No. 876,035. PATENTED JAN. 7, 1908.

W. W. YOUNG.

SOUND REPRODUCING AND MODIFYING DEVICE.

APPLICATION FILED JAN. 10, 1906.

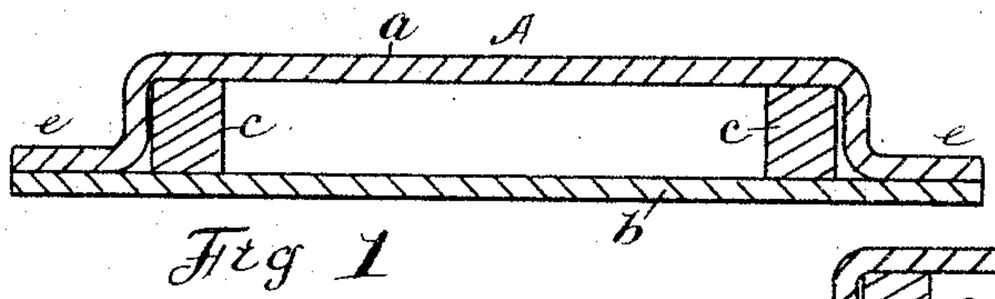

Fig. 1

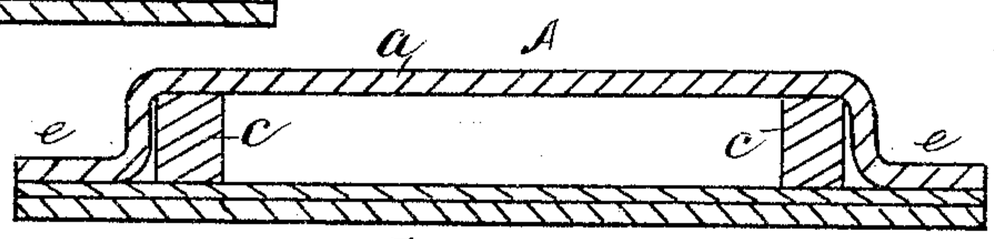

Fig. 2

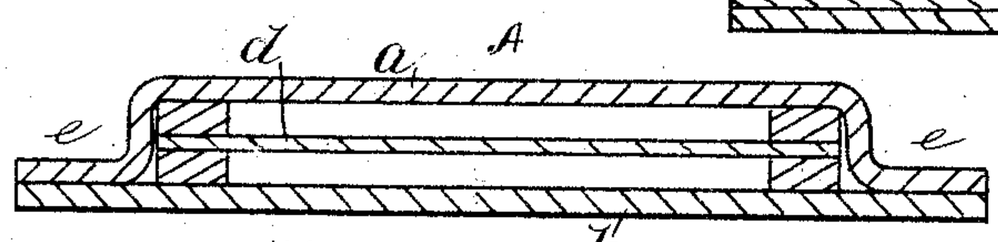

Fig. 3

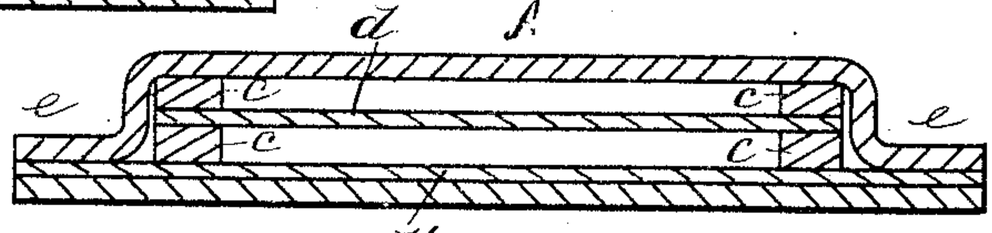

Fig. 4

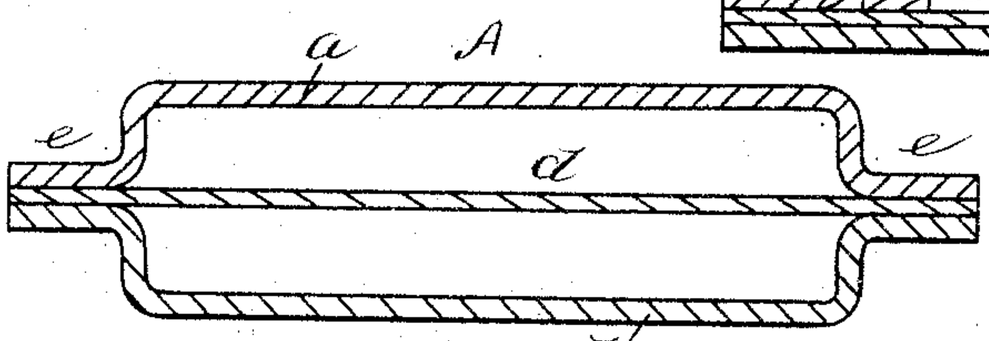

Fig. 5

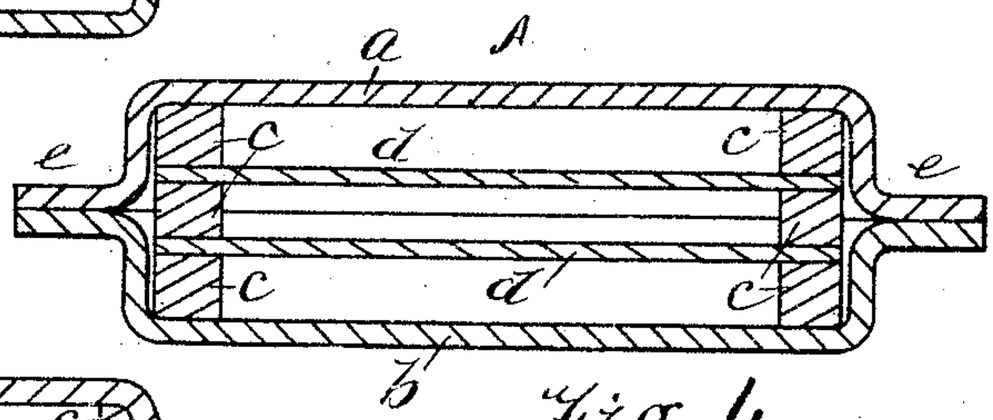

Fig. 6

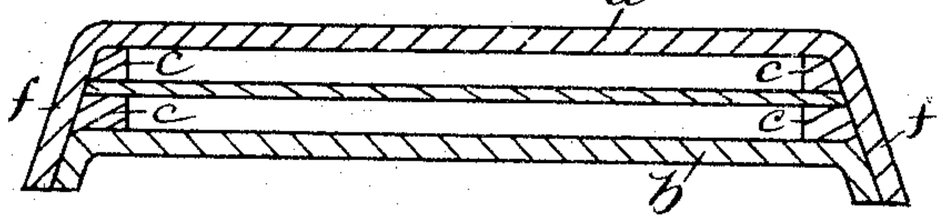

Fig. 7

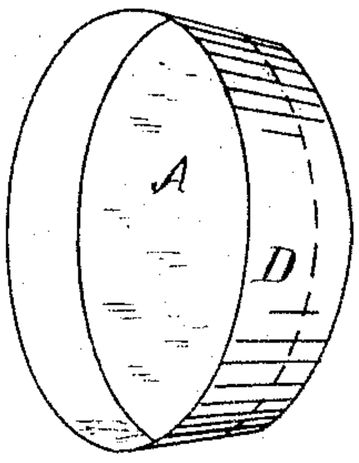

Fig. 8

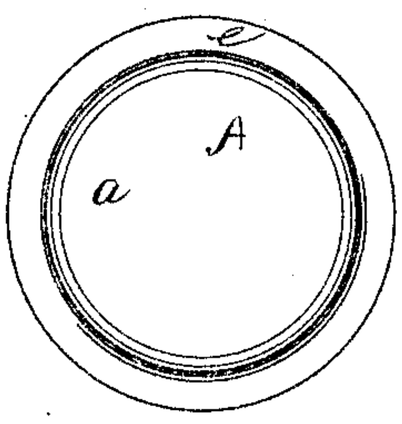

Fig. 9

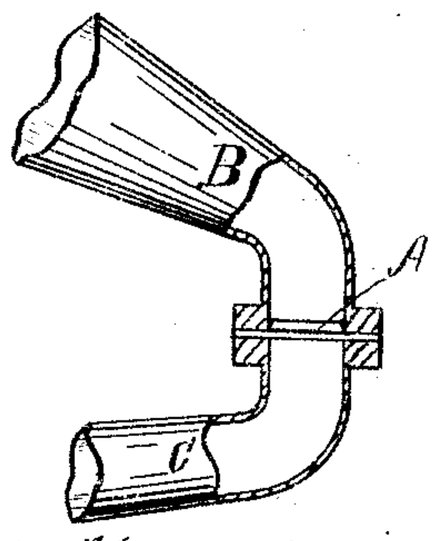

Fig. 10

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UNITED STATES PATENT OFFICE.

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SOUND REPRODUCING AND MODIFYING DEVICE.

No. 876,035 Specification of Letters Patent. Patented Jan. 7, 1908.

Application filed January 10, 1906. Serial No. 295,329.

To all whom it may concern:

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing in Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Sound Reproducing and Modifying Devices or Diaphragms for Phonographs and other Talking-Machines, of which the following is a specification, reference being had to the accompanying drawings and letters of reference marked thereon.

Heretofore, the sound produced by phonographs, graphophones, talking machines, etc., has been indistinct, metallic and resonant so that the words or other matter heard are not clear and distinct, the sound waves appearing to be confused and a rumbling, rasping sound produced instead of the clear, distinct tones and sounds desired.

