

W. W. YOUNG.  
ACOUSTIC DIAPHRAGM.  
APPLICATION FILED MAR. 28, 1910.

975,596.

Patented Nov. 15, 1910.

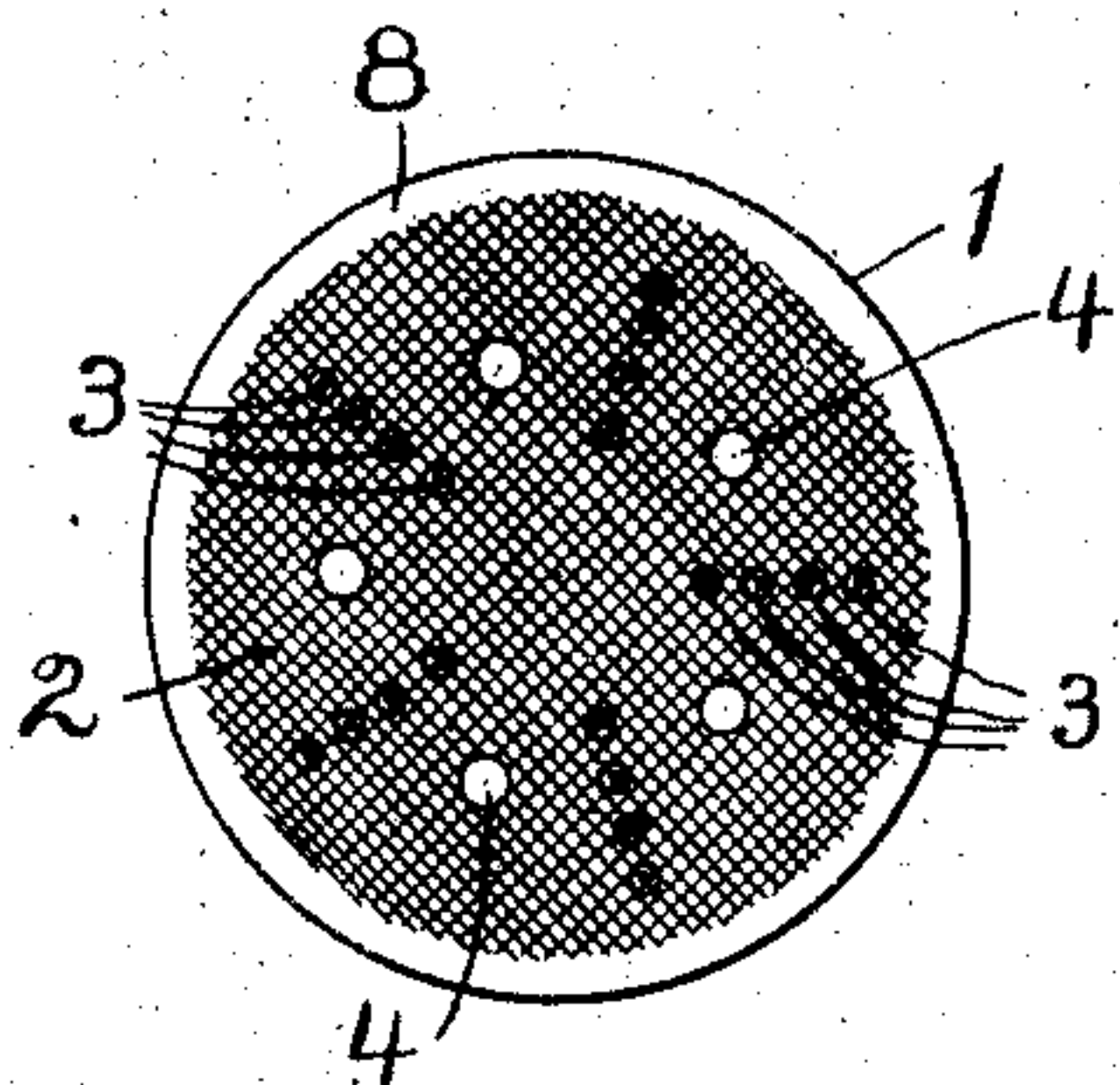


FIG. 1.

