Jan. 5, 1932. A. E. TAUSCHER ET AL 1,839,714

AMPLIFIER FOR SOUND REPRODUCING DEVICES

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Fig. 1.

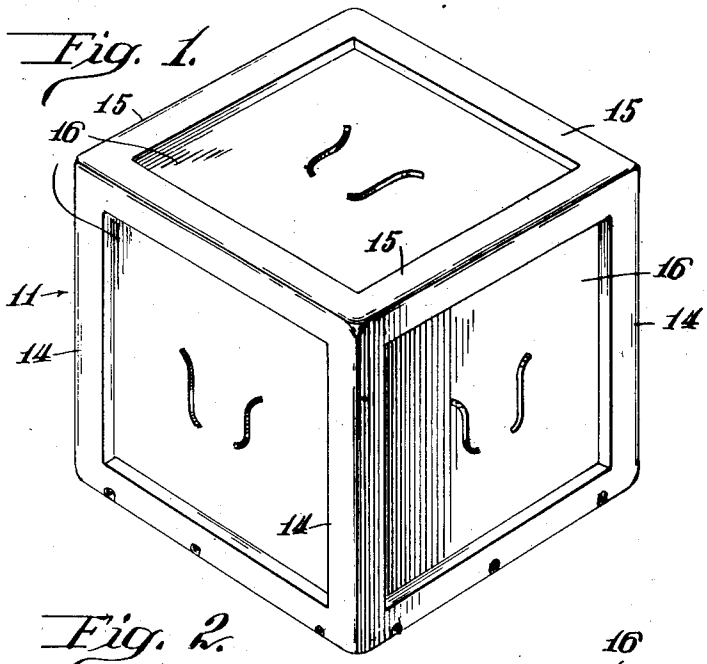
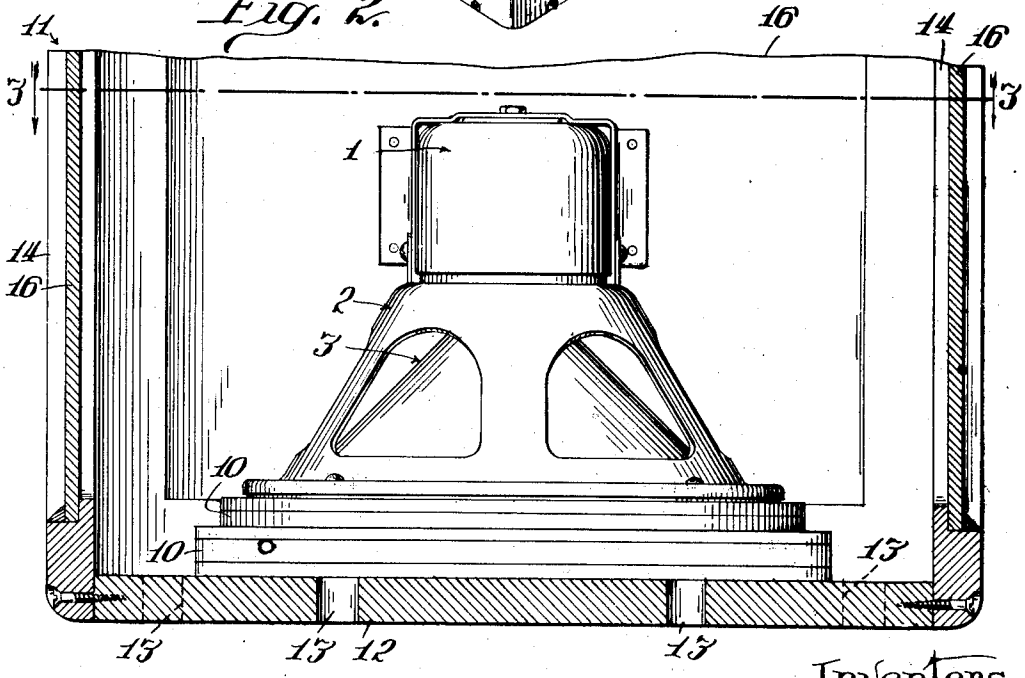


Fig. 2.



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Fig. 3.

