

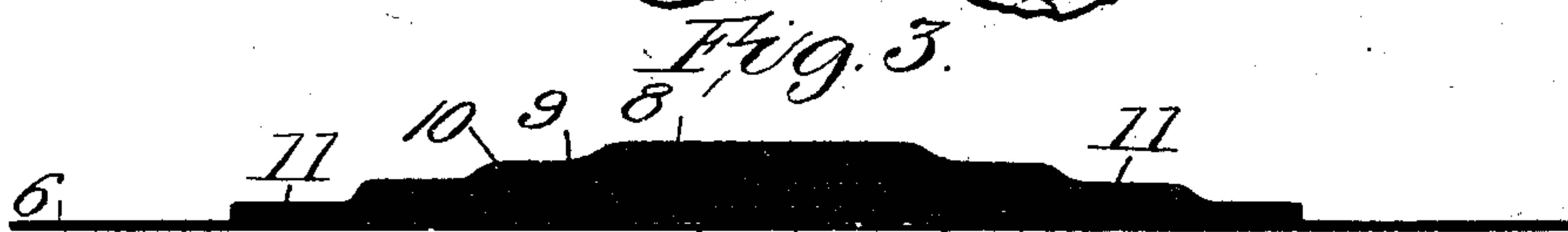
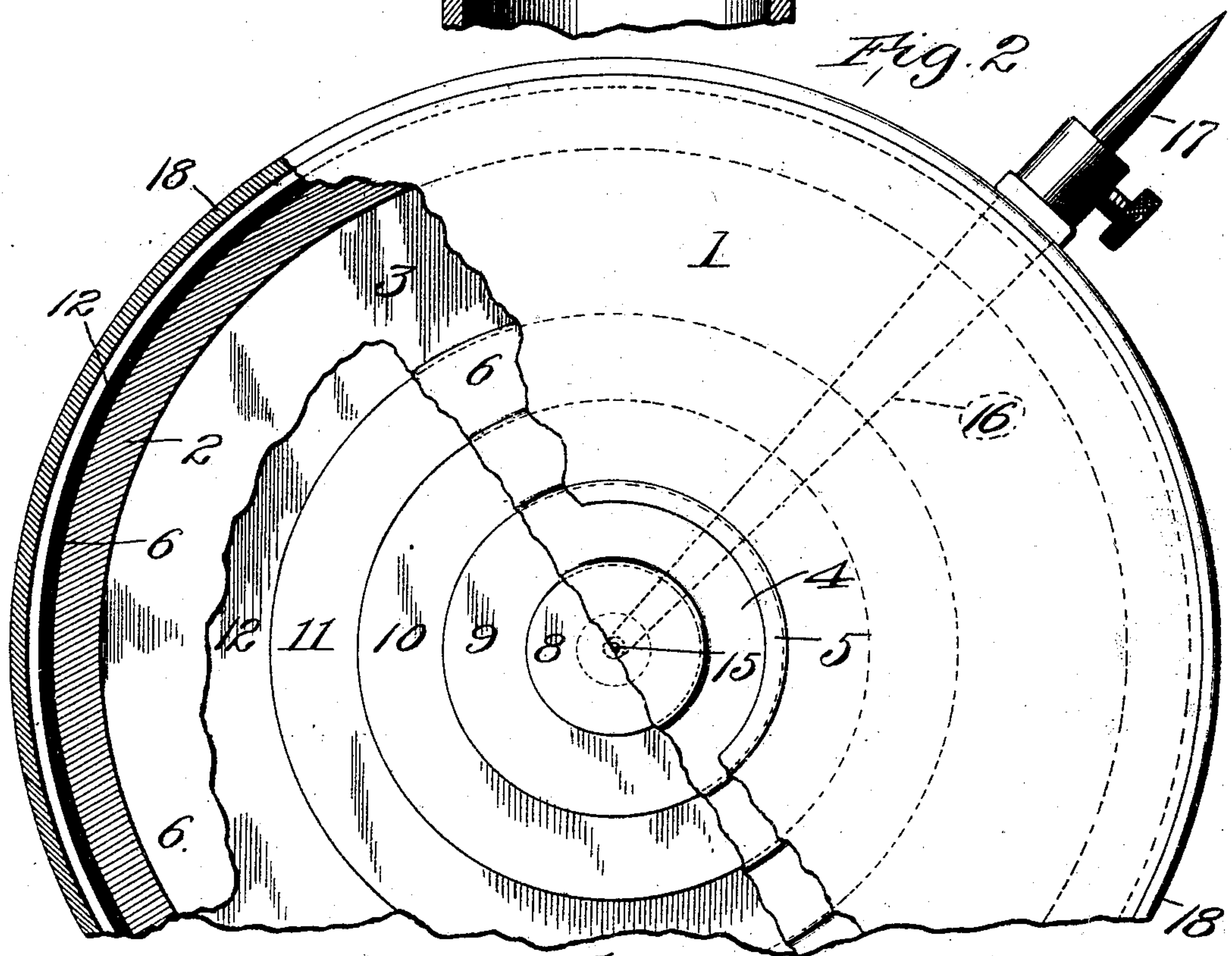
