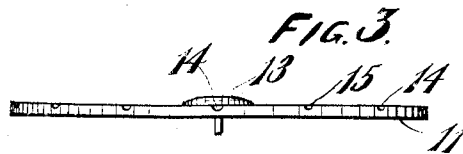
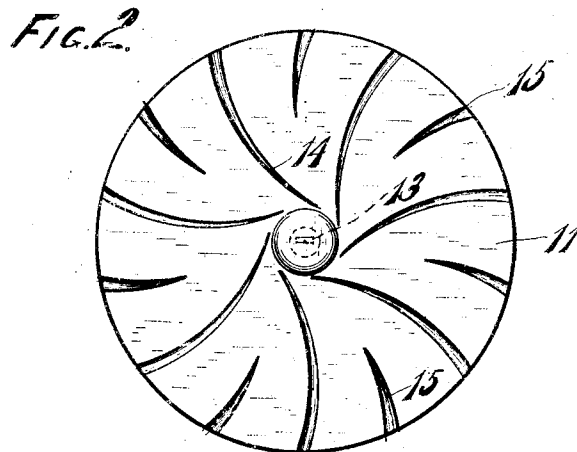
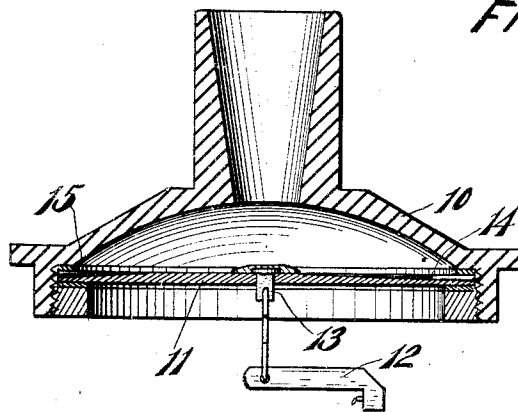


J. H. ELLIS & A. J. HOFFMAN.
 DIAPHRAGM.
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1,040,294.

Patented Oct. 8, 1912.



WITNESSES

D. D. Thuermer.
Katherine Holt

INVENTORS

James H. Ellis & Albert J. Hoffman
By Morsell & Caldwell.
 ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES H. ELLIS, OF MILWAUKEE, AND ALBERT J. HOFFMAN, OF WAUWATOSA,
WISCONSIN.

DIAPHRAGM.

1,040,294.

Specification of Letters Patent.

Patented Oct. 8, 1912.

Application filed October 11, 1911. Serial No. 654,113.

To all whom it may concern:

Be it known that we, JAMES H. ELLIS, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin; and ALBERT J. HOFFMAN, a citizen of the United States, and resident of Wauwatosa, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Diaphragms, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to diaphragm constructions for sound recording and reproducing instruments and has for its object to provide a diaphragm which while being highly sensitive to weak sound vibrations will properly respond to the stronger sound vibrations and will also truly record or reproduce the original volume of sound.

Another object of the invention is to provide a diaphragm construction of a single sheet of resilient material rendered more flexible at its peripheral or marginal portion by lines of scoring.

With the above and other objects in view, the invention consists in the diaphragm as herein claimed and all equivalents.

Referring to the accompanying drawings in which like characters of reference indicate the same parts in different views: Figure 1 is a sectional view of a diaphragm constructed in accordance with this invention in its position for use in a sound box; Fig. 2 is a plan view thereof; and Fig. 3 is an edge view thereof.

In these drawings 10 indicates a sound box of ordinary construction and 11 is the diaphragm embodying this invention, 12 being the usual stylus connected at the center thereof by connection 13. Under this invention the diaphragm is composed of a single sheet of resilient material, preferably celluloid in a disk shape which is clamped in the sound box at its edges, as usual. This disk is of a greater thickness than would be suitable for use in its unaltered condition, being too stiff to respond properly to slight vibrations, but it is so altered by means of scoring in one or the other surfaces thereof, as to render it more flexible at its peripheral or marginal portions just inside of the edge clamped by the sound box. The scoring for this purpose

may take any desired form but it has been found in practice to be desirable to cut or engrave arc shaped lines 14 having the general direction of radial lines but tangent to an imaginary circle concentric with the disk and terminating, or rather beginning at such point of tangency and becoming wider and deeper as they approach the edge of the disk. It has also been found desirable to form these arc shaped engraved or scored lines of approximately the same radius as the disk. It has further been found desirable to provide a disk with shorter supplemental scoring lines 15 similar to the lines 14 and positioned midway between them, but of only half the length thereof and confined to the outer edge of the disk. The direction of the scoring lines is such that the distorted sectors between them have the appearance of being twisted and are of greater length than if described by truly radial lines. Their greater length gives a greater resiliency to the diaphragm as a whole, but because of the scoring lines becoming deeper and wider as they approach the edge of the disk the degree of flexibility becomes greater as the edge or margin of the disk is approached. This is further assured by the presence at the marginal portion of the disk of the supplemental scoring lines 15.

With a diaphragm of this construction it has been found that the dense unresponsive disk which is unsuitable for diaphragm purposes before the scoring operation is performed on it is rendered freely sensitive to the weakest sound vibrations while accurately following the stronger vibrations and thus more truly recording and reproducing the sound value, whatever its volume may be. The scoring has the effect of weakening the margin of the diaphragm so that the diaphragm may respond bodily to all vibrations, whether weak or strong, and avoid the formation of local vibrations in the diaphragm which would disturb a truthful reproduction.

What we claim as new and desire to secure by Letters Patent, is:

1. A diaphragm having grooved arc shaped lines of varying depth therein arranged approximately radial.

2. A diaphragm, comprising a disk having grooved arc shaped lines of varying depth formed therein approximately radial

and tangent to a circle concentric with the disk.

3. A diaphragm, comprising a disk having arc shaped lines formed therein approximately radial and increasing in depth and width toward the edge of the disk.

4. A diaphragm, comprising a disk having grooved arc shaped lines of varying depth formed therein approximately radial,
10 and supplemental arc shaped grooved lines

of varying depth intermediate of the radial lines at the margin of the disk.

In testimony whereof, we affix our signatures, in presence of two witnesses.

JAMES H. ELLIS.

ALBERT J. HOFFMAN.

Witnesses:

C. H. KEENEY,

R. S. C. CALDWELL.