

L. STEINBERGER.  
MOUTHPIECE.  
APPLICATION FILED AUG. 6, 1910.

Patented Apr. 4, 1911.

988,907.

Fig. 1.

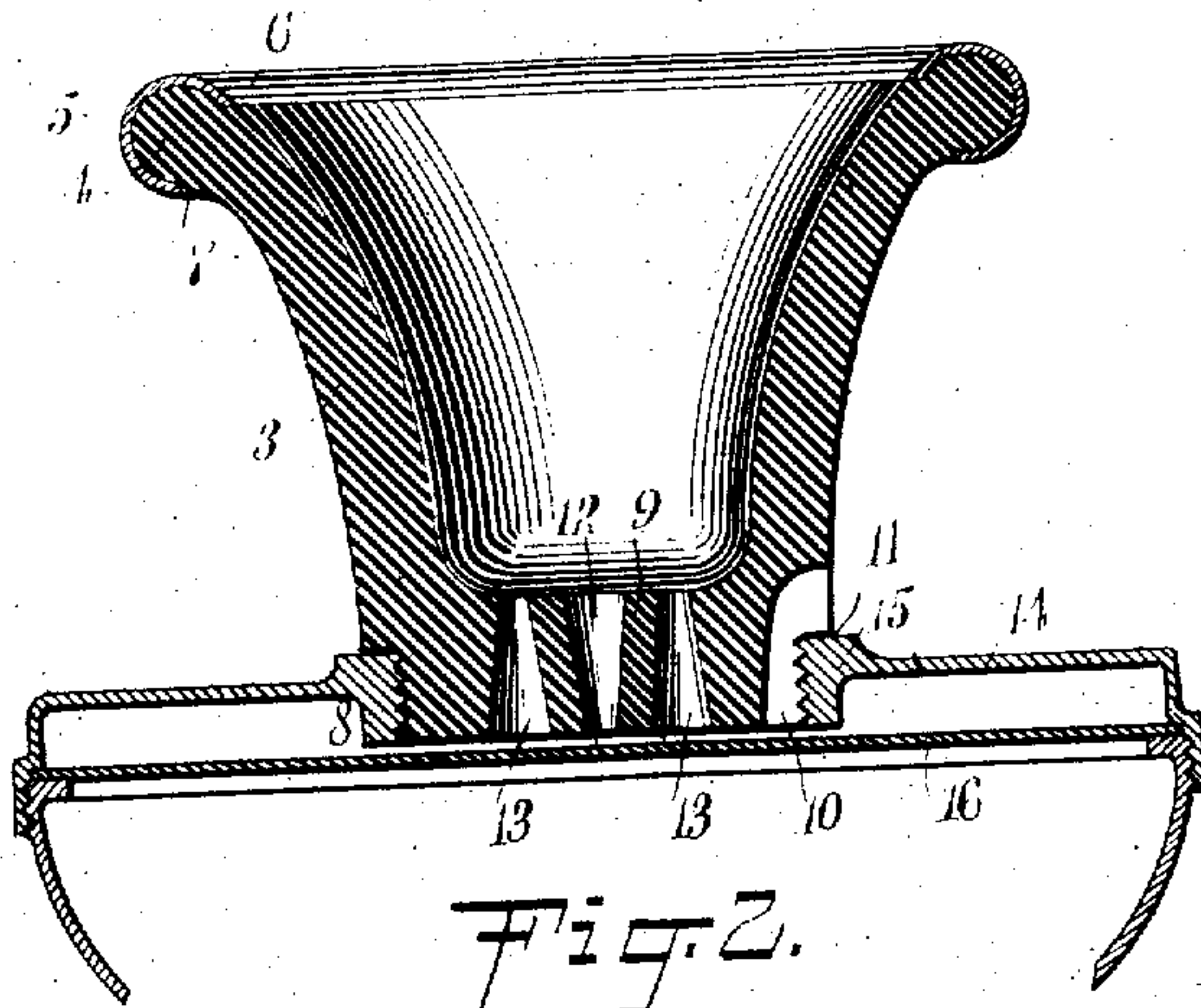
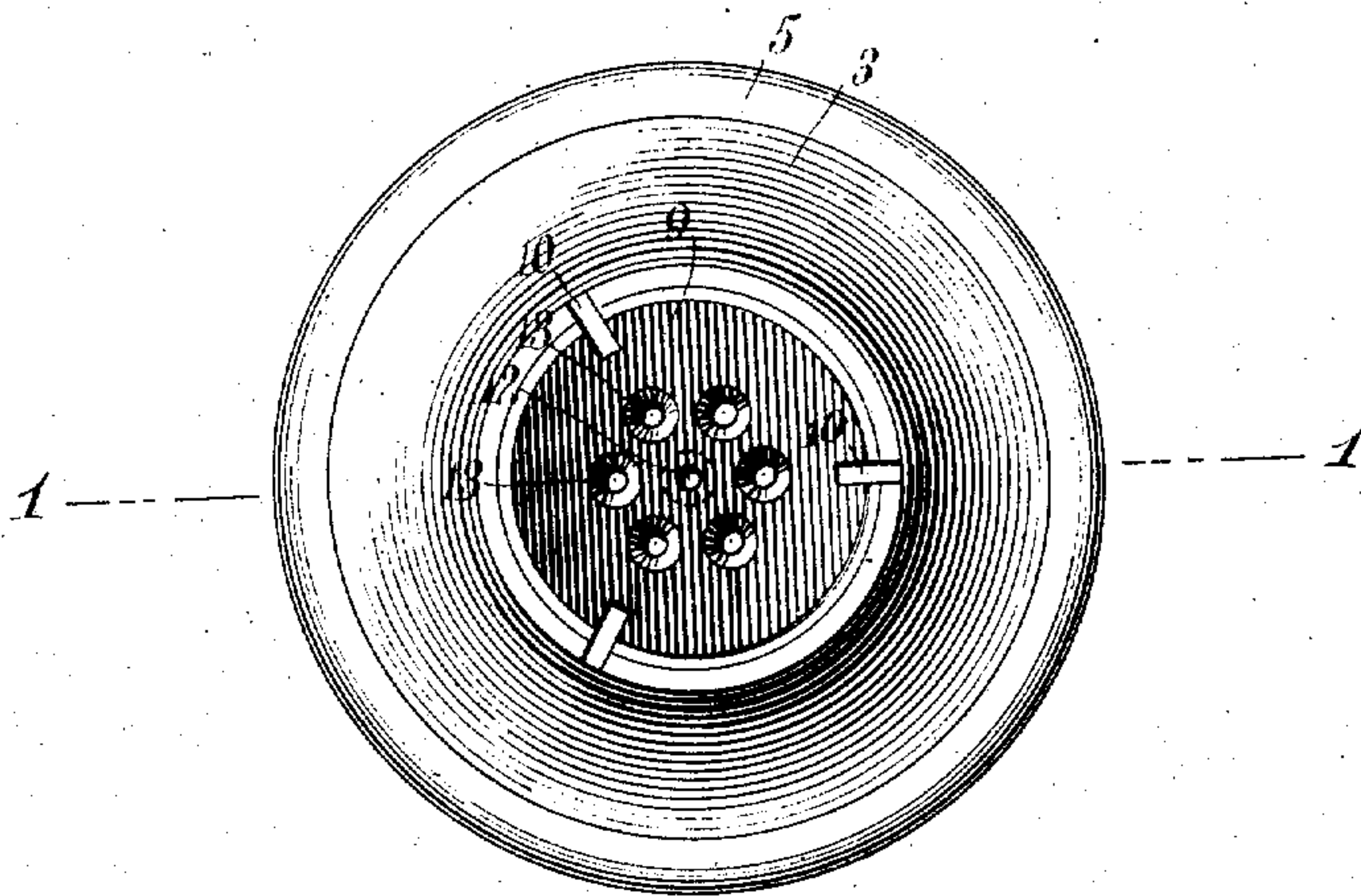


Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## MOUTHPIECE.

988,907.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed August 6, 1910. Serial No. 575,896.