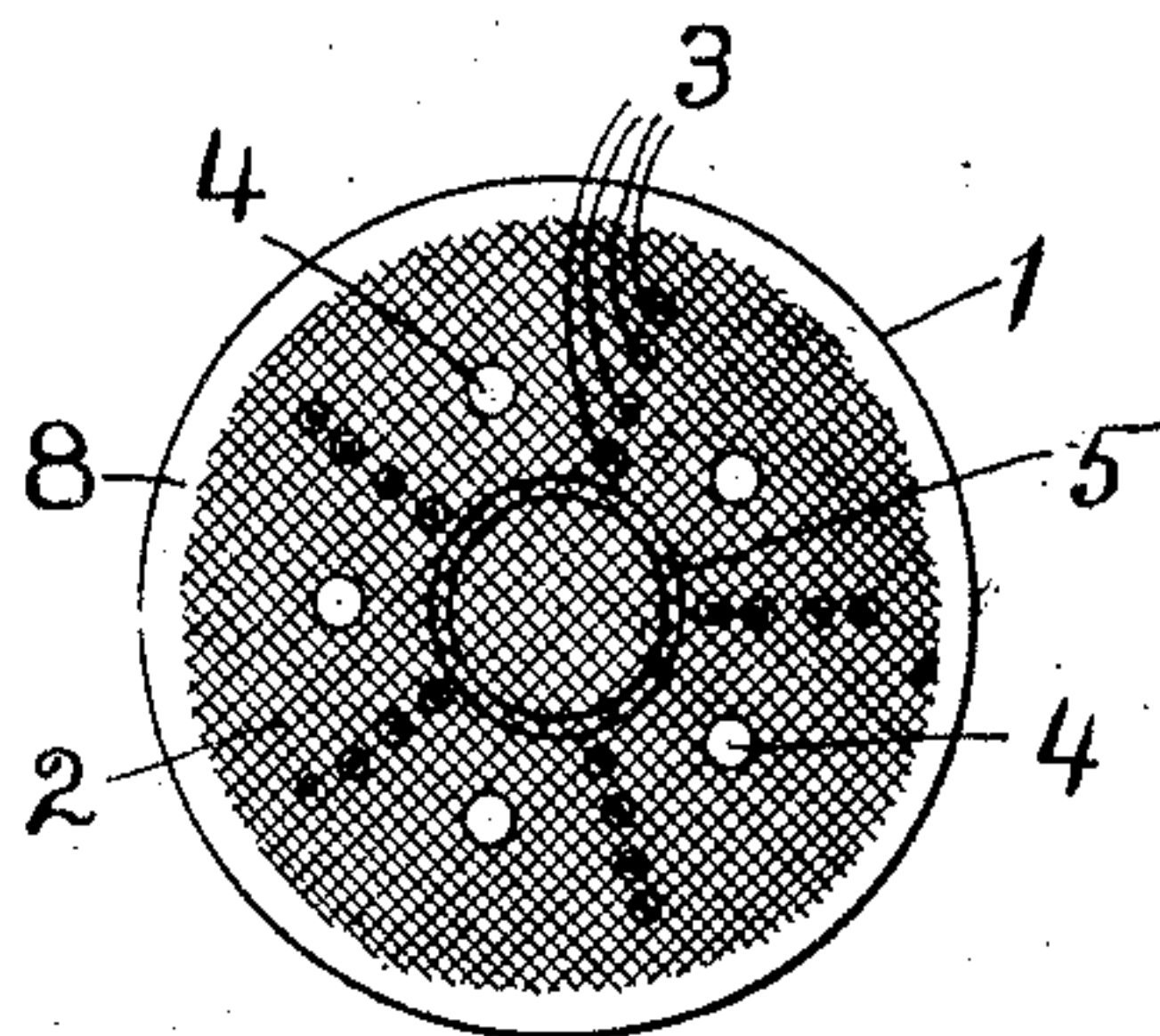


FIG. 2.

