Feb. 9, 1926. **1,572,387**

H. C. HARRISON

SOUND BOX

Filed July 20, 1923

Fig. 1

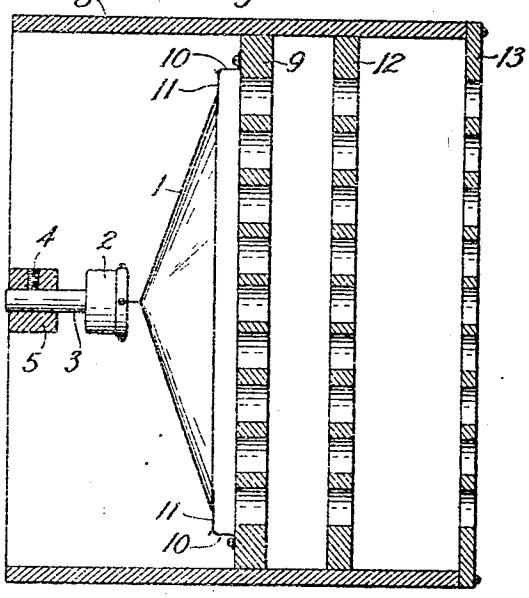
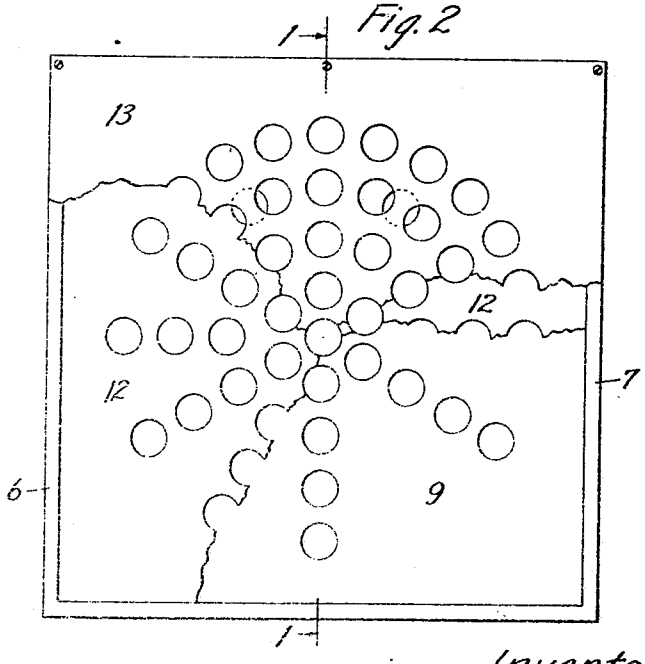


Fig. 2



Inventor:
Henry C. Harrison.
by Fred A. Palmer Atty

Draftsman

27

Patented Feb. 9, 1926. 1,572,387

UNITED STATES PATENT OFFICE.

HENRY C. HARRISON, OF PORT WASHINGTON, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

SOUND BOX.

Application filed July 20, 1923. Serial No. 652,748.

To all whom it may concern:

Be it known that I, HENRY C. HARRISON, a citizen of the United States, residing at Port Washington, in the county of Nassau, State of New York, have invented certain new and useful Improvements in Sound Boxes, of which the following is a full, clear, concise, and exact description.

This invention relates to a sound box, particularly for large direct acting phonic diaphragms, and has for an object to provide an arrangement of a sound box and diaphragm such that a gradual transformation of impedance is provided for the sound waves as they proceed from the diaphragm to the outside air, whereby transition losses are made small.

This is accomplished by providing a series of spaced apertured partitions or plates at the front of the diaphragm, the effective aperture area in each partition and the spacing of the partitions increasing as the distance from the diaphragm increases, whereby the desired gradual transformation of impedance is obtained.

For further details of the invention, reference may be made to the drawings, wherein Fig. 1 is a sectional elevation of the invention taken on line 1—1 of Fig. 2 which is a front elevation.