*To all whom it may concern:*

Be it known that I, LOUIS STEINBERGER, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Mouthpiece, of which the following is a full, clear, and exact description.

My invention relates to mouthpieces, and especially to mouthpieces of the kind used for telephones, and by the aid whereof sounds are to be thrown upon a diaphragm, my more particular purpose being to improve the acoustical properties of the structure, and also to render the mouthpiece more sanitary.

I also seek to improve and strengthen the mouthpiece at its weakest points, and to otherwise improve its general efficiency.

My invention further contemplates giving to various parts of the mouthpiece such curvature that the complete structure will have a minimum of abrupt corners, especially in those portions of the mouthpiece which ordinarily face the operator; hence, it will be free from lodging places for bacteria and other disease germs, and may be cleansed readily when necessary or desirable.

My invention further comprehends improved means for strengthening the mouthpiece by applying upon the outer rim thereof a ring of metal, the inner and outer edges of this ring being bent toward each other and lodged against shoulders carried by the rim.

My invention still further contemplates certain sanitary features growing out of the use of the ring just mentioned, and particularly out of the manner in which the ring is mounted, and owing to the rounded corners of the interior of the mouthpiece.

More particularly stated, my invention comprehends a mouthpiece provided with a massive bottom having perforations, these perforations being so shaped as to direct the sound waves in a manner suitable for conserving the power and form of the sound waves and of causing them to produce a maximum effect.

My invention further comprises a mouthpiece having in its bottom a single central passage of frusto-conical form and adjacent to this passage are a number of other passages arranged substantially in the form

of a circle and each having substantially the form of a cone frustum, the smaller end of the single central passage being adjacent to the larger ends of the surrounding passages. My purpose in thus forming the mouthpiece, and particularly in elongating the sound passages, is—first, to convey the sound waves, as nearly as possible in their original form, to a point in very close proximity to the diaphragm, and to direct upon the center of the diaphragm a single column of sound waves concentrated, as far as practicable, and localized relatively to the diaphragm in order to cause the diaphragm to vibrate with a maximum of amplitude at its center; and second, to bring to bear upon the diaphragm, not at its center, but at a plurality of points outside of its center and encircling the same, a number of distinct columns of sound waves, each acting like the column of sound waves of a trumpet or horn, thus acting upon the diaphragm in a substantially different way and tending to preserve intact the overtones of the sound waves and communicating the same faithfully to the diaphragm. By using both the central passage and the encircling passages, as described, I find that the sound waves are transmitted with increased fidelity, and moreover motive power of the sound waves as applied to the diaphragm is greatly increased.

My invention further comprehends a mouthpiece that is practically indestructible, owing to the fact that the bottom threaded portion (which is usually of frail construction when made of insulating material), is formed of a solid mass of insulating material integral with the body portion of the mouthpiece, hence is as strong as it can be possibly made; the sound conveying passages extending through the solid bottom of my improved mouthpiece are also of a novel form and of considerable length, and will greatly improve the acoustic properties of the structure.

Considering the structure as a whole, it will be readily seen that I have produced a practically indestructible mouthpiece which at the same time possesses a number of other very desirable features.

The upper exposed peripheral edge of my improved mouthpiece is provided with a strengthening extending portion integral



with the main body portion, which will practically obviate the chipping that usually takes place at that portion of the mouthpiece. When desired or required, the strengthening extending portion may be still further strengthened by mounting thereon a separate ring-like member made of any suitable material. The application of the separate ring-like member also gives the mouthpiece a distinctive and ornamental appearance.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a section on the line 1—1 of Fig. 2, through my improved mouthpiece; and Fig. 2 is an inverted plan or bottom view of the mouthpiece, showing more particularly the distribution of the sound passages.

The body portion of the mouthpiece is shown at 3, and at 4 this body portion is provided with a rim integral with it and rounded.

