Aug. 12, 1930. L. STEVENS 1,772,645

SOUND AMPLIFIER

Filed Sept. 29, 1925 2 Sheets-Sheet 1

Fig. 1.

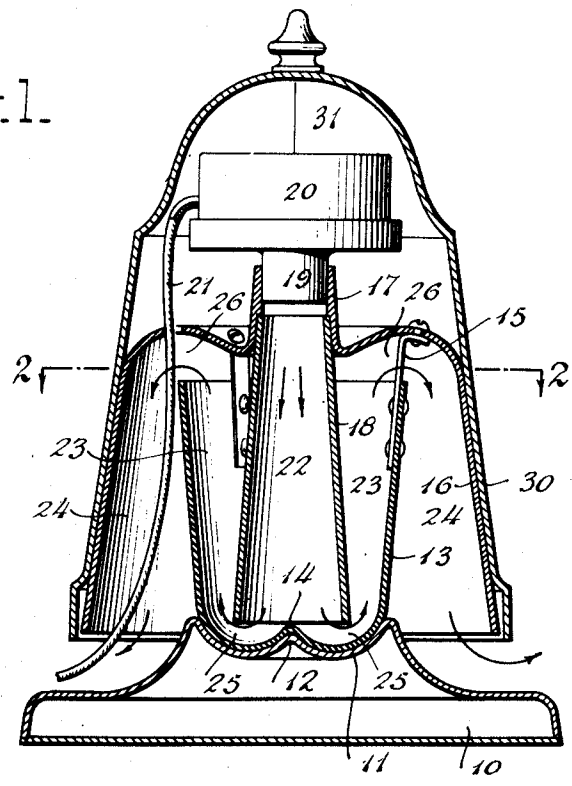
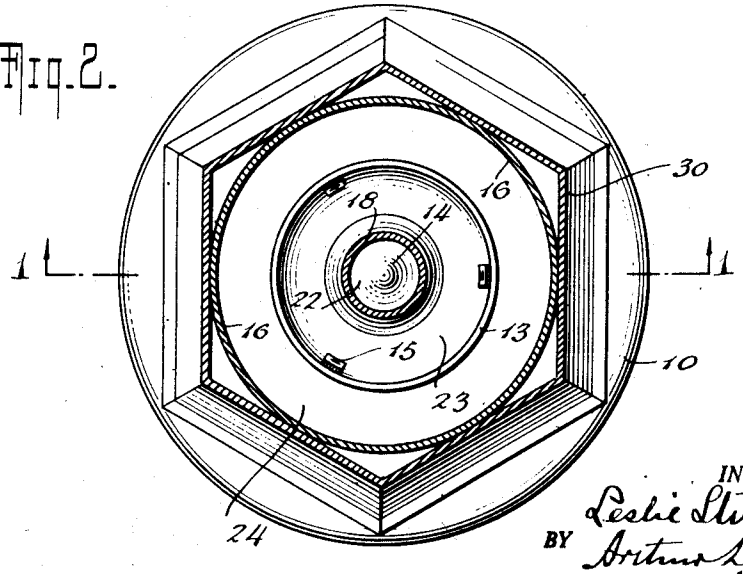


Fig. 2.



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Fig. 3.

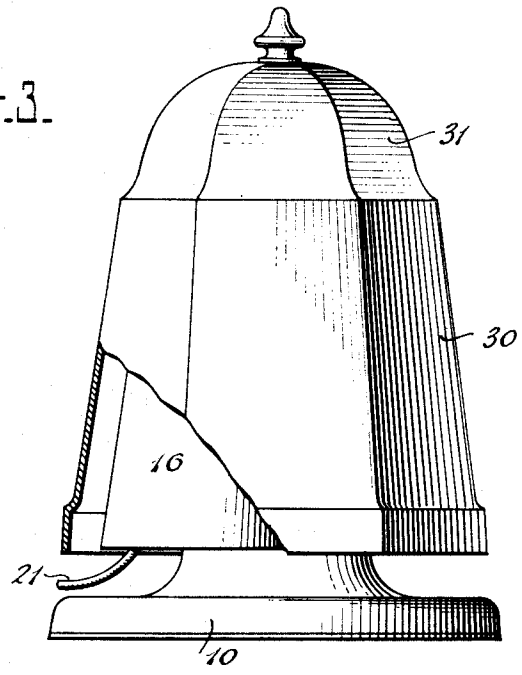


Fig. 4.

