

C. L. HYDE.

SOUND CONCENTRATOR.

(Application filed Dec. 12, 1901.)

(No Model.)

Fig. 1.

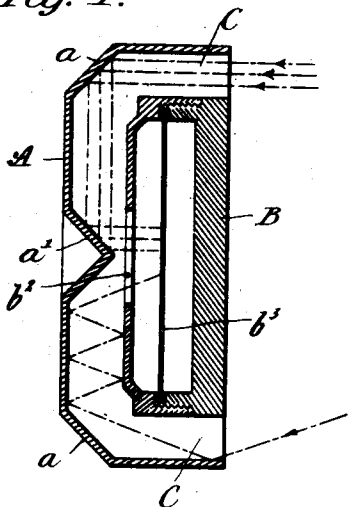


Fig. 3.

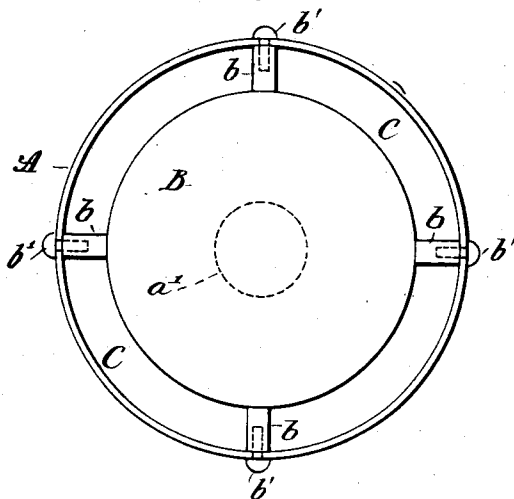


Fig. 2.

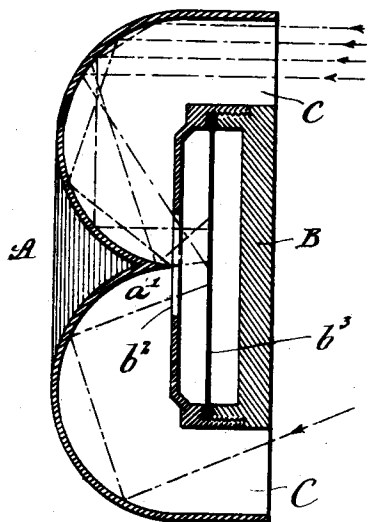
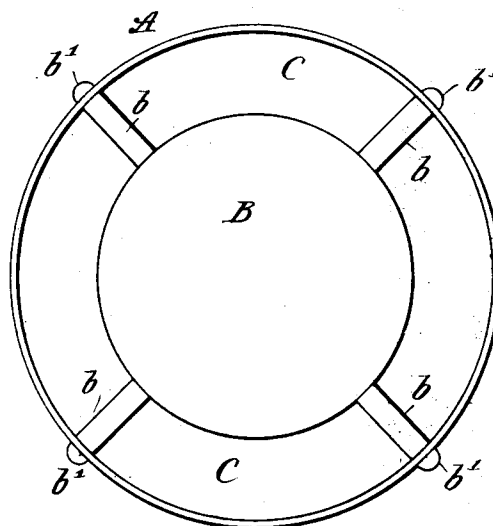


Fig. 4.



Witnesses  
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# UNITED STATES PATENT OFFICE.

CHARLES LIVINGSTON HYDE, OF TUXEDO PARK, NEW YORK, ASSIGNOR, BY  
MESNE ASSIGNMENTS, TO HUTCHISON ACOUSTIC COMPANY, A CORPORATION OF NEW JERSEY.

## SOUND-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 711,974, dated October 28, 1902.

Application filed December 12, 1901. Serial No. 85,625. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES LIVINGSTON HYDE, a citizen of the United States, residing at Tuxedo Park, in the county of Orange and State of New York, have invented certain new and useful Improvements in Sound-Concentrators, of which the following is a full, clear, and exact description.

This invention pertains to sound concentrating and focusing apparatus designed to direct sound-waves to the most sensitive area of a diaphragm capable of being vibrated thereby.

The essential feature of my invention is a substantially cup-shaped body, into the open end of which the sound-waves are adapted to enter, the bottom or inner end of such body being shaped to reflect and concentrate the sound-waves and finally direct them backward along the axis of the cup-shaped body until they strike the center of a vibrating diaphragm mounted in the cup at right angles to its axis. Certain other advantages flow from the relative arrangement of the cup and diaphragm, which will be referred to in the more detailed description following.

In the accompanying drawings, Figures 1 and 2 show in section alternative forms of my invention, and Figs. 3 and 4 plans of the same, respectively.

