

No. 685,429.

Patented Oct. 29, 1901.

G. OSTEN & W. P. SPALDING.
DIAPHRAGM FOR ACOUSTICAL APPARATUS.

(Application filed Feb. 5, 1901.)

(No Model.)

Fig. 1.

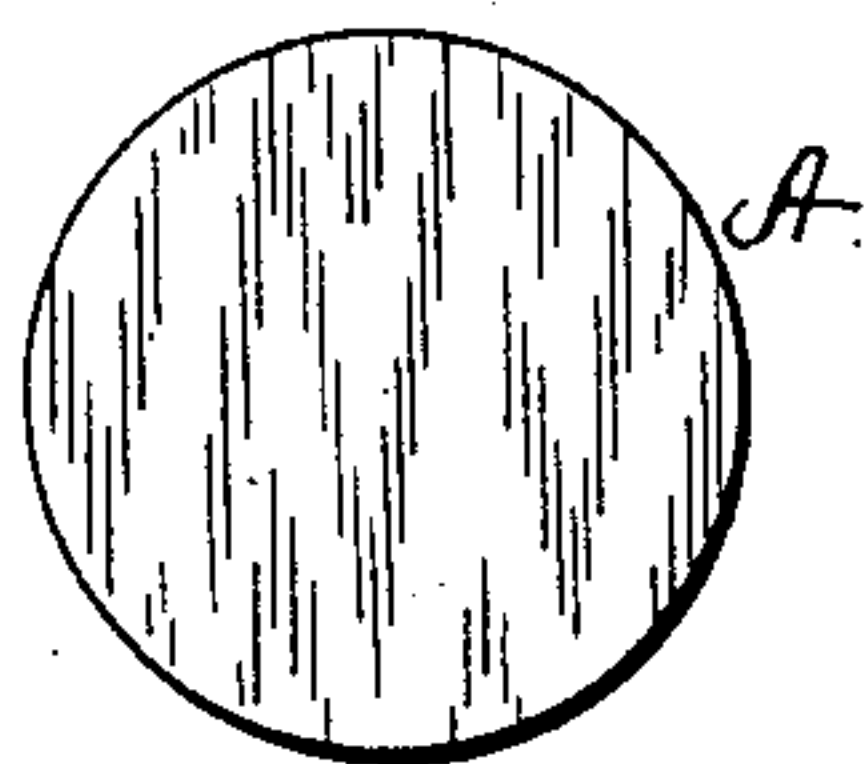


Fig. 2.

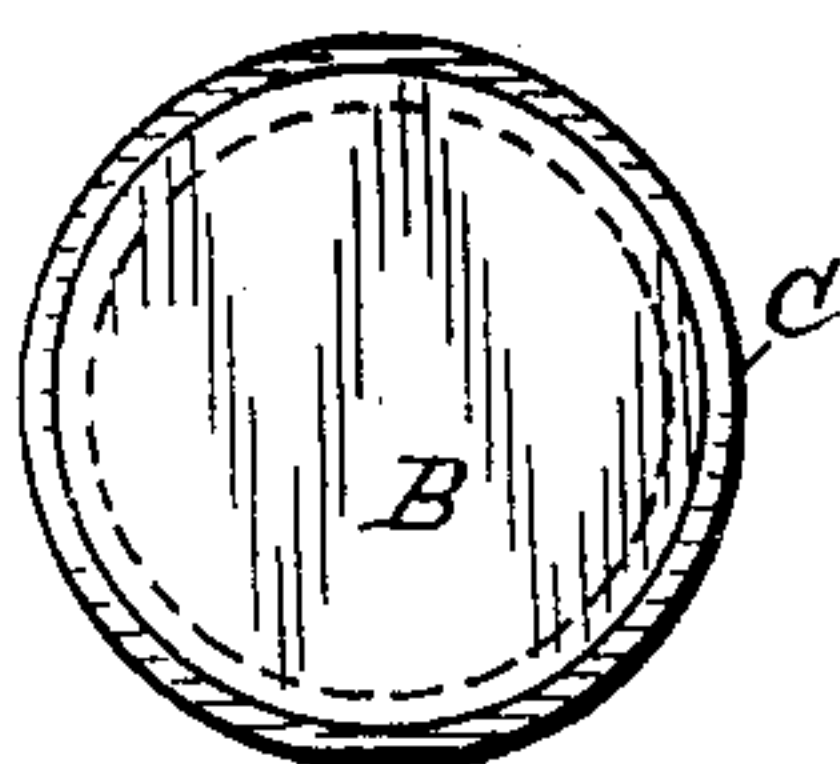


Fig. 3.