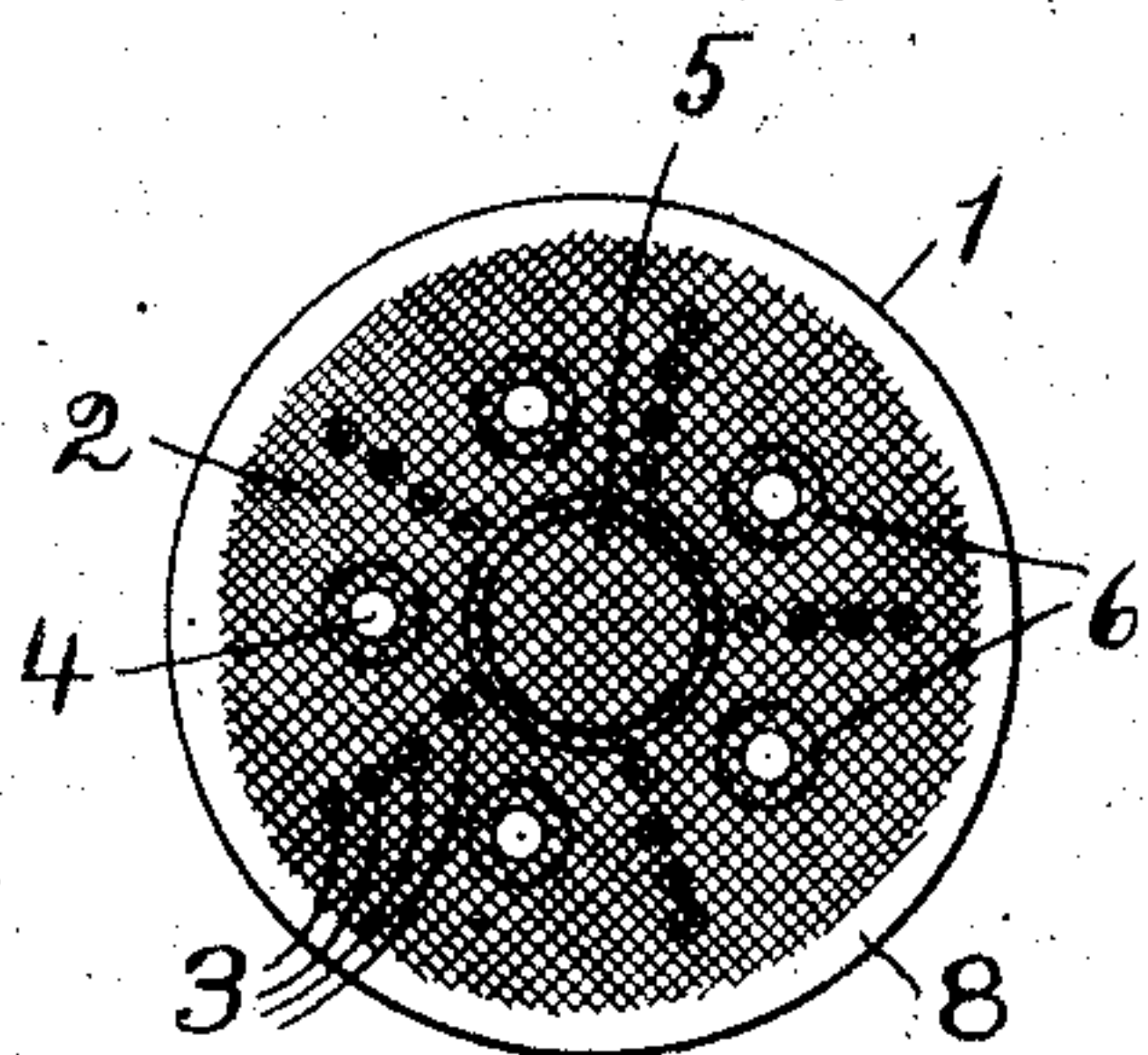


FIG. 3.