At 5 is a metallic ring which in its cross section has substantially a C shape, as will be understood from Fig. 1. The inner and outer edges of the rim are lodged against shoulders 6, 7, so that the outer surface of the ring and the adjacent surface of the body portion 3 are flush with each other and the aggregate surface thus formed is practically continuous. By this arrangement the ring fits closely in position upon the mouthpiece and as the edges of the ring form a neat joint with the shoulders 6, 7 little, if any, room is left for the lodgment of bacteria, and the mouthpiece is therefore rendered comparatively sanitary.

The body portion 3 is provided with a thick, massive bottom 9 and with a reduced portion 8 threaded externally. The mouthpiece is further provided with three slots 10 which serve as air vents. Adjacent to the reduced threaded portion 8 and bounding the same in one direction is an annular shoulder 11. The bottom, owing to its great thickness, extends above the shoulder 11, thus strengthening the mouthpiece at what would ordinarily be its weakest point. By disposing the upper surface of the bottom above the shoulder, the mass of material between the internal surface of the mouthpiece and portions of the shoulder closest to said internal surface is increased, thus rendering the mouthpiece practically indestructible as against breakage. The bottom 9 is provided with a central passage 12 having generally a frusto-conical form, this passage being so disposed that its end of largest diameter merges into the open space within the body portion 3. A number of other sound passages 13 are disposed

around the passage 12 and substantially in the form of a circle. The passages 13 are each of frusto-conical form and are so arranged that the portions of greatest diameter of the passages 13 are adjacent to the portion of smallest diameter of the passage 12. By this arrangement the passages 13 practically open outward—that is, downward according to Fig. 1, like so many horns or trumpets.

At 14 is the transmitter face and disposed centrally of the same is an annular portion 15 threaded internally and adapted to receive the reduced threaded portion 8. The transmitter diaphragm is shown at 16 and lies in such position that the adjacent ends of the sound passages 12, 13 are brought into very close proximity with it, as will be understood from Fig. 1. Owing to the fact that the bottom 9 is very thick and massive and that the face of this bottom is immediately adjacent to the diaphragm 16 and is strictly parallel with the diaphragm, there is no compartment, as in the ordinary construction, to interfere with the sound waves. That is to say, the sound waves simply follow the passages 12, 13 straight through the bottom until they arrive at the diaphragm and are given but little chance for reflection or interference, being directed squarely against the diaphragm.

The acoustical action of the single central passage 12 is considerably different from that of the various passages 13. The passage 12 acts in a measure like the funnel or mouthpiece of an ear trumpet, and concentrates a portion of the sound waves directly upon the center of the diaphragm.

Each passage 13, however, acts somewhat like a horn and causes the sound waves conveyed through it to spread out as they would do in leaving a horn, and to strike the diaphragm which is immediately adjacent to them. I thus produce two effects both playing upon the diaphragm; first, a concentration of sound waves at the center of the diaphragm, and second a scattering of the sound waves in the manner well known in a horn, several different portions of the sound waves thus scattered, however, playing upon a substantially circular portion of the diaphragm, this portion encircling the central portion upon which the first-mentioned portion of the sound waves is concentrated. By this arrangement the sound waves as a whole are caused to produce a maximum effect. Both the volume and fidelity of the sound waves are conserved and preserved, so that a maximum of power and accuracy of movement is conferred upon the diaphragm. It is questionable if all the acoustical principles underlying the action of a horn—for instance, a phonographic horn—are understood at the present time. If the horn of a



phonograph be removed, other parts remaining intact, the machine may play as before, but the sounds are exceedingly harsh and do not appear to have either the vitality or the volume which is present in case the horn be used.

In my improved mouthpiece the various sound passages 13, by acting in a measure like so many horns, seem to preserve the vitality of the sound waves passing through them, and this all without loss of power; whereas, the single sound passage 12 appears to work upon a slightly different principle—to wit, the concentration of powerful waves directly upon the center of the diaphragm, thereby tending to communicate to the center of the diaphragm, a maximum of power.

I do not limit myself to the particular form of any or all of the parts herein shown and described, nor to the exact combination shown; neither do I limit myself to employ in every instance sound passages of a conical formation, nor to any particular number of them; nor to have in every instance rounding corners at the points shown, nor to employ in every instance a separate ring-like member on the peripheral edge of the mouthpiece. Neither do I limit myself to the use of any prescribed materials. I prefer, however, to employ the material well known in this art as "electrose."

