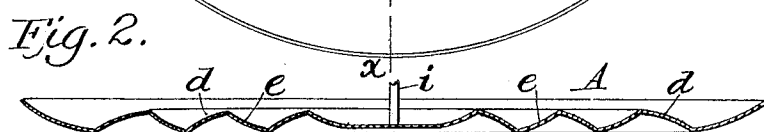
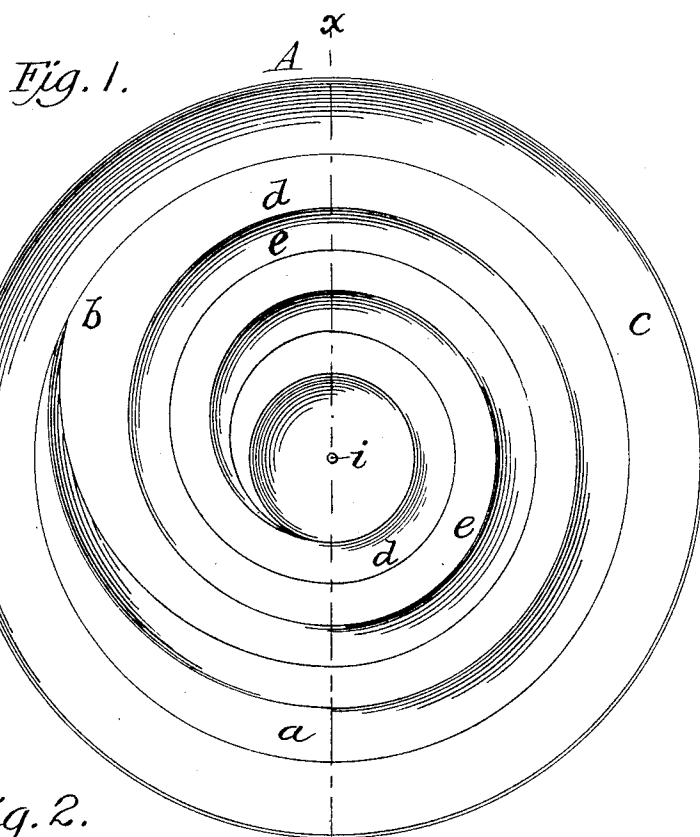


No. 804,903.

PATENTED NOV. 21, 1905.

J. H. VAN MATER.
ACOUSTIC DIAPHRAGM.
APPLICATION FILED MAY 25, 1905.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN H. VAN MATER, OF ATLANTIC HIGHLANDS, NEW JERSEY.

ACOUSTIC DIAPHRAGM.

No. 804,903.

Specification of Letters Patent.

Patented Nov. 21, 1905.

Application filed May 25, 1905. Serial No. 262,124.

To all whom it may concern:

Be it known that I, JOHN H. VAN MATER, a citizen of the United States, residing at Atlantic Highlands, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Acoustic Diaphragms for Recording and Reproducing Sound and Speech; and I declare the following to be a description thereof.

My invention relates to an improved formation of acoustic diaphragms for recording and reproducing sound-waves and the manner of using the same.

The principal objects sought to be accomplished by my invention are the inclination to a central point of the waves of sound produced by the vibrations of an acoustic diaphragm and the steadying of the vibratory action of the diaphragm when in use. The first of these objects I secure by a novel conformation of the face of the diaphragm, and the second object is effected by a central spring which acts as a governor for the diaphragm, all of which will hereinafter be more particularly set forth.

Other points of my invention will be set forth in the following specification and appear in the drawings.

Figure 1 is a plan or face view of the diaphragm. Fig. 2 is a central cross-section of Fig. 1 on line *xx*, and Fig. 3 shows a cross-section of the diaphragm-holder with the diaphragm in place.

In the drawings, A represents the diaphragm, which I prefer to make of thin metal, although other materials may be used.

B represents the holder in which the diaphragm is located for use.

The main portion or body of the diaphragm is formed into a spiral ridge *a*, beginning near the center and gradually widening until it terminates near the circumference at *b*. Between its circumference and the outer termination of the spiral ridge or corrugation the diaphragm forms a concentric flat ring *c*, which is tilted or inclined at an angle to the plane of its face. The spiral ridge *a* is formed so that it is highest at its longitudinal center; but the sides are different in form. On its outer face the spiral ridge or corrugation *a* descends in a convex curve to the plane of the diaphragm, as shown at *d*, while on the inner side it is concave, as shown at *e*.

It will be observed that when the diaphragm is made of a thin sheet of metal or other mate-

rial by stamping or turning it up on a former the corrugation or spiral ridge *a* will present a concave surface toward the center on both sides.