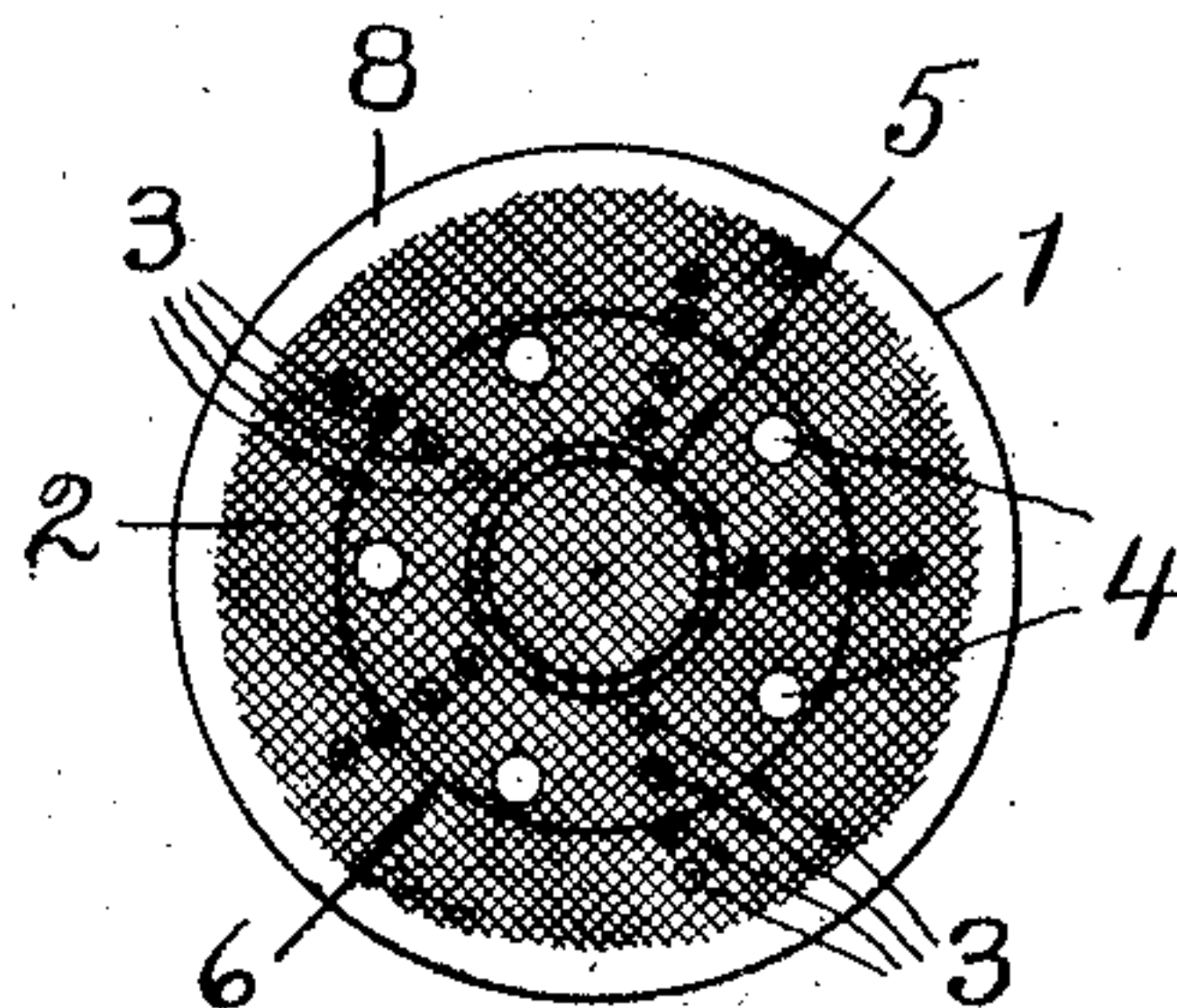


FIG. 4.

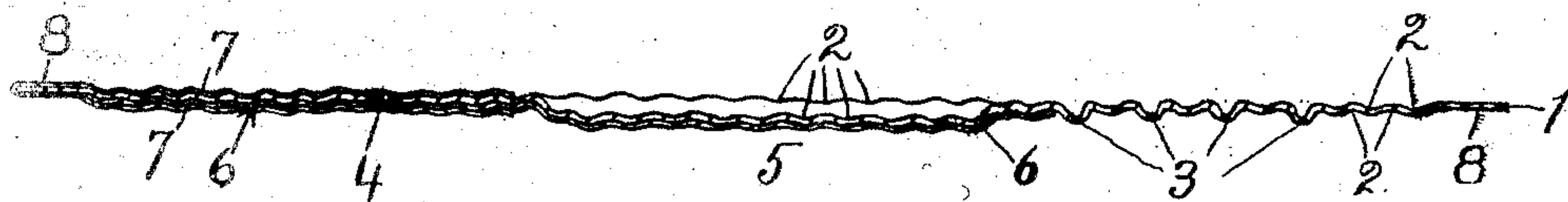


FIG. 5.