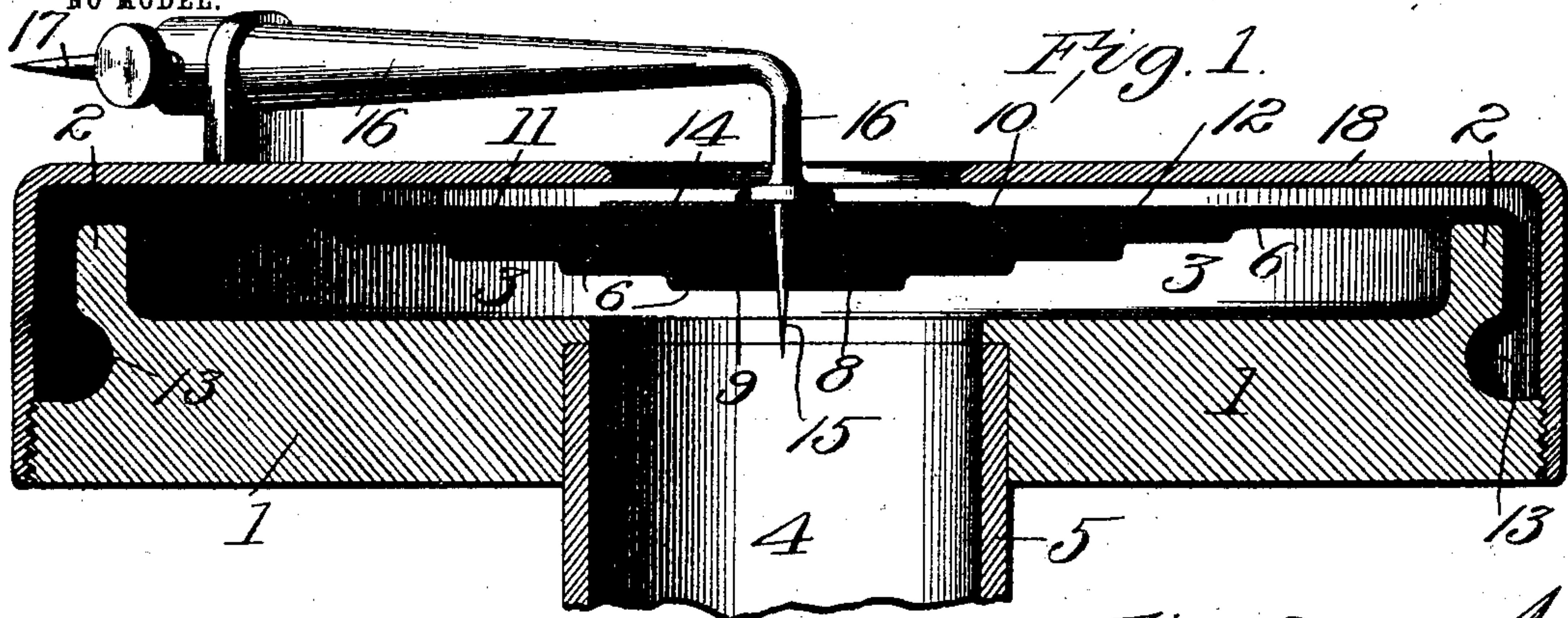
No. 719,361.

