

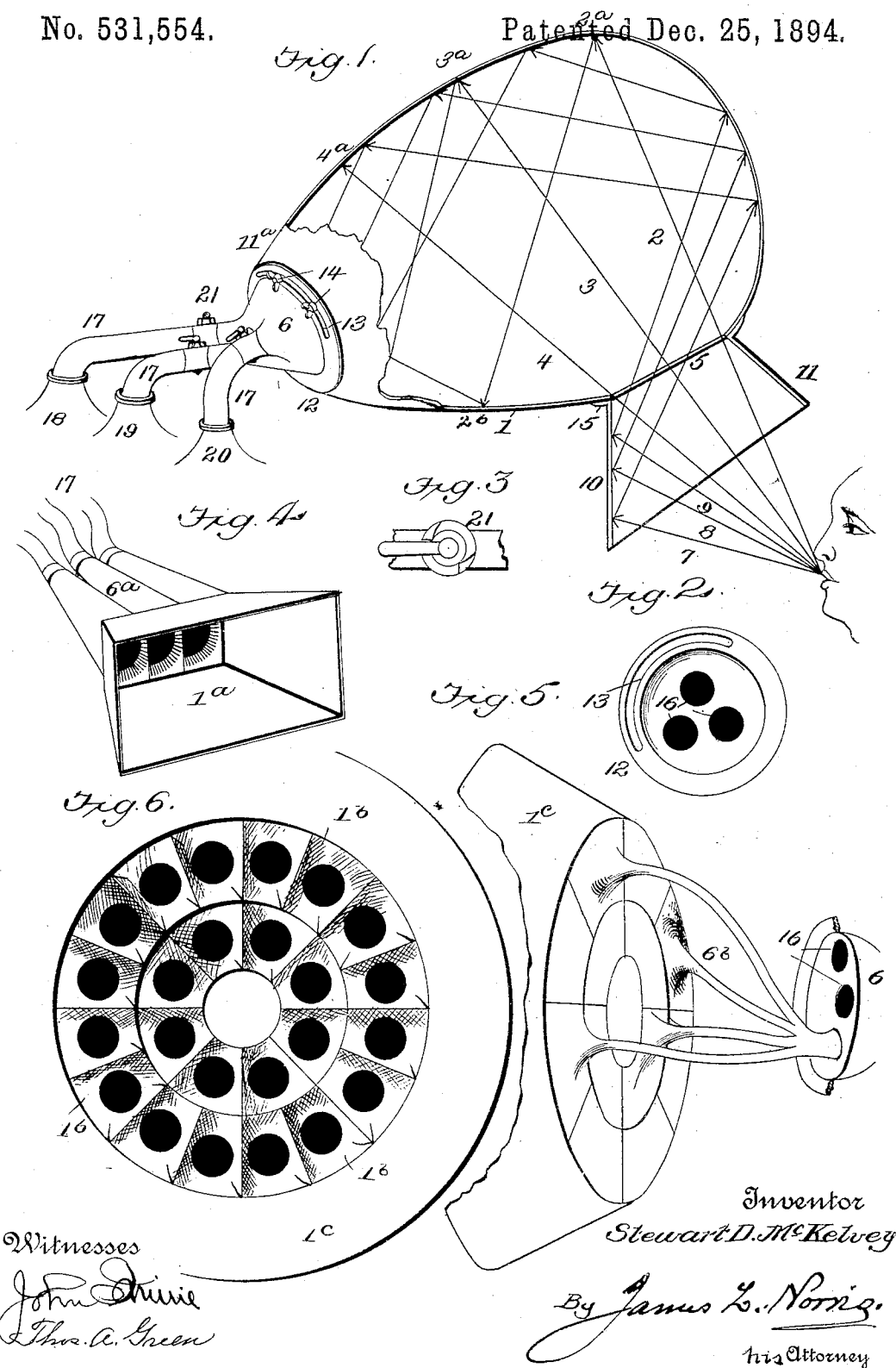
(No Model.)

S. D. McKELVEY.

APPARATUS FOR COLLECTING, CONCENTRATING, AND DISTRIBUTING  
SOUNDS.

No. 531,554.

Patented Dec. 25, 1894.



# UNITED STATES PATENT OFFICE.

STEWART D. McKELVEY, OF CANTON, OHIO.

APPARATUS FOR COLLECTING, CONCENTRATING, AND DISTRIBUTING SOUNDS.

SPECIFICATION forming part of Letters Patent No. 531,554, dated December 25, 1894.

Application filed February 5, 1894. Serial No. 499,155. (No model.)

*To all whom it may concern:*

Be it known that I, STEWART D. McKELVEY, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented new and useful Improvements in Apparatus for Collecting, Concentrating, and Distributing Sounds, of which the following is a specification.