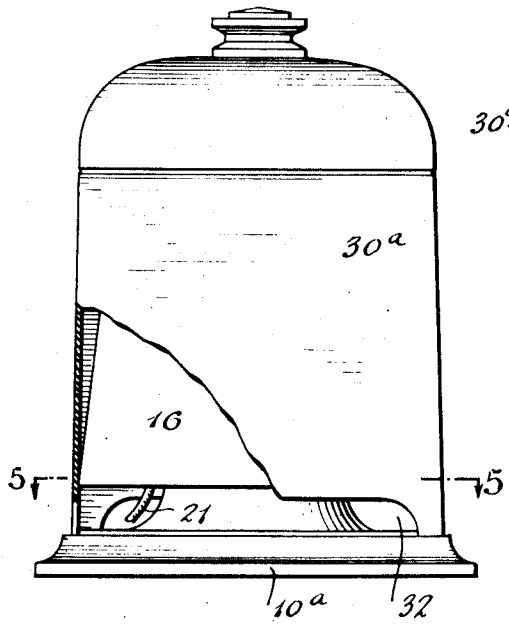
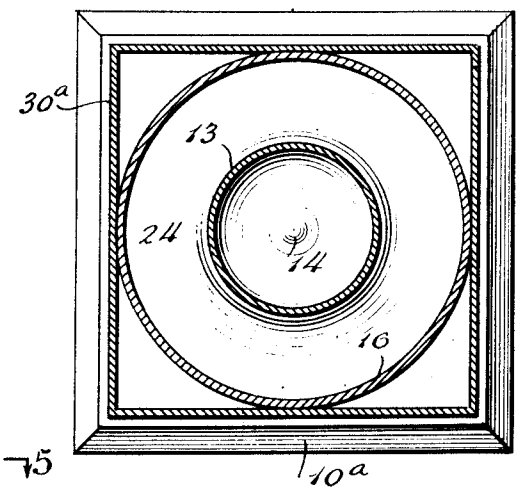


Fig. 5.



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UNITED STATES PATENT OFFICE

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SOUND AMPLIFIER

Application filed September 29, 1925. Serial No. 59,261.

This invention relates to sound amplifiers, and particularly to the type adapted to be used with radio-receiving apparatus. The object of the invention is to provide a new and improved device of this character, and more particularly, to provide a compact structure of attractive appearance and of simple construction and low manufacturing cost, and having exceptionally fine tonal qualities, all as will appear more fully from the following description.

An illustrative embodiment of my invention and a modification thereof are shown in the accompanying drawings, in which:—

Fig. 1 is a central vertical sectional view, taken on line 1—1 of Fig. 2, of a radio loud speaker according to the invention;

Fig. 2 is a section on line 2—2 of Fig. 1;

Fig. 3 is a side elevation of the device of Fig. 1 with a portion of the outer casing broken away;

Fig. 4 is a view similar to Fig. 3 showing a loud speaker having an outer casing of different shape mounted upon the amplifier proper; and

Fig. 5 is a section on line 5—5 of Fig. 4.

The amplifier proper comprises a base 10 which for the purpose of illustration is shown as constructed of sheet material in the form of a hollo casing. It is not essential, however, that the base be constructed of sheet material, as it may be made of a solid block of wood or other suitable material. The top of the base 10 is provided with a raised central depression or recess 11, from the edge of which the upper surface of the base extends downwardly and outwardly, most desirably in a radially concave curve as shown, the center of which recess is provided with an upwardly projecting teat 12. Seated within the recess 11 and rigidly secured thereto, preferably by cement or the like, is a cup-shaped sound directing member 13, the lower end of which is shaped to conform to the recess 11 and is provided with a central teat 14 which fits upon the teat 12. The member 13 is preferably flared outwardly from its lower end, and adjacent to its upper edge has rigidly secured thereto a plurality of supporting brackets 15 which are rigidly connected to and support a cup-shaped sound directing member 16 in spaced concentric relation to the member 13; the brackets 15 also serving to hold the upper edge of the member 13 in spaced concentric relationship with the megaphone 18. The central upper portion of the member 16 is shaped to form a hollow upwardly extending boss 17 in the lower end of which the smaller end of the megaphone 18 is secured. The lower end of the megaphone 18 terminates a short distance above the curved bottom wall of the member 13 and concentrically thereof, the axis of the megaphone thus being in alignment with the teat 14. The lower edge of the member 16 is located so as to leave a sufficient sound outlet opening beneath it. Into the upper end of the hollow boss 16 is inserted the neck 19 of the telephone unit 20, which unit may be of any suitable construction, such as commonly used with radio loud speakers. The numeral 21 indicates the usual conducting cord for connecting the telephone unit with the receiving apparatus proper.