The object of my invention is to produce a simple and inexpensive device which may be readily adjusted in place and which will overcome the objections heretofore obtaining, and which will result in the giving forth of clear and distinct sound waves free from confusion and free from the metallic, resonant and scratching effect frequently found in machines of the class referred to.

I accomplish the objects of my invention by the construction herein disclosed.

In the accompanying drawings, in which like letters of reference indicate like parts, Figure 1 is a transverse sectional view of one form of my invention in which the simplest form of air chamber is shown; Fig. 2 is a similar view of my device showing a diaphragm arranged in the air chamber next to one of the walls thereof; Fig. 3 is a similar view showing a diaphragm centrally arranged, thus forming two air chambers; Fig. 4 is a like view showing one inner diaphragm centrally arranged in the air chamber and one diaphragm located adjacent one outer wall; Fig. 5 is a like view showing a different shape of the outer casing; Fig. 6 is a like view showing two interior diaphragms; thus forming three air chambers; Fig. 7 is a like view showing the outer edge tapering to fit into a taper opening; Fig. 8 is a perspective view on a smaller scale of a shell adapted to receive a device shaped like that shown in Fig. 7; Fig. 9 is a plan view of my device constructed as shown in Figs. 1 to 6, inclusive, and Fig. 10 is a view on a greatly reduced scale of a section of a sound conduit and a section of a horn with a diaphragm between. Figs. 1 to 7, inclusive, are on a scale greatly enlarged beyond the size of the device as ordinarily made for the instruments in common use.

In detail, A indicates the device as a whole; B, the horn extension or smaller end of the horn; C, the sound conduit extending to the horn or horn extension; D, a shell adapted to hold the device A when the same is inserted in a tapering receptacle; *a* indicates one outer wall of the device and *b* the other outer wall; *c* indicates rings mounted between the two walls; *d* and *d'* indicate inner diaphragms of celluloid or other suitable material; *e* indicates an annular projection by which the device is held in position, and *f* indicates a tapering periphery.

I find that a construction comprising two pieces of material so arranged with reference to each other as to form an air chamber therebetween, results in greatly modifying and clarifying the sounds or tones that issue from a machine of the character referred to. In such construction the outer wall or walls form a diaphragm and the air space therebetween forms an air cushion. I find further that the introduction into such space or chamber of a diaphragm formed of a sheet of celluloid or other like material will greatly improve the tone, and when so constructed the device is provided with an air chamber or cushion either on one or upon both sides of such introduced diaphragm.