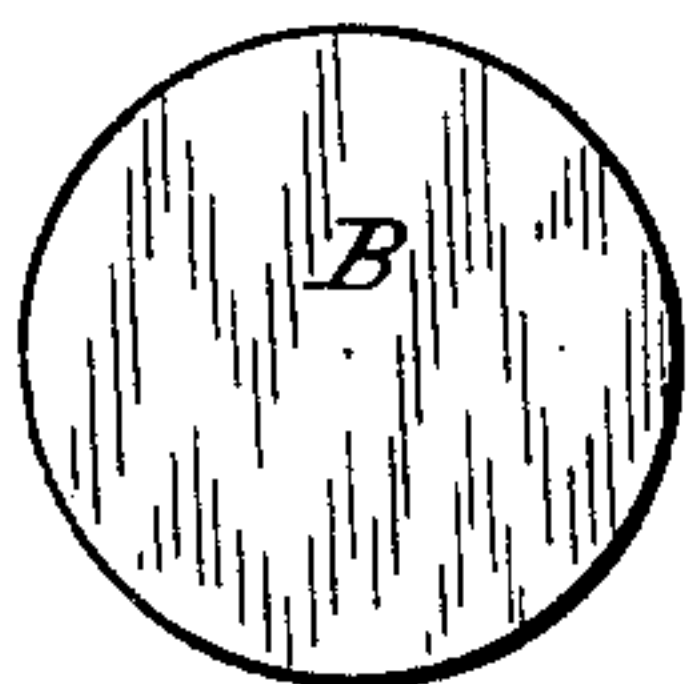


Fig. 4.