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# UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF SPRINGFIELD, MASSACHUSETTS.

ACOUSTIC DIAPHRAGM.

975,596.

Specification of Letters Patent.

Patented Nov. 15, 1910.

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*To all whom it may concern:*

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Acoustic Diaphragm, of which the following is a specification.

My invention relates to improvements in acoustic diaphragms, and more particularly to acoustic diaphragms for use in the sound-boxes of talking-machines, although by no means restricted to such use, and consists essentially of a perforated disk of suitable material which has irregular or broken surfaces and also has burs formed thereon, a thin covering or coverings of suitable material on such disk for the perforations therein, and a suitable coating of material or materials capable of being applied in solution and then hardening upon said disk and in such perforations and said covering or coverings, the latter being permeable by such solution, all as hereinafter set forth.

The above-mentioned coating should be of a nature which insures the required permanent unity between it and the parts to which it is applied while in solution, and which adds materially to the excellency, efficiency, and value of the diaphragm. By the term "solution," as herein employed, is meant any compound, emulsion, or any character of mixture of suitable composition to produce the hard, permanent, and exceedingly advantageous or beneficial coating to which special attention has been called.

The object of my invention is to produce an acoustic diaphragm, of the above-indicated class, which possesses practically all of the desirable as well as the essential characteristics and qualities of a device of this kind, among which characteristics or qualities may be mentioned durability and stability, resiliency and resonance, capability of giving out clear, loud and distinct tones of great volume and depth, and of evenly distributing the sound waves, and immunity from blasts and scratching sounds and other alien and discordant noises.

Other objects will appear in the course of the following description.

I attain the objects and secure the advantages of my invention by the means illustrated in the accompanying drawings, in which—

Figure 1 is a side view of one form of

disk that may be used in my invention; Fig. 2, a similar view of a similar disk for a similar purpose, but slightly modified; Fig. 3, a side view of a finished diaphragm; Fig. 4, a side view of a slightly modified form of diaphragm, and, Fig. 5, a greatly enlarged and exaggerated cross-section through the center of a diaphragm which embodies the aforesaid invention in a practical form, as do in part or in whole the other views.

Some of the covering and some of the coating are omitted from the last view, but it will be understood that in reality the covering extends to the right of the center, over the burs, as far as it does to the left of the center, and the coating is over the entire device.

Similar figures refer to similar parts throughout the several views.

Diaphragms such as mine are invariably round, hence a member 1 in the shape of a disk is employed by me as the base or major element of my invention. This disk is thin, has its surfaces broken up by pebbling or pitting, as represented at 2, is provided with a number of burs 3 which are struck out of said disk, and is perforated so as to form a number of clean-cut holes 4 therein or there-through. The center of the disk 1 may be left undisturbed, save for the pits 2 and the corresponding convexities or protuberances, as shown in Fig. 1, or said center may be dished on one side and correspondingly bulged on the other side, as shown at 5 in the other views.

The holes 4 are transformed into what may be termed lesser diaphragms by means of one or more very thin coverings 6 and a coating 7. In Fig. 3 there is one of these coverings 6 for each hole 4, while in Fig. 4 only one such covering is employed, each covering in the first instance being concentric with its hole, and the single covering in the second instance being concentric with the disk 1. When the single covering is used, it may be larger than the one shown in Fig. 4, as much larger as may be desired up to the full superficial area of the disk 1. Although the shape of the coverings is not of vital importance, for the sake of appearance I prefer to make them round.

The coating 7 is on both sides of the disk 1 and the covering or coverings 6, and is the medium by means of which the latter are fixed to the former.

The disk 1 may be made of a variety of



different kinds of metallic and non-metallic materials, but any material to be adaptable for the purpose should be thin, of course, and must be capable of receiving and retaining the coating 7 and possess the necessary qualities of then producing the required effect. Thin sheet-aluminum and pure linen-fiber paper or cardboard are among the best materials and give some of the best results.