As will be noted by referring to Fig. 1 of the drawings, the megaphone 18, the member 13, and the member 16, forming sound-directing members of the amplifier, are rigidly secured together in spaced concentric arrangement to form a unitary structure. These parts of the amplifier are so constructed and arranged that a long tortuous passage, or conduit, of gradually increasing cross-sectional area is provided for the sounding column of air. This conduit comprises the innermost central passage 22 enclosed by the wall of the megaphone 18, the intermediate passage 23 enclosed between the wall of the megaphone and the wall of the member 13, and the outer passage 24 defined between the wall of the member 13 and the wall of the member 16; the passages 22 and 23 being connected by the transverse passage 25 between the lower edge of the megaphone 18 and the recessed bottom of the member 13, and the passages 23 and 24 being connected by the transverse passage 26 formed between the upper edge of the member 13 and the top of the member 16. The teat 14 located centrally of the axis of the megaphone and the

recess at the bottom of the member 13 serve to deflect the sound waves equally in all directions from the megaphone to the passage 23. It will further be noted that in all portions of the sound amplifying conduit, that is to say, in the transverse passages 25 and 26 as well as in the longitudinal passages 22, 23 and 24, there is a gradual increase in the cross-sectional area of the conduit. In addition, the curvature of the recess at the base of the member 13 and the curvature at the top of the member 16 are such that sharp bends or corners which might tend to interfere with the vibrations of the air column are avoided.

An outer casing 30, which, in the form shown in Figs. 1 to 3 inclusive, is of hexagonal cross-section, is detachably seated upon and encloses the member 16. The side walls of the outer casing 30 are most desirably inclined at the same angle as the side walls of the member 16, and the parts are so proportioned that the outer casing bears the relationship of a circumscribed polygon to the circular perimeter of the member 16 at any horizontal plane intersecting the two members. Due to the equal inclination of the side walls of the outer casing 30 and member 16, and the geometrical relationship of circumscribed polygon and inscribed circle respectively, it will be seen that the outer casing rests upon and is supported by the member 16 substantially at and along the longitudinal center of each of the side faces of the wall of the hexagonal outer casing. The casing 30 extends upwardly beyond the top of the member 16 so as to define a compartment 31 in which the telephone unit 20 is located; the dimensions of the upper portion of the outer casing being such that the telephone unit is entirely out of contact with the walls of said outer casing.

In order to obtain superior results in sound reproduction, the megaphone 18, the members 13 and 16, and the outer casing 30, are made of non-resonant material so that no disturbing sound effects will occur due to vibration or rattling of the parts of the amplifier. A suitable material having the desirable non-resonant properties is buckram or other stiff woven fabric impregnated with any suitable cement and sizing and molded to the desired shape. Two or more layers of the fabric are preferably employed, stiffened with sizing and shaped and pressed between dies to the desired configuration while the sizing is moist. A further prevention of vibration or rattling of the parts of the amplifier is secured by the rigid connection by the brackets 15 of the free edge of the member 13 with the member 16, and also by the outer casing 30 being supported by the wall of the member 16; the weight of the casing 30 and its contact with the member 16, especially adjacent the lower edge thereof, effectually damping or choking any tendency of the member 16 to vibrate in resonance with any notes produced in the sounding air column.