I find that for the outer material the best result is attained by the employment of soft leather stretched to a reasonable extent and cemented or otherwise held in position. When a celluloid film is employed as an interior diaphragm the best result is attained by the employment of a sheet of celluloid chemically treated, such treatment comprising coating such film or sheet upon one or both sides with an emulsion of gelatin and then subjecting the sheet so coated to the action of acetic acid, followed by treatment with a solution of hyposulfid of soda. This treatment preserves the celluloid sheet, preventing subsequent chemical action; also preventing expansion or contraction, thus preserving it in its original, normal condition when inserted in the device, and insures its constant normal action.

The device may of course be employed as an original diaphragm, or as a part of the same, or as a supplementary device, as herein set out in detail, the principles of

the air chamber being employed in each instance.

It will, of course, readily be seen that in some instances a sheet of isinglass, birch-bark, thin metal, glass, or other suitable material may be employed for the interior or inserted diaphragm or diaphragms. There must be employed, however, to give the desired result, one or more air cushions or air diaphragms, so that the action of the sound waves is transmitted to such interior diaphragm by the confined air. As at present advised, in most instances the celluloid sheet treated as above described gives the best result, but in some instruments, and with some records, I find that where the interior diaphragms are constructed of the other materials above referred to, a very desirable and improved result is attained.

In order to give the best results, my device should be inserted in the sound conduit at a point between the reproducing diaphragm forming part of the machine and the smaller end portion of the horn, as for instance, in the machine known as the "Victor" I find it advisable to introduce the device in the conduit at the point where the horn extension B joins the conduit C. I find also, for convenience in introducing and removing the device, it is desirable in some instances, especially for use in machines having no joint, similar to that referred to—the Victor, to construct the device of the shape shown in Figs. 7 and 8, the periphery of the device being slightly tapering to conform to the taper of the horn, and by preference the periphery should be covered with a soft material like leather or other similar material. I find also that in some instances a very desirable result may be attained by arranging two interior diaphragms in such manner that there is an air space or cushion therebetween, and that the outer portions or walls of the device consist of soft leather having one or more openings.

The best result is attained when the outer walls are made of soft leather held snugly in position and one or more inner diaphragms are arranged between the outer walls, the inner diaphragm or diaphragms being made of materials other than leather.

The shell shown in Fig. 8 is adapted to receive one of the devices shaped like that shown in Fig. 7, and I prefer that the smaller end of the same be covered with soft leather so as to form an air space between the inserted device A and the leather covering on the smaller opening in the ring or shell D, so that, with different records and different instruments, the parts may be used together or detached, thus varying the tones. It will be seen that several of the devices may be so arranged as to be built up, one upon the other, and these being inserted in the horn or other part of the sound conduit will enable the user to adapt the devices to instruments and records of different kinds, and if it be found that one of the devices does not give the desired result with a particular instrument or record, then another may be readily added, and in this way the user may change the number of devices until the desired result as to sound and clearness is attained.

While in machines like the "Victor" I prefer to introduce the device at the joint as shown in Fig. 10, I may introduce the same at any other convenient point in the sound conduit.

I prefer to employ separating rings made of cardboard, but of course various changes in construction may be made and the same desirable results be obtained.

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

1. A device of the character described, comprising outer walls extended or flanged exteriorly and fastened together at these points, and one or more imperforate inner diaphragms.

2. In combination with a talking machine, an independent device of the character described, adapted to be placed in the sound conduit of the machine, comprising outer walls extended or flanged exteriorly and fastened together at these points, and having one or more air chambers between them.

3. A device of the character described, having outer walls of leather extended or flanged exteriorly and fastened together at these points, and one or more inner diaphragms of vibrative material.

4. The combination of a closed shell adapted to fit into a sound conduit of a talking machine, such shell consisting of pieces of leather attached to each other at their outer edges, and one or more sound modifying devices shaped to fit into said shell whereby one or a plurality of said devices may be employed at will.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM W. YOUNG.

Witnesses:

ALLEN WEBSTER,

J. M. STERNS.