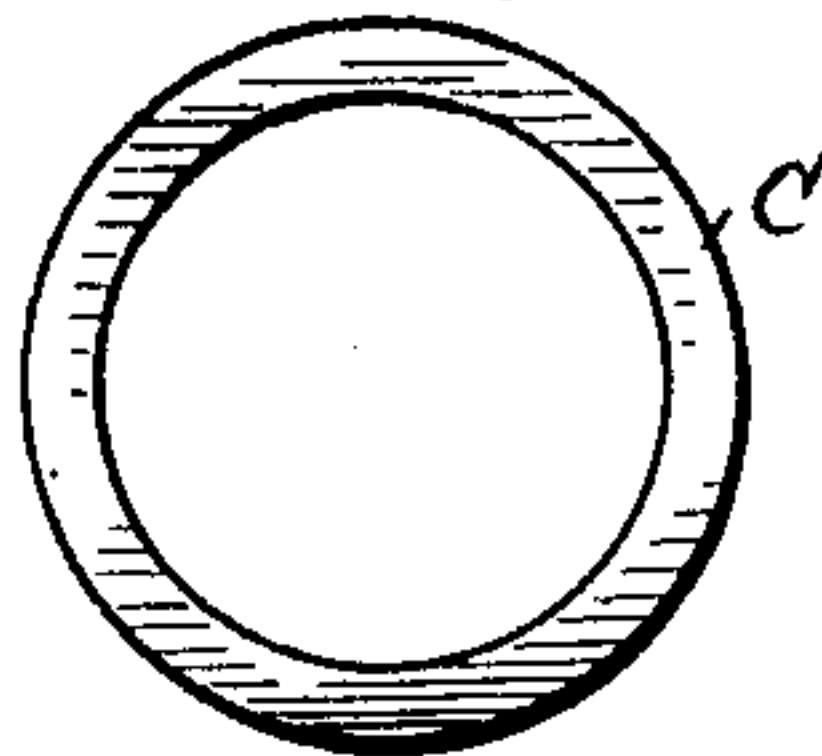
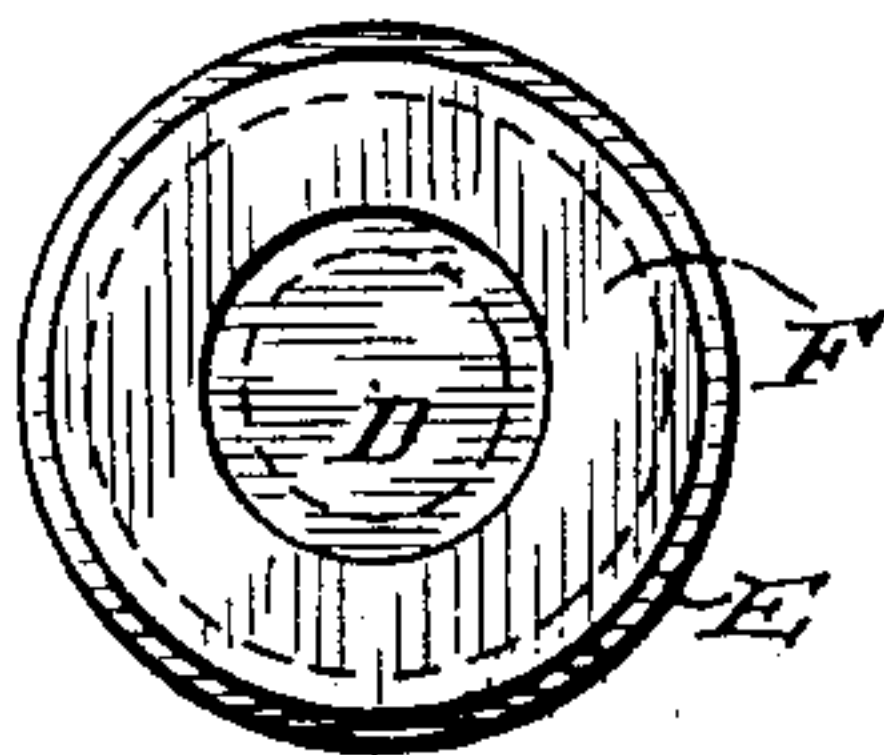


Fig. 5.



Witnesses
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by *[Signature]*
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UNITED STATES PATENT OFFICE.

GEORGE OSTEN AND WILLIAM P. SPALDING, OF DENVER, COLORADO.

DIAPHRAGM FOR ACOUSTICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 685,429, dated October 29, 1901.

Application filed February 5, 1901. Serial No. 46,129. (No model.)

To all whom it may concern:

Be it known that we, GEORGE OSTEN and WILLIAM P. SPALDING, residents of Denver, Colorado, have invented a new and useful
5 Improvement in Diaphragms for Acoustical Apparatus, which invention is fully set forth in the following specification.

The object of this invention is to provide
10 a diaphragm for use in the recorders and reproducing apparatus, which will possess vibratory properties of superior delicacy and accuracy, enabling sounds to be truthfully recorded and reproduced even as to their minutest details.
15 This object is attained by making the diaphragm, either in whole or in part, of a specially-prepared paper, such as hereinafter described. The paper, preferably wood-pulp paper, is first submerged in a solution of bi-
20 carbonate of soda in distilled water, where it is allowed to remain for several hours in a warm place. The effect of this solution is to neutralize or destroy all foreign matter in the paper which would be detrimental to its vi-
25 bratory properties. At the same time the paper by absorbing the solution acquires a leather-like toughness. After its removal from the bicarbonate solution the paper is submerged for several hours in distilled water
30 for cleansing purposes. The paper is next submerged and let stand for an hour or more in a solution of chlorid of gold—from one to one and a half ounces of distilled water to two or three grains of chlorid of gold. After re-
35 moval from the gold solution and drying the paper is placed in a solution of from one hundred and fifty to two hundred grains of nitrate of silver and one to two grains of cyanid of potassium in one and a half to
40 two ounces of distilled water and let remain for from five to eight hours. The effect of the gold and silver solutions is to thoroughly impregnate the paper with deposits of these metals, imparting thereto the desired me-
45 tallic properties. The cyanid of potassium acts to cause the paper to absorb the solution more readily and quickly. After the paper is removed from the silver solution and has become nearly but not entirely dry it is
50 placed between two pieces of perfectly clean paper and covered with a warm smooth

smoothing-iron for clothes—until thoroughly dry, when it is placed where air can circulate about it.