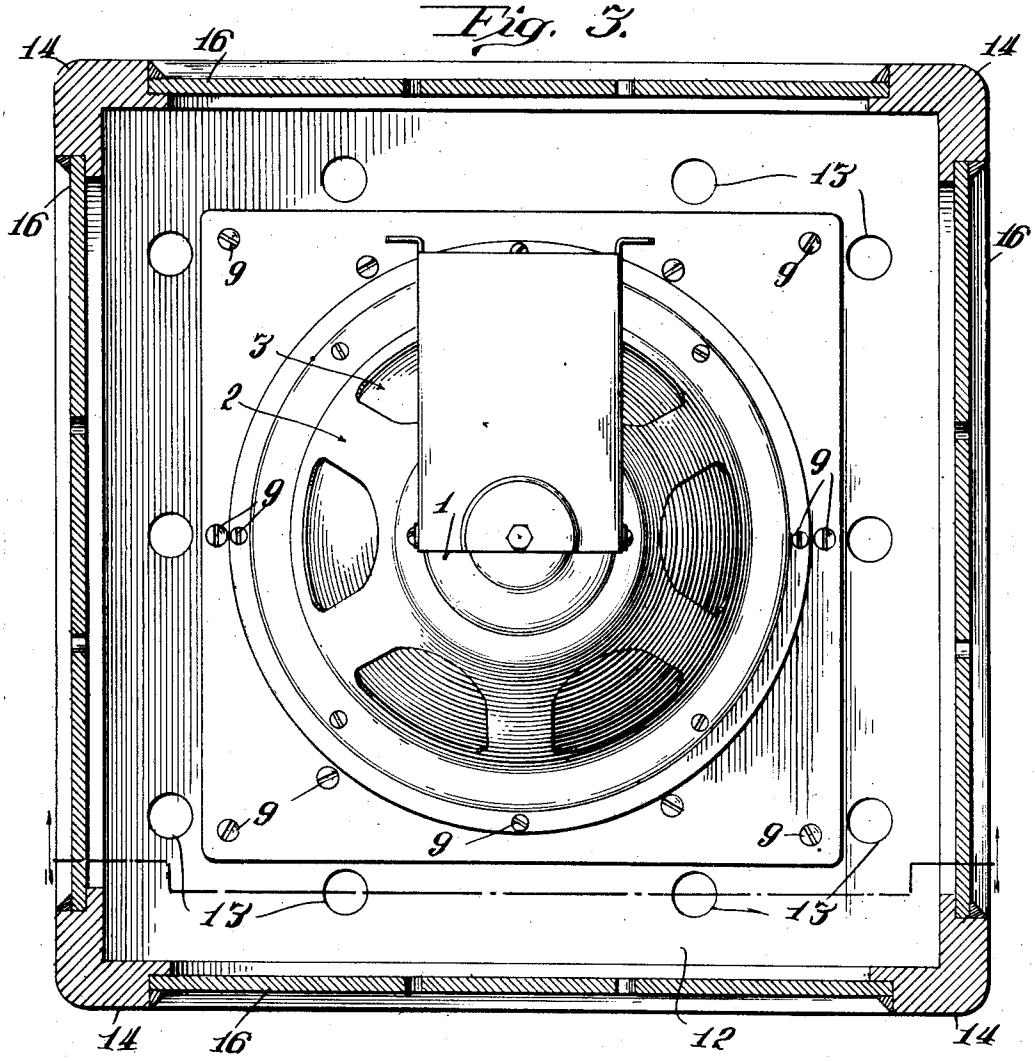
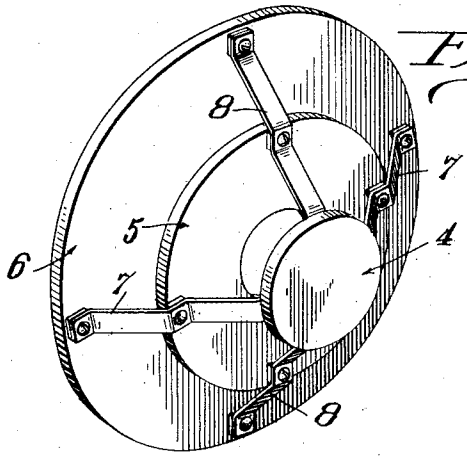


Fig. 4.



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AMPLIFIER FOR SOUND REPRODUCING DEVICES