PATENTED JAN. 27, 1903.

W. B. OUTTEN.  
SOUND BOX.

APPLICATION FILED JUNE 2, 1902.

NO MODEL.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

WARREN B. OUTTEN, OF ST. LOUIS, MISSOURI.

## SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 719,361, dated January 27, 1903.

Application filed June 2, 1902. Serial No. 109,924. (No model.)

*To all whom it may concern:*

Be it known that I, WARREN B. OUTTEN, a citizen of the United States, residing at St. Louis, Missouri, have invented certain new and useful Improvements in Diaphragms, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an enlarged sectional view through my improved sound-box. Fig. 2 is a fragmentary inverted plan view, and Fig. 3 is a sectional view illustrating the manner of building up the diaphragm.

This invention relates to a new and useful improvement in diaphragms for transmitting sound and is adapted for use in connection with phonographs, graphophones, gramophones, telephones, stethoscopes, auscultators, and other devices wherein diaphragms are vibrated to transmit sound-waves.

The object of the invention is to produce a device of the character described which will transmit sound-waves approximating in volume more nearly the original sound-waves than any instrument of similar character heretofore made and on the market with which I am familiar.

Being useful in connection with so many sound-wave transmitters, it will be obvious that slight modifications can and undoubtedly will be made to accommodate my invention to the various uses for which it may be employed.

This invention consists in the arrangement of the diaphragms, which diaphragms are preferably composed of animal membrane containing muscular tissues or fibers which approximate the muscular structure of the ear-drum secured by an adhesive substance, whereby tense radiating lines are formed to overcome the dormant areas in said diaphragms. While I have employed animal membrane in devices of this character which I have constructed and obtained excellent results, yet it may be that there are other materials which can be employed with good results, and therefore I do not wish to be understood as limiting myself specifically to the materials hereinafter mentioned, nor to the

treatment thereof by any particular ingredients, as it is obvious that there are numerous ingredients which can be used in connection with the diaphragms without in the least departing from the nature and principle of my invention.

In the drawings, 1 indicates a box or housing provided with a flange 2, forming, with the diaphragm stretched thereover, an internal sounding-chamber 3, connected with the exterior by an opening 4 in the stem or tube 5, extending rearwardly from the body portion 1.

6 indicates a diaphragm of some principal or foundation membrane, such as goldbeaters' skin, preferably of one thickness, which is stretched over the flange 2 and secured in position while tense in some suitable manner—such, for instance, as a cord or wire engaging the ends thereof and burying said edges in the annular groove in the outer face of the flange 2. This diaphragm may be stretched while wet or green, so that upon drying it will become tense or taut. In the center of this diaphragm and preferably on the outer surface thereof I secure, by means of a suitable mucilaginous substance, a disk 8, said disk being preferably composed of a number of thicknesses of goldbeaters' skin stuck together. This disk will place the diaphragm 6 under greater tension, due to the drawing or pulling action of the securing medium for the disk to the diaphragm, and will also form what I will term "tense" radiating lines, which serve to concentrate the vibrations of the diaphragm to a central point. This I have found to be important in that the liability to the formation of dormant areas is lessened, which dormant areas might otherwise exist in the diaphragm and tend to neutralize the vibrations thereof. Flange 2 is for this reason preferably circular in order that this pull may be evenly distributed throughout the surface of the diaphragm, and this disk 8 is centrally located relative to the attachment of the edges of the diaphragm to the flange. When the adhesive substance which secures the disk 8 to the diaphragm 6 has become dry and has produced these tense radiating lines before described, another disk 9, of larger diameter than the disk 8, is secured by adhesive substance to the outer face