The apparatus consists in general of two parts, A the reflecting, concentrating, and focusing body, which may be referred to as the "concentrator," and B the frame or case in which the diaphragm is supported. The concentrator is a cup-shaped structure having, preferably, a cylindrical exterior and interior and whose depth is not of prime importance, although a depth of about one-half its diameter is found to give good results. The inner end or bottom of the cup is provided with annular walls  $a$ , inclining inward and cutting off what would otherwise be a square corner at the base of the cup. At the center of the bottom of the cup a cone  $a'$  is formed, with its apex lying in the axis of the cup and about in the same plane with the beginning of the inclined walls  $a$ . When the incline of the wall  $a$  and that of the cone are straight, as in Fig. 1, they are preferably at forty-five

degrees, and thus form a right angle with each other. Likewise in the form shown in Fig 2 the semicircle formed by the curve of the sides and cone have chords forming a right angle between them. Still further and obvious modifications of the two forms shown would be elongations of the straight cone and sides of Fig. 1 until they met and the interruption of the middle portion of the semicircle of Fig. 2 by a plane surface at right angles to the axis, the general object being to provide surfaces which will deflect sound from the outer corners of the concentrator radially inward and thence outward or backward substantially parallel to the axis.

The frame or case B is in the form of a thick disk of less diameter than the internal diameter of the concentrator and mounted concentrically within the walls of the latter. As a means of support in this position a number of lugs  $b$  are used, into which screws  $b'$ , engaging the walls of the concentrator, pass. The front of the case has a central opening  $b^2$  facing the cone  $a'$ , and immediately back of the opening is a diaphragm  $b^3$ , the center of which is thus exposed to the sound-waves reflected backward from the cone. The part B may be a mechanical or an electrical telephone-transmitter which it is desired sound coming from a distance will actuate with the greatest force, and in case the sound is produced by speech with the greatest clearness. The transmitter is placed inside of the concentrator for various reasons. It thereby restricts the entrance of sound to the annular passage C, which conveys it to the inclined surfaces  $a$  and  $a'$  and finally to the diaphragm. If sounds entered along the axis of the concentrator, they would be deflected outward by the cone and interfere with those entering at the side. Hence by closing the middle portion of the concentrator these interfering portions of the sound are excluded. Again, by housing the telephone inside of the concentrator a compact single structure is obtained. It is not essential, however, that the telephone be located inside of the concentrator, since it might be placed outside and the sound conveyed to it from the cone by means of a tube; but it would then be preferable to close the middle

portion of the concentrator by a disk or block of some character.

In using this apparatus the open end is to be presented to the source of sound, so that the waves will enter as near direct as possible; but by properly proportioning the width of the passages through which the sound travels the instrument will be efficient through a range of about forty-five degrees.

10 Having described my invention, I claim—

1. A sound-concentrator, consisting of a cup-shaped body having an axial projection with inclined sides on its bottom and an inclined surface around the edge of its bottom and means whereby sound is first directed 15 against the inclined sides.

2. A sound-concentrator, consisting of a cup-shaped body having internal inclined walls around its bottom, and a conical projection at the center of its bottom and a shield 20 forming an annular opening at the mouth of the cup, for the purpose set forth.

3. A sound-concentrator, consisting of a hollow cylinder, having one end closed, an annular internal inclined surface around the edge of the closed end and adapted to deflect 25 sound toward the center along substantially radial lines, an internal projecting cone at the center of said closed end and a disk of less diameter than the cylinder and supported 30 in the open end thereof, for the purpose set forth.

4. A sound-concentrator, consisting of a cup-shaped body having an axial projection 35 with inclined sides on its bottom, and an inclined surface around the edge of its bottom, in combination with a shield closing the middle portion of the mouth of the cup-shaped body and forming an annular opening for the 40 entrance of sound.

5. A sound-concentrator, consisting of a cup-shaped body having an axial projection with inclined sides on its bottom, and an inclined surface around the edge of its bottom, 45 in combination with a shield closing the middle portion of the mouth of the cup-shaped body and forming an annular opening for the entrance of sound and a telephone-transmitter contained in said shield.

50 6. A sound-concentrator, consisting of a cup-shaped body having an axial projection with inclined sides on its bottom, and an in-

clined surface around the edge of its bottom, in combination with a shield closing the middle portion of the mouth of the cup-shaped 55 body and forming an annular opening for entrance of sound, a telephone-transmitter contained in said shield and facing said projection.

7. An apparatus for concentrating and focusing sound, consisting of a cup-shaped body 60 having internal deflecting-surfaces at its closed end tending to direct the incoming sounds first in a substantially radial direction and then in an outward or backward direction. 65

8. The combination with a telephone-transmitter, of a sound-deflector consisting of a conical projection pointing toward the diaphragm of the transmitter and means for directing sound laterally against the sides of 70 the projection, substantially as described.

9. The combination with a telephone-transmitter, of a conical projection pointing toward the diaphragm of the transmitter and an annular inclined surface surrounding the projection whereby sound proceeding from a source behind the transmitter will be concentrated, and directed toward the front of the 75 transmitter. 80

10. The combination with a sound-concentrator, in the form of a cup, and having a central projection with inclined sides on its bottom and annular inclined sides around the bottom adapted to deflect sound toward said 85 central projection, of a telephone-transmitter located in the cup with its diaphragm exposed to sounds deflected by the central projection, substantially as described.

11. A sound-concentrator, consisting of a cylinder having one end closed and the other 90 end provided with an annular opening near the edge, deflecting internal surfaces adapted to direct the sound entering the annular opening backward along the axis, in combination 95 with a telephone-transmitter located inside of the cylinder, substantially as described.

In witness whereof I subscribe my signature in presence of two witnesses.

CHARLES LIVINGSTON HYDE.

Witnesses:

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