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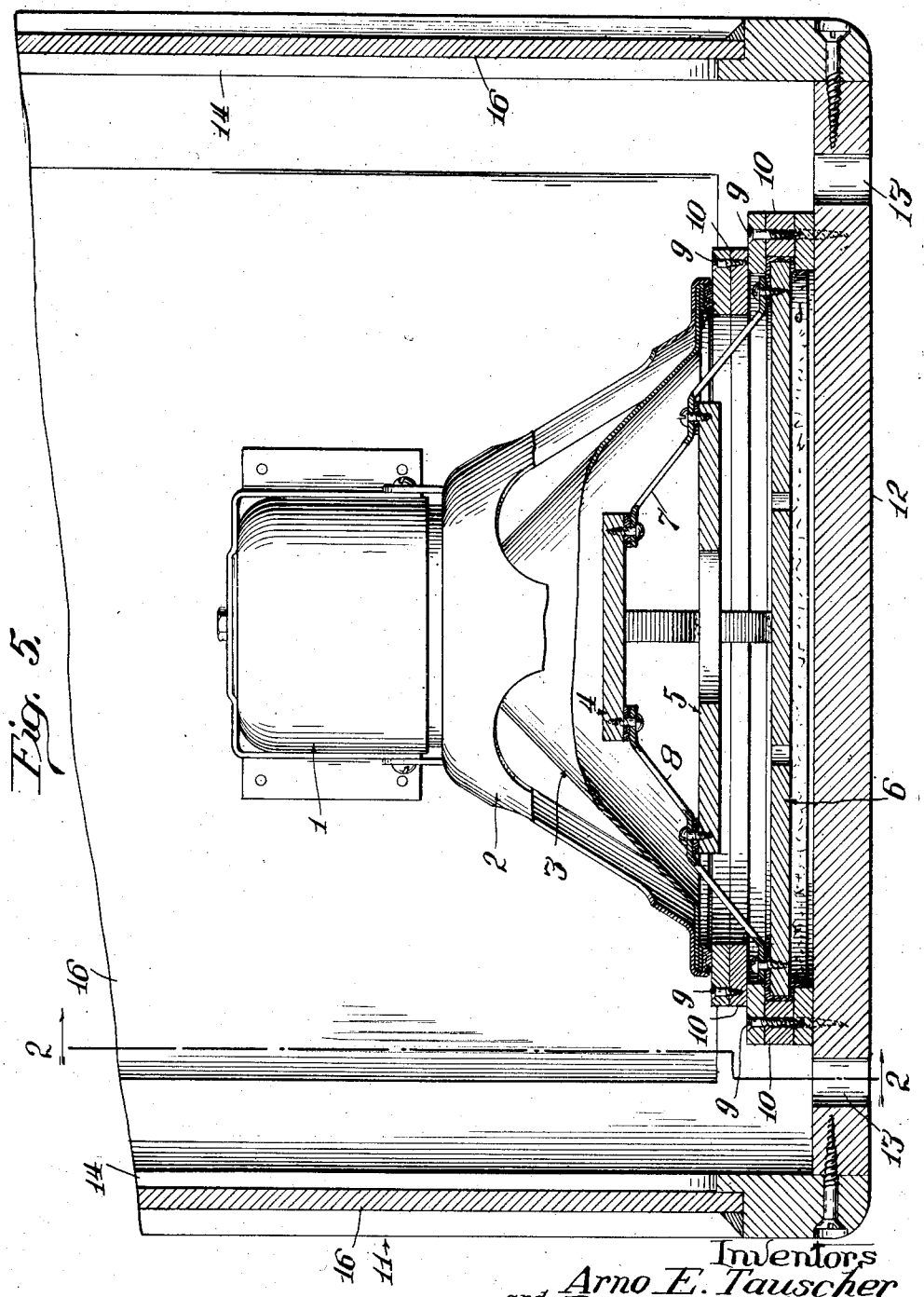


Fig. 5.

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AMPLIFIER FOR SOUND REPRODUCING DEVICES

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Fig. 6.

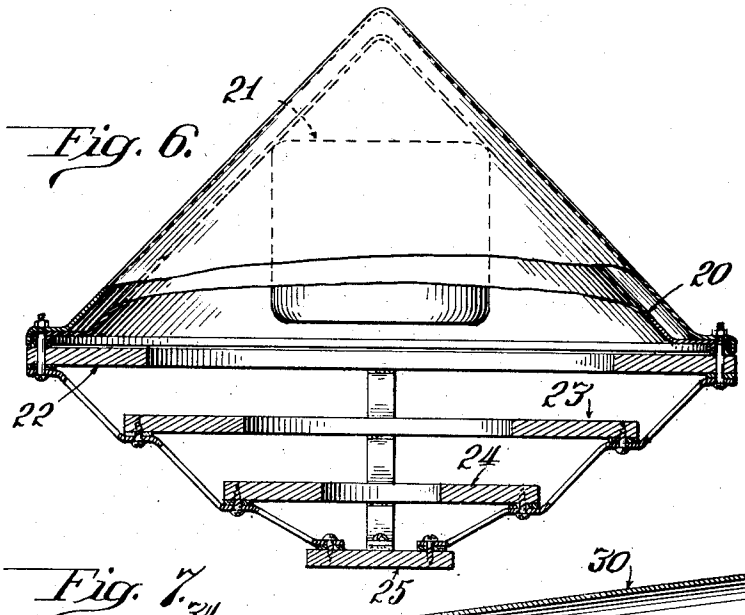


Fig. 7.