My invention has for its object to provide simple and efficient means for concentrating sound vibrations imparted to the air from any person and convey them to one or more diaphragm chambers through which the sound can be conducted to one or more phonographs.

To these ends the invention consists in certain novel features of construction and new combinations of devices as hereinafter described and claimed.

In the annexed drawings illustrating the invention—Figure 1 represents in partial longitudinal section a view of a sound concentrator embodying my improvements. Fig. 2 is a face view of that side of a distributing head which is arranged toward and in connection with the concentrating chamber. Fig. 3 is a view of a cock or valve for controlling the passage of sound waves through the apparatus. Fig. 4 is a view of a modified form of sound concentrator. Figs. 5 and 6 represent views of another modification in the form and construction of the concentrator.

Referring to Fig. 1, the numeral 1 designates the main chamber of a sound concentrator, of a preferred form of construction, for receiving, concentrating and distributing sound, as will hereinafter more fully appear. In this figure the source of sound is indicated as proceeding from the human voice. The three diverging lines 2, 3 and 4 indicate the direction taken by certain sound waves passing straight through the opening 5 to the opposite or upper inner face of the main concentrating chamber 1 and striking said inner face at the points 2<sup>a</sup>, 3<sup>a</sup> and 4<sup>a</sup>. In the transmission of sound, as well as light, it is a well known fact that the angle of reflection is equal to the angle of incidence. Thus in the chamber 1 the sound waves after moving in the initial lines 2, 3 and 4 are reflected from the points 2<sup>a</sup>, 3<sup>a</sup> and 4<sup>a</sup> at proper angles to the opposite or lower inner surface of the concentrator,—the secondary point of incidence of

one of these waves being shown at 2<sup>b</sup>,—and thence along other lines the sound waves are again reflected into and through a funnel shaped distributing head 6 that is attached to the reduced end of the concentrator. As shown in Fig. 1, other initial wave lines or vibrations, as 7, 8 and 9, are projected against the inner surface of an outer receiving chamber 10 which communicates through the opening 5 with the main chamber 1 of the sound concentrator. These sound waves 7, 8 and 9 are reflected into the chamber 1 and from side to side thereof, as shown, toward and through the distributing head 6 together with the sound waves first mentioned. It is obvious that sound waves will be also projected against the upper lip 11 of the outer funnel shaped chamber 10 and reflected thence back to or near the point 11<sup>a</sup> adjacent to the distributing head. To avoid confusing the drawings only a few of the lines indicating the direction of the sound waves are shown.

The main concentrating chamber 1 and the distributing head 6 are preferably connected in such a manner as will permit the chamber 1 to be partly rotated or turned from side to side as may be required for the purpose of directing the outer funnel shaped receiving chamber 10 toward the source of sound. The drawings show only one of many modes of construction that may be conveniently adopted for connecting the main chamber 1 and distributing head 6 so as to permit movement of either with relation to the other. In the form of construction illustrated in Figs. 1 and 2 an annular flange 12 on the distributing head 6 is provided with an elongated curved or segmental slot 13 to receive a pair of bolts that are fastened to a similar flange on the reduced end of the main chamber 1, the said bolts being provided on their outer ends with washers and thumb-nuts 14, Fig. 1, to securely connect the chamber 1 and head 6 in the position to which they may have been adjusted with relation to each other.

The outer or receiving chamber 10 may have a flange 15 fitted closely around the inlet opening 5 of the main chamber 1 and riveted or otherwise secured to said main chamber.

The main chamber 1 and the funnel shaped receiver 10 may be made of any suitable material such as hard rubber or japanned tin;

or any other appropriate material may be employed in their construction.

The distributing head 6 may be made of metal, as malleable iron, or any other suitable material.

In Figs. 2 and 5 I have shown the distributing head 6 as having three separated or distinct openings 16, though any other required number may be provided, for connection with tubes 17 Fig. 1 leading to separate diaphragm chambers 18, 19 and 20 of any suitable construction such as ordinarily used in connection with or forming part of a phonograph. The conducting tubes 17 if required to be rigid may be made of any suitable metal but I prefer to have them composed of rubber tubing or similar flexible material to allow them to be extended or turned in any desired direction according to the required position of adjustment of the concentrator.

I may provide each conducting tube 17 with a cut off valve or cock 21, Fig. 3 of suitable construction. These valves or cocks may be located at any desirable points in the several tubes 17 or they can be placed in the diaphragm chambers 18, 19 and 20 at the ends of said tubes, but I prefer to arrange them as near to the distributing head 6 as possible.

