Jan. 21, 1930. N. BALDWIN 1,744,032

DIAPHRAGM

Filed Aug. 8, 1924

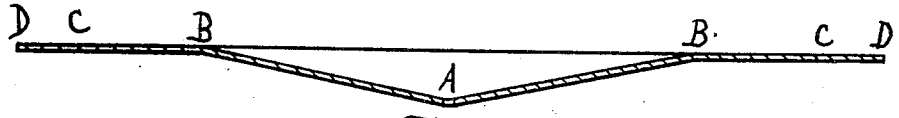

Fig. 1

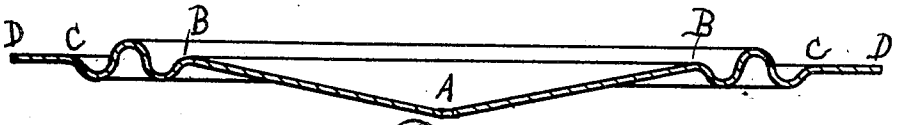

Fig. 2

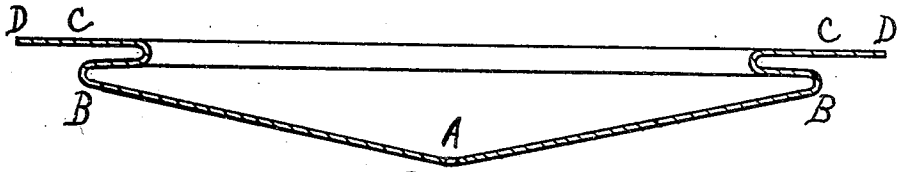

Fig. 3

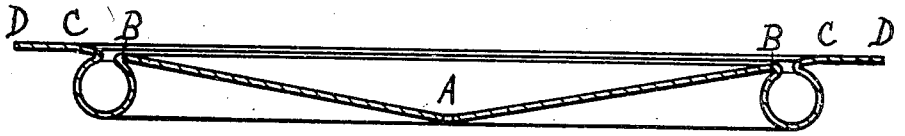

Fig. 4

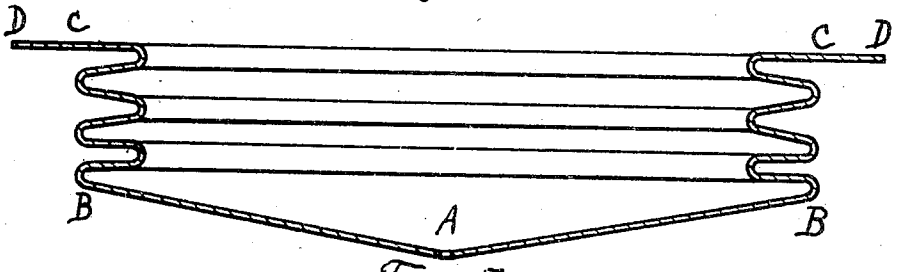

Fig. 5

Nathaniel Baldwin INVENTOR

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UNITED STATES PATENT OFFICE

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DIAPHRAGM

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The present invention appertains to diaphragms for acoustic purposes, such as for phonograph recorders, phonograph reproducers, telephone transmitters, telephone receivers, loud speakers, etc. The object is to provide a diaphragm which in operation will vibrate partly or mainly as a solid body instead of a flexible body, as is usually the case, with diaphragms, thus producing increased efficiency as a sound producer or as a converter of sound waves into mechanical energy.

In this invention the object is attained by making the central or main part of the diaphragm cone-shaped, dished, or otherwise curved to stiffen it and to provide for the necessary flexibility at or near the edge of the diaphragm by means of a zone which is plane, corrugated, or formed with over-lapping folds.

The invention is illustrated in the accompanying drawing in which—

Fig. 1 is a vertical cross section of the diaphragm in its simplest form. Fig. 2 is a vertical cross-section of a modification of the diaphragm shown in Fig. 1. Fig. 3 is a vertical cross-section of a modification of the diaphragm shown in Fig. 2. Figs. 4 and 5 are vertical cross-sections of modifications of the diaphragm shown in Fig. 3.

In the several figures the central annular portion AB is cone-shaped, dished, or otherwise curved which renders it rigid, while the concentric annular portion BC is flat, or corrugated in such way as to render it more flexible. The concentric annular portion or edge CD is adapted to be clamped upon the diaphragm seat in whatever instrument the device is used.

The flexible portion BC of the diaphragm shown in Fig. 1 is flat; in Fig. 2 it is corrugated; in Fig. 3 it is formed into an overlapping fold; in Figs. 4 it is formed into an overlapping fold on one side of the diaphragm; and in Fig. 5 it is formed into several over-lapping folds presenting the form of a bellows.

In either of the forms illustrated a vibratory force applied at the center will cause the portion AB to vibrate as a whole, while the portion BC yields to the movement. The result is increased efficiency as a sound producer over the ordinary flat or corrugated diaphragm which is flexible throughout and responds to the full movement only at the center. Therefore, either of the forms of diaphragms here illustrated will have increased efficiency when used in a phonograph reproducer, in a telephone receiver, in a loud speaker, etc.

If the central portion of either of the diaphragms here illustrated is operatively connected to any other mechanism, and sound waves beat upon the diaphragm, the effect of the sound upon the entire surface AB will be concentrated at the point of connection because this portion AB is rigid, while in the case of the ordinary flat or corrugated diaphragm the larger portion of the force of the sound waves is impressed upon the diaphragm seat. Therefore, either of the forms of diaphragms here illustrated will have increased efficiency when used in a phonograph recorder, microphone, etc.

I claim:

1. A diaphragm having a relatively rigid central zone, a substantially plane peripheral edge zone, and a folded zone adjacent the periphery, said folds having such shape that portions of said folded zone other than crest portions thereof are substantially parallel to the peripheral portion.

2. A diaphragm having a relatively rigid central portion, a peripheral portion, and a recumbent fold formed adjacent said peripheral portion.

3. A diaphragm having a relatively rigid non-plane central zone, a substantially plane peripheral edge portion, and a relatively flexible portion adjacent the periphery, said flexible portion having crenulations whereof parts other than the crests lie substantially parallel to the plane peripheral portion.

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