C is a pin secured to the center of the diaphragm and extending through a hole *f* in the cross-bar *g*, which is secured to the retaining-ring *h* of the diaphragm-holder B. The end *i* of the pin C is intended to be connected with any of the various styles of recorders or reproducers. (Not shown.)

Around the pin C and resting on the diaphragm is a spring *s*, which bears against the diaphragm with sufficient pressure to steady it. Where the diaphragm is of small size, the spring *s* may be dispensed with, the diaphragm resting on the supports at its circumference only. The spring *s* may bear at one end against the cross-bar *g* and good results be obtained. On the under side of the cross-bar *g* is a metal plate *p*, which is secured at one end *o* to the cross-bar, the other end resting on the spring *s*. A thumb-screw *r* is set through the bar *g* and bears on the plate *p* to regulate the pressure of the spring on the diaphragm. The regulating-plate *p* is either forked or pierced at its free end where it rests on the spring *s*, so as not to bind on the pin C. On the inside of the holder B is a cushion *k*, on which the flat rim of the diaphragm rests, and is held in place by the impinging thereon of the retaining-ring *h* of the holder.

When made and used in this way, the diaphragm may be of any desired size and quite thin, as the spiral corrugation or ridge *a* will tend to stiffen it inside of the outer flat rim *c*, and the spring *s* takes up any tendency to limpness.

I have described the preferred way of constructing and using my device; but various modifications may be employed without departing from the spirit of my invention. For instance, where the inner face of the corrugation or ridge *a* is concave in form advantage is obtained where the corrugation is even concentric as well as spiral, and again where the spiral form of ridge is used great benefit is secured even when the inner face thereof is not concave.

The design in making the inner face of the corrugation concave is to reflect or centralize the sound-waves. By forming the inner side of the ridge concave and the outer convex both sides of the diaphragm will have the in-

ner face of the corrugations concave when the disk is of thin material and pressed or turned up. I do not, however, wish to limit myself to a diaphragm composed of a disk which is pressed or turned up, as a diaphragm one side of which is flat and the other formed with a spiral wave on its face will accomplish beneficial results irrespective of the form of the side of the diaphragm receiving the impact of the sound-waves.

The cushion *h* on which the diaphragm rests may be solid and made of leather or even soft wood, if desired.

I claim—

1. An acoustic diaphragm for reproducing or recording sound, comprising a disk with an operative surface in the form of a spiral ridge commencing near its center and terminating near its circumference, substantially as shown and described.

2. An acoustic diaphragm for reproducing or recording sound, comprising a disk with an operative surface in the form of a succession of circling ridges, the inner face of such ridges being concave, substantially as shown and described.

3. An acoustic diaphragm for reproducing or recording sound, comprising a disk with an operative surface in the form of circling ridges the inner sides of which are concave and the outer face thereof convex, substantially as shown and described.

4. An acoustic diaphragm for the recording or reproduction of sound comprising a disk having an operative surface composed of a spiral ridge beginning near the center and terminating near the circumference, said spiral ridge having its inner side concave and the outer side convex substantially as shown and described.

5. An acoustic diaphragm for the purposes described, comprising a disk of thin metal having stamped or spun therein and there-through a spiral ridge beginning near the cen-

ter and terminating near the circumference, substantially as shown and described.

6. An acoustic diaphragm for the recording or reproduction of sound, having an operative surface comprised of a spiral ridge and an outer plain rim turned at an angle to its face, substantially as shown and described.

7. In apparatus for recording and transmitting sound, an acoustic diaphragm, held at its circumference in a holder, a cross-bar diametrically spanning said holder, an actuating-pin secured to the center of the diaphragm adapted to connect with the usual cutter or reproducing tool, and a spiral spring surrounding the actuating-pin between the cross-bar and diaphragm, said spring exerting pressure between the face of the diaphragm and the cross-bar substantially as shown and described.

8. In apparatus for recording and transmitting sound, an acoustic diaphragm, held at its circumference in a holder, a cross-bar diametrically spanning said holder, an actuating-pin, secured to the center of the diaphragm, adapted to connect with the usual cutter or reproducing tool, a spiral spring surrounding the actuating-pin, between the cross-bar and diaphragm, said spring exerting pressure between the face of the diaphragm and the cross-bar and means for varying the pressure exerted by said spiral spring on the diaphragm substantially as shown and described.

9. In apparatus for recording and reproducing sound, an acoustic diaphragm having a central pin and surrounding spring combined with a holder having means for retaining the spring under tension against the center of the diaphragm, substantially as shown and described.

JOHN H. VAN MATER.

Witnesses:

JOHN E. FOSTER,
FRANK W. REITER.