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A mouthpiece, comprising a body portion having an opening, a bottom bounding said opening, said bottom being provided with a central passage and with a plurality of other passages formed in a circular row encircling said first-mentioned passage, each of the second-mentioned passages being of substantially frusto-conical form.

2. A mouthpiece, comprising a hollow body portion provided with a bottom, said bottom having a central passage of substantially frusto-conical form, and a plurality of other passages disposed substantially in the form of a circle around said first-mentioned passage, said second-mentioned passages having each the form of a cone frustum, the various passages being so disposed that the portion of larger diameter of said first-mentioned passage merges into the interior of said hollow body portion of said mouthpiece and the portions of largest diameter of the other passages extend outwardly from said bottom.

3. A mouthpiece, comprising a body portion having a large central opening, and also having a bottom bounding said opening, said bottom being provided with a plurality of sound passages each having a substantially frusto-conical form, the end of smallest diameter of one of said passages

merging into the central opening, and the end of largest diameter of another of said passages extending away from said opening.

4. A mouthpiece, comprising a body portion having a comparatively deep opening, and also having a bottom bounding said opening, said bottom being provided with a central passage of substantially frusto-conical form, said bottom being further provided with a number of passages of substantially frusto-conical form arranged in a circle surrounding said first-mentioned passage and communicating with said opening.

5. A mouthpiece, comprising a body portion having a comparatively deep opening, and a bottom bounding said opening, said bottom having a reduced threaded portion to facilitate its mounting upon a transmitter or the like, said bottom being provided with a plurality of sound passages, each having at one end of a large diameter and at its opposite end a smaller diameter, the ends of smaller diameter merging into said opening and the ends of larger diameter being directed away from said opening, said bottom being further provided with a single central sound passage disposed intermediate said first-mentioned sound passages, and extending entirely through said bottom.

6. A mouthpiece, comprising a body portion having a thick, massive bottom, said bottom being provided with air passages of substantially frusto-conical form.

7. A mouthpiece, comprising a body portion having a large central opening of considerable depth, and a bottom bounding said opening, said bottom being shallow as compared with the depth of said opening, said bottom having a plurality of sound passages through it, said sound passages each having the form of a cone frustum.

8. A mouthpiece, comprising a body portion having a bottom integral therewith, said bottom having a surface disposed in the form of a plane, said bottom also having substantially conical passages through it.

9. A mouthpiece, comprising a body member having a reduced portion integral with it and also having a thick massive bottom of such shape as to form in connection with the inner face of said body portion a curved surface in which abrupt bends are avoided.

10. A mouthpiece, comprising a body member provided with an inner surface and with a flat bottom having a reduced portion, said inner surface merging into the adjacent surface of said flat bottom by a gradual curve so as to avoid the use of abrupt corners.

11. A mouthpiece, comprising a body member provided with an inner surface and further provided with a massive flat bottom, said inner surface of said mouthpiece merging into the adjacent surface of said flat bottom by a gradual curve to prevent



the use of abrupt corners, said bottom being further provided with sound passages, and means for mounting said body portion.

5 12. A mouthpiece, comprising a body member provided at each of its ends with a strengthening portion integral with it, said body member being further provided with sound passages whereby sound waves may be conveyed through it, and also pro-  
10 vided with means integral with it for facilitating its mounting upon a support.

13. A mouthpiece, comprising a body member having a reduced portion, and a shoulder bounding said reduced portion,  
15 said mouthpiece being provided with a bottom the thickness of which is greater than the length of said reduced portion, said

bottom thus extending past said shoulder, said bottom being provided with sound pas-  
sages.

20 14. A mouthpiece, comprising a thick, massive bottom, said bottom being provided with air passages of substantially frusto-conical form, one of said passages having its end of largest diameter disposed adja-  
25 cent to the end of smallest diameter of another passage.

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

LOUIS STEINBERGER.

Witnesses:

J. L. McAULIFFE,

PHILIP D. ROLLHAUS.

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