10 The pits 2 and the convexities or protuberances produced thereby are generally very numerous, quite small, and close together, although some variation in these particulars is permissible. Their arrangement  
15 may be regular or irregular, as desired. An unbroken ring 8 may be left on each side of the disk 1, outside of the pits and protuberances. These plane-surface rings 8 afford smooth, sound-box connecting bearings for  
20 the diaphragm.

The burs 3 are formed by punching them out of the disk 1 in such a way as to leave smooth, hollow, conical protuberances, through the small ends of which will be  
25 usually minute openings. These burs are preferably arranged radially around the dished center, or a corresponding area, of the disk 1, four (more or less) to a radius, with a hole 4 between adjacent radii, substantially as shown, but this order or arrangement of burs and holes is subject to  
30 some modification, and the number of holes as well as the number of burs may be changed.

35 The holes 4 will, as a rule, be round, although this is not imperative, and there may be considerable variation in their size.

I use for the covering or coverings 6 very thin fabric, such as tissue-paper.

40 The material or combination of materials used for the coating 7, and which is applied in any suitable manner to both sides of the disk 1 with its covering or coverings 6, must be of such a nature that it will adhere firmly  
45 to and intimately and permanently unite with the parts, and also fix such covering or coverings securely to said disk; furthermore, the nature of the coating must be such that it will so unite with the other elements and  
50 harden during the process of manufacturing the diaphragm as to produce a device having the required stability, permanence and excellence. The coating not only covers the disk and impregnates and permeates the  
55 covering or coverings, but fills the bur openings and also fills more or less completely the holes 4. A good coating solution for my purpose in this case, which is readily applied and as readily hardens when dry, consists of  
60 silicate of soda or silicate of potash, oxid of zinc, and an earth cement, mixed together with the proportions of about one part each of the oxid of zinc and the cement to about  
65 of potash. These proportions may vary to

a considerable extent without seriously affecting the efficiency of the resulting coating.

As I am aware that other coating substances or materials will give the desired results, I do not intend to restrict myself to any particular coating substance or material or combination of the same suitable for the purpose.

Each of the elements or features herein described and which together make up this diaphragm, with the possible exception in some cases of the dished center, is indispensable to the attainment of the desired end, as I have found by long and careful experiment, the pits, burs, lesser diaphragms, and coating each contributing something essential to the perfection required of an acoustic diaphragm designed for talking-machine and analogous purposes. And in many if  
85 not most instances, it is not well to dispense with the dished center.

In practice, the pits and their protuberances are usually finer than they appear in the drawings.

In addition to the variations or modifications already noted others may be made without departing from the nature of my invention.

What I claim as my invention, and desire  
95 to secure by Letters Patent, is—

1. A disk, for a diaphragm of the class described, consisting of a pitted member having burs thereon and holes therethrough independent of the bur openings.

2. A disk, for a diaphragm of the class described, consisting of a member having its structure broken up throughout approximately its entire area, provided with burs, and having holes independent of the bur  
105 openings.

3. A disk, for a diaphragm of the class described, consisting of a member having protuberances over approximately the entire superficial area of its sides, provided with  
110 burs, and having holes independent of the bur openings.

4. A disk, for a diaphragm of the class described, consisting of a pitted member having burs thereon and holes therethrough  
115 independent of the bur openings, and provided with a dished center, such burs and holes being located between said dished center and the periphery of said member.

5. A diaphragm, of the class described, consisting of a pitted disk having burs thereon and holes therethrough independent of the bur openings, covering material on such disk for such holes, and a hard overlying coating on said disk and covering material  
125 and in the disk perforations and uniting said covering material with the disk.

6. A diaphragm, of the class described, consisting of a pitted disk having burs thereon and holes therethrough independent of  
130



the bur openings, and provided with a  
dished center, such burs and holes being lo-  
cated between said dished center and the pe-  
riphery of said disk, covering material on  
5 such disk for such holes, and a hard over-  
lying coating on said disk and covering  
material and in the disk perforations and  
uniting said covering material with the disk.

7. A diaphragm, of the class described,  
10 consisting of a pitted disk having burs there-

on and holes therethrough independent of  
the bur openings, covering material on such  
disk for such holes, and a hard overlying  
coating on said disk and covering material,  
said covering material with the coating 15  
thereon forming lesser diaphragms.

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Witnesses:

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