Instead of the turning valve or cock shown in Fig. 3 I may employ slide valves in the tubes 17 or in the head 6 or diaphragm chambers 18, 19 and 20 for the same purpose, namely, to open or close communication through these devices as may be required.

Fig. 4 illustrates a form of sound concentrator in which the main chamber 1<sup>a</sup> serves also as a receiving chamber and communicates through a multiple and tubular distributing head 6<sup>a</sup> with the tubes 17 that lead to the diaphragm chambers.

Another modification in the construction of the sound concentrator is shown in Figs. 5 and 6 consisting of a number of separate funnel shaped receiving and concentrating chambers 1<sup>b</sup>, say twenty-four, more or less, surrounded by a flange 1<sup>c</sup> and connected in multiple series by means of converging tubes 6<sup>b</sup> with the opening 16 in a distributing head 6 which communicates through suitable tubes with a number of diaphragm chambers in the manner already described. A concentrator of this form may be connected straight to one phonograph or be connected up in series or multiple series, as desired. If the source of sound be directly in front then all the funnels 1<sup>b</sup> would approximately receive the same volume of vibrations but if the sound waves were stronger on one side than the other then those directly in front of the source of sound would, of course, be most favorably located. Hence to properly convey and distribute the sound I connect the funnels in series as shown in Fig. 5, preferably using flexible tubing 6<sup>b</sup> between the funnels 1<sup>b</sup> and the distributing head 6 to conduct the sound waves. It will be apparent that the manner of arranging and connecting these funnels can be greatly

varied and that by means of an appropriate arrangement of conducting tubes the sound can be distributed to a number of instruments at the same time; or the concentrator may be employed to increase the volume of sound transmitted to, say, two, three or four diaphragms in a phonograph having a corresponding number of recording styles and tablets, ribbons or cylinders.

For many purposes the simple form of concentrator shown in Fig. 1 is preferable. If this concentrator were made excessively large each time the sound is reflected it would produce an echo, but the concentrator being of medium size, say, for ordinary purposes about thirty inches in diameter at the larger part, the time between the incident wave and the reflected vibration will not be perceptible and by reflecting the waves of sound in the manner described the amplitude of the vibrations delivered to the distributing head 6 will be greatly increased.

The concentrating chamber may, or may not, be mounted upon a permanent support, according to the desire of the user. Its size is such that it may be readily held in the hand in any suitable position, either upon a level with the head of the speaker, or above, or below the same. When held upon a level with the mouth, or thereabout, the receiving chamber 10 will be turned laterally, and if above or below the speaker's head it will be turned so as to point downward, or upward, respectively. If a permanent support be preferred, any simple form of frame will answer the purpose, no special construction being essential.

The main concentrating chamber 1 is approximately ovoid in its general form, its section being ellipsoidal, or nearly so, as shown in Fig. 1.

What I claim as my invention is—

1. An apparatus for collecting and distributing sound waves and increasing the amplitude of the vibrations, consisting of an approximately ovoid concentrating chamber for receiving and reflecting the sound waves and tubes connected with said chamber for distributing the sound to a plurality of phonographs, substantially as described.

2. In an apparatus for collecting, concentrating and distributing sound waves, the combination of a diaphragm chamber, an approximately ovoid concentrating chamber, a distributing head connected with the concentrating chamber, and tubes for connecting the distributing head with the diaphragm of a plurality of phonographs, substantially as described.

3. In an apparatus for collecting, concentrating and distributing sound waves, the combination of a concentrating chamber, a distributing head, and tubes that connect said chamber and head in series, substantially as described.

4. In an apparatus for collecting, concentrating and distributing sound waves, the

combination of a concentrating chamber, an outer receiving chamber communicating with the concentrating chamber near one end thereof, a distributing head connected with the outer end of the concentrating chamber, and tubes leading from said distributing head to conduct the sound waves to various points, substantially as described.

5. In an apparatus for collecting, concentrating and distributing sound waves, the combination of a concentrating chamber and a distributing head having an adjustable connection with each other, the said concentrating chamber being adapted to be rotated on said head to be adjusted toward the source of sound, substantially as described.

6. In an apparatus for collecting, concentrating and distributing sound waves, the combination of an approximately ovoid concentrating chamber having an inlet near its

larger end, a distributing head connected with the smaller or reduced end of said chamber, and a tube or tubes for conducting sound from said distributing chamber to one or more points, substantially as described.

7. In an apparatus for collecting, concentrating and distributing sound waves, the combination of a concentrating chamber, tubes communicating with said chamber to conduct the sound to different points, and valves for controlling or cutting off the passage of sound through said tubes, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

STEWART D. MCKELVEY. [l. s.]

Witnesses:

F. A. ZIMMER,  
GEO. O. MCKELVEY.