Referring in detail to the drawings, the diaphragm 1, which may be of paper, metal or the like and of conical form, is adapted to be actuated by an electromagnetic receiver, the shaft 3 of which is adjustably secured by means of the set screw 4 in a bar 5 or the like which extends between and is fastened to the vertical side walls 6 and 7 of the sound box. At the front of the diaphragm and in the sound box 8 is an apertured partition 9 which carries hangers 10 spaced around the periphery of the cone 1 and about which are threaded or woven a string 11, or the like, to provide a flexible support for the periphery of the diaphragm 1. All of this is described and claimed in Keller application, Serial No. 646,351, filed June 19, 1923.

According to the present invention, it is proposed to use, in combination with the apertured partition 9, other apertured partitions 12 and 13, the effective aperture area in each partition and the spacing between adjacent partitions increasing as the distance from the diaphragm increases. This gives a gradual transformation of impedance as the sound waves proceed, thereby keeping transition losses at a minimum and good quality at a maximum. The use of these partitions makes it possible to efficiently use heavier diaphragm material than heretofore, for instance, heavier bristol-board, since the air surrounding the diaphragm has a greater effective density than is ordinarily the case, due to restricting the sound waves which leave the diaphragm.

As an illustration of dimensions that may be used, the diaphragm 1 may be a foot or more in diameter and 5 inches or more high.

What is claimed is:

1. A large direct acting diaphragm, and a sound box therefor comprising a plurality of spaced apertured partitions across said sound box in the path of the sound waves from said diaphragm, said partitions and apertures therein being arranged to provide a gradual transformation of impedance from the diaphragm to the outside air.

2. A large direct acting diaphragm, and a sound box therefor comprising a plurality of apertured partitions, the spacing of the partitions increasing as the distance from the diaphragm increases.

3. The method of obtaining small transition losses from a large direct acting diaphragm which comprises gradually transforming the impedance as the sound waves proceed by varying the effective mass and the elasticity of the transmission medium.

4. A large direct acting diaphragm and a sound box therefor comprising a plurality of apertured partitions, the aperture area and the spacing of the partitions increasing as the distance from the diaphragm increases.

5. A large direct acting diaphragm, and a sound box therefor comprising a plurality of apertured partitions, the effective aperture area of the partitions increasing as the distance from the diaphragm increases.

6. In combination, a large direct acting diaphragm, and impedance transforming means for coupling the diaphragm to the air, comprising a series of spaced plates having small openings uniformly distributed over the active surface, the total effective mass of the air in the openings per plate progressively decreasing from the diaphragm to the free air, the said masses of air in the openings being separated by air chambers in which the

volumes progressively increase and hence the elasticities progressively decrease.

7. In combination, a large direct acting diaphragm, and a plurality of apertured plates containing a multiplicity of openings, said plates and diaphragms being associated to form successive intervening air chambers therebetween, the effective area of the apertures and the spacing of the apertured plates being proportioned to offer an increasing impedance at each stage as the diaphragm is approached, thereby reducing transition losses between the free air and the diaphragm.

8. In combination, a large direct acting diaphragm and a sound box having a number of apertured plates at the front of the diaphragm providing with the diaphragm and the sound box a series of chambers, the spacing between adjacent plates and the effective area of the apertures increasing as the distance from the diaphragm increases, thereby causing a gradual transformation of impedance as the sound waves proceed.

9. In combination, a large direct acting diaphragm, and means for loading said diaphragm comprising a number of apertured plates in a chamber in front of said diaphragm, the relationship between the effective area of the apertures and the locations of the plates being such that the air immediately in front of the diaphragm has a greater effective density than the free air and such that the effective density successively decreases at each apertured plate as the free air is approached.

10. In combination, a large direct acting diaphragm and a sound box containing successive apertured plates positioned parallel to and at varying distances from the said diaphragm so as to form sound chambers of increasing size as the distance from the diaphragm increases, the air in the apertures serving effectively as series masses and separated by air volumes which serve effectively as shunt elasticities in a sound transmission system.

In witness whereof, I hereunto subscribe my name this 16th day of July, A. D. 1923.

HENRY C. HARRISON.