In order to preserve the paper from effects
55 of the weather, either wet or dry, cold or heat, an oily substance, such as pure white wax, is applied thereto. The oily substance also has the effect of removing excessive metallic
60 sounds.

It will of course be understood that the proportions of the materials with which the paper is treated may be varied as desired and that the procedure may be varied within wide
65 limits, the principal purpose being to impart to the paper the leather-like toughness and metallic properties.

While paper is preferred, other suitable fibrous materials treated in the manner above
70 indicated may be employed in the construction of diaphragms according to the invention. In utilizing this specially-prepared paper or fibrous material in the construction of dia-
75 phragms for acoustical apparatus the vibratory body or part, which is made of said material, may constitute the whole or only a part of the diaphragm, greatly improved results being attained in either case.

The accompanying drawings illustrate sev-
80 eral forms of diaphragms embodying this invention.

Figure 1 is a plan view of a diaphragm made entirely of the specially-prepared pa-
85 per. Fig. 2 is a plan view of another form of diaphragm. Figs. 3 and 4 are details illustrating the paper center and supporting-ring, respectively, of the diaphragm of Fig. 2; and Fig. 5 is a plan view of still another form of
90 diaphragm.

As already stated, the diaphragm A of Fig. 1 is made entirely of the specially-prepared paper.

In the diaphragm of Figs. 2, 3, and 4 the vibratory body B is made of the specially-
95 prepared paper and cemented to an outer supporting ring or frame C, of suitable material, preferably of mica. The cement used is preferably a paste of white shellac and alcohol. In applying the paste the edge of the
100 paper center B is roughened where it overlaps the ring C, so that the cement will take hold. The mica ring serves as a bearing for the means for clamping the diaphragm in

place in a recorder or reproducer and is less likely to be injured than if the clamping means acted directly upon the paper.

In Fig. 5 the diaphragm consists of a body or annulus F of the specially-prepared paper. Annulus F is cemented at its inner edge to a central plate D, of very thin metal, and at its outer edge to a supporting-ring E, of mica, metal, or other suitable material.

Although specially designed for use in sound recording and reproducing apparatus, diaphragms embodying this invention may be employed in other apparatus where diaphragms are adapted to be acted upon by sound vibrations.

What we claim is—

1. In an acoustical apparatus, a vibratory body consisting of fibrous material impregnated with metal.
2. A vibratory body for acoustical apparatus consisting of fabric of fibrous material impregnated with metal.
3. In an acoustical apparatus, a vibratory body consisting of paper impregnated with metal.
4. In an acoustical apparatus, a vibratory body consisting of toughened fibrous material impregnated with metal.
5. In an acoustical apparatus a vibratory body consisting of toughened paper impregnated with metal.
6. A vibratory body for use in acoustical apparatus consisting of paper impregnated with gold and silver.
7. A vibratory body for use in acoustical

apparatus consisting of toughened paper impregnated with gold and silver.

8. A vibratory body for use in acoustical apparatus consisting of paper toughened by the action of a solution of bicarbonate of soda and impregnated with gold and silver by the action of a solution of chlorid of gold and a solution of nitrate of silver.

9. A vibratory body for use in acoustical apparatus consisting of toughened paper impregnated with metal, and having applied thereto an oily substance.

10. A diaphragm for use in acoustical apparatus consisting of a vibratory body of toughened fibrous material impregnated with a metal and having a supporting-frame around its outer edge.

11. A diaphragm for use in acoustical apparatus consisting of a vibratory body of fibrous material impregnated with a metal having a supporting-frame around its outer edge and a thin metallic central plate.

12. In a diaphragm for use in acoustical apparatus, an annular vibratory body of toughened fibrous material impregnated with a metal having a thin metallic central plate.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

GEORGE OSTEN.
WM. P. SPALDING.

Witnesses:

MARY JONES,
JESSIE D. THOMPSON.