of disk 8, the marginal edges of the larger disk 9 being pressed firmly onto the diaphragm 6, to which said marginal edges become attached. This second disk acts in the same way as the first—to wit, it produces these tense radiating lines before referred to and draws the diaphragm 6 more tightly and considerably reduces the liability to the formation of dormant areas. When the adhesive substance which secures the disk 9 has become dry, another disk 10, of larger diameter than the disk 9, is attached to the outer face thereof, the marginal edges of disk 10 being secured to the diaphragm 6. The adhesive substance used in applying this disk 10 in position is allowed to dry, as before described, and this disk acts in the same way as the others heretofore described in reducing the dormant areas and more tightly stretching the diaphragm 6. In the drawings I have shown a fourth disk 11 applied in position over the disk 10 and with its marginal edges secured to the diaphragm 6. This fourth disk 11 acts in the same manner as the disks before described, and when in position there is still left a clear space between the margin thereof and the flange 2. All of the disks 8, 9, 10, and 11 are each preferably composed of a number of layers of goldbeaters' skin cut to the proper shape and adhered together, the adhesive substance being wet slightly at the time the disks are applied in order that they may be readily pressed into the proper shape, said disks drying or at least partially drying when in the desired position. I have produced very good results by using from ten to fifteen layers of goldbeaters' skin in the construction of these disks. After the disks are applied as above described, which application is shown in Fig. 3, I then take a number of layers of goldbeaters' skin and after treating them with a solution hereinafter described apply them wet over the disks, securing the successive layers by the use of some adhesive substance to the flange 2 in some suitable manner. These last-mentioned diaphragms are applied one after another until an outer diaphragm having from ten to fifteen layers of goldbeaters' skin is in position, when the cord or wire is used to embed the edges of all of the diaphragms in the groove before referred to. In the drawings I have indicated this outer diaphragm composed of a number of layers by 12 and the embedding wire by 13.

14 indicates a metal disk which is applied centrally with respect to the diaphragm 12 by means of some adhesive substance. This disk is provided with an opening in its center for the reception of a pointed pin or projection 15 on the end of the needle-post 16. If desired, the diaphragms and disks may be punctured centrally before being applied in position to receive this pin, said pin serving to hold the needle-post firmly in place, thus avoiding the use of beeswax or other substance commonly

employed to secure the needle-post to the diaphragm.

17 indicates the stylus, which is secured in the needle-post, shown in this instance as a reproducing-stylus. It is obvious that where the sound-box is to be used in connection with recording and reproducing sound post 16 may also be constructed to carry a cutting-stylus.

18 indicates a casing or shell which is employed to protect the diaphragm for well-understood purposes.

Before using goldbeaters' skin in my improved sound-box it is desirable to treat the same so as to render the texture thereof more compact and at the same time prevent the volatilization of all moisture which would tend to destroy the flexibility and efficiency of the diaphragm. The composition I have used and found to answer is made up as follows: two ounces liquid glass, one ounce glycerin, one-half ounce oil of resin, two drams chlorid of cobalt, and enough water added to make a mixture of twelve ounces. The liquid glass is employed to preserve a certain amount of moisture lent to the mixture by the non-volatile and solvent glycerin. The oil of resin acts as a drier and also as a bond for the other ingredients, while the chlorid of cobalt is used as a preservative and germicide.

For purposes of distinction I will term the diaphragm 6 the "inner" diaphragm and will state that, if desired, it can be composed of several layers and I will term the diaphragm 12 the "outer" diaphragm.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a diaphragm composed of animal membrane, of a circular support therefor, a disk which is secured to the center of said diaphragm by an adhesive substance, whereby said disk draws said diaphragm toward a central point to form tense radiating lines to overcome dormant areas in said diaphragm, and a second disk placed in position over the first-mentioned disk and having marginal contact with the diaphragm beyond said first-mentioned disk, for drawing said diaphragm toward a central point to increase the tensility thereof; substantially as described.

2. A diaphragm for the purposes described treated with liquid glass, glycerin, and oil of resin; substantially as described.

3. A diaphragm for the purposes described treated with liquid glass, glycerin, oil of resin and chlorid of cobalt; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 30th day of May, 1902.

WARREN B. OUTTEN.

Witnesses:

GEORGE BAKEWELL,  
G. A. PENNINGTON.