By making the member 16 of circular cross-section, I am enabled to employ outer casing members of different cross-sectional shapes with the same amplifier proper. Figs. 4 and 5 show a construction in which an outer casing 30^a of square cross-sectional configuration is employed. The side walls of the outer casing shown in Figs. 4 and 5 are only slightly inclined, and are extended downward at the corners to rest on the base 10^a, but they are so proportioned as to make contact with the lower edge of the member 16 so as to counteract any tendency of the bell member 16 to vibrate. The outer casing of these figures is provided adjacent to its lower edge with the cutout portions 32 to permit the exit of the sound waves from the amplifier.

It will be understood that any desired cross-sectional configuration of the outer casing member, as well as the outer member 16 of the amplifier proper, may be employed without departing from the spirit of my invention, it being desirable, however, that the outer casing shall contact with the lower end of the member 16 to secure the desired damping effect. It will also be understood that various other modifications may be made in the construction shown without departing from the invention as set forth in the claims, that the amplifier proper may be used without the outer casing, and that sound amplifiers embodying features of my invention may be used for amplifying sound vibrations from sources other than radio telephone units.

What is claimed is:

1. A sound amplifier, comprising a plurality of rigidly connected members constructed of sheet material and arranged in nested spaced concentric relationship to define a tortuous passage of gradually increasing cross-sectional area, and a detachable outer casing of sheet material enclosing said plurality of members, said outer casing contacting with the outer one of said plurality of members adjacent to the outer edge thereof to prevent vibration of said member.

2. A sound amplifier, comprising a plurality of rigidly connected members constructed of sheet material and arranged in nested spaced concentric relationship to define a tortuous passage of gradually increasing cross-sectional area, and a detachable outer casing of sheet material enclosing said plurality of members and shaped to provide a compartment for a telephone unit attached to one of said members, so that the unit shall be exposed and accessible when the outer casing is removed.

3. A sound amplifier, comprising a detachable outer casing, a unitary inner assemblage providing a conduit of gradually increasing cross-sectional area for a sound-

ing column of air, said outer casing defining with said assemblage a compartment for a telephone unit, and means to support said unit within said compartment entirely out of contact with the walls thereof.

4. A sound amplifier, comprising an inner assemblage consisting of a plurality of outwardly flaring members annular in cross-section rigidly connected together in spaced concentric relationship to form a tortuous passage of gradually increasing cross-sectional area, an outer casing enclosing and detachably mounted upon said inner assemblage, the cross-sectional configuration of said outer casing bearing the relationship of a circumscribed geometrical figure to the outer annular member of said assemblage and contacting therewith adjacent to the exit end of said tortuous passage and serving to dampen vibrations of said outer annular member.

5. A sound amplifier, comprising an inner assemblage consisting of a megaphone, a cup-shaped outer member and a cup-shaped intermediate member arranged in nested spaced concentric relationship, said outer member being provided with a central hollow boss in one end of which said megaphone is entered and the other end of which is formed to receive the neck of a telephone unit, and an outer casing detachably mounted on and enclosing said inner assemblage, one end of said outer casing projecting beyond said inner assemblage and forming therewith a compartment for a telephone unit, the walls of which compartment will be spaced from and out of contact with the telephone unit.

6. A sound amplifier, comprising a base, a megaphone, an outer member and an intermediate member rigidly secured together in spaced concentric relationship to form a unitary assemblage, said intermediate member being mounted on the base, and an outer casing detachably mounted on and enclosing said outer member and serving by engagement therewith to dampen vibration thereof.

7. A sound amplifier, comprising an upper part formed to provide a cup-shaped outer member and a megaphone positioned centrally of the outer member, a lower part formed to provide a base and a cup-shaped intermediate member to extend upward in said outer member, means for supporting the upper part on the lower part in position to provide a tortuous passage of gradually increasing cross-area for a sounding column of air, and a detachable outer casing covering the outer member of said upper part and providing above said outer member a compartment for a telephone unit.

8. A sound amplifier, comprising an inner assemblage consisting of a plurality of outwardly flaring members rigidly connected together in spaced concentric relationship to form a tortuous passage of gradually increasing cross-sectional area, and vibration damping means on the outer flaring member of said assemblage contacting therewith adjacent the exit end of said tortuous passage at spaced positions around said outer flaring member, said vibration-damping means being provided by a removable outer casing formed to enclose said inner assemblage.

In testimony whereof I have hereunto set my hand.

LESLIE STEVENS.