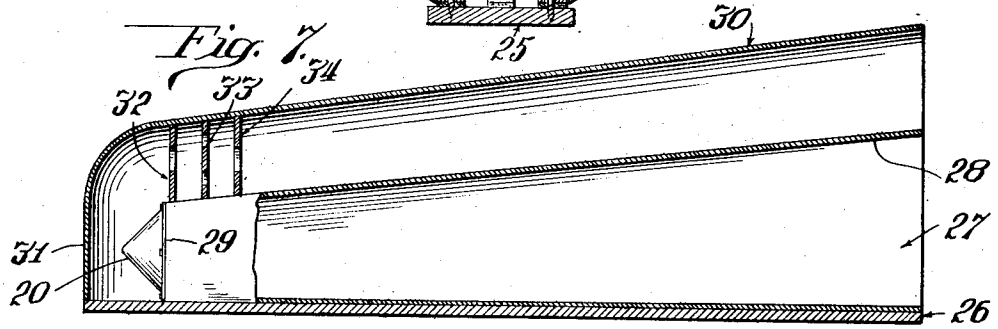


Fig. 8.

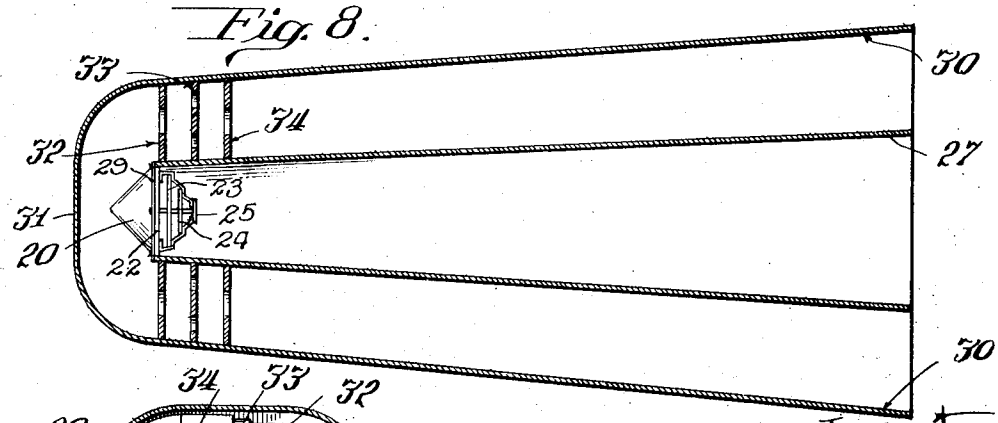
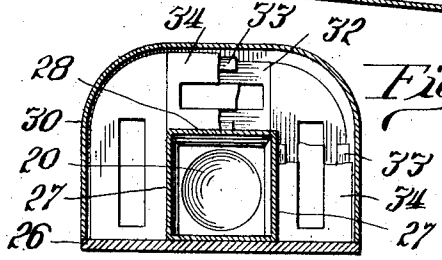


Fig. 9.



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UNITED STATES PATENT OFFICE

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AMPLIFIER FOR SOUND REPRODUCING DEVICES

Application filed September 5, 1930. Serial No. 480,012.

This invention relates to sound wave responsive devices such as constitute parts of radio sets, and has for its particular object to provide a device of this character which will more truly, accurately and pleasingly transmit to the ears of listeners the tones received from broadcasting stations by radio receiving sets.

The device of the invention may be designated as an attachment to or a component part of the speaker of the receiving set.

It is quite commonly known that sound waves received and transmitted to the ear by radio receiving sets do not correspond accurately in tone value and quality with the sound waves created by human voices and musical instruments as broadcasted to receiving sets. Many tones are rendered harsh, brassy or nasal through defects in the diaphragms of the broadcasting and receiving instruments, lack of proper sounding boards, etc., and it is the purpose of the device of this invention to reproduce to the ear of the listener the sound waves as created by voice and instrument at the broadcasting station in their original tone values or substantially those values.

The present invention is illustrated in the accompanying drawings wherein:

Fig. 1 is a perspective view of a device constructed in accordance with the invention.

Fig. 2 is a vertical sectional view of the same on the line 2—2 of Fig. 5 showing the conventional speaker of a radio receiving set in elevation.

Fig. 3 is a plan section of the device on the line 3—3 of Fig. 2.

Fig. 4 is a perspective view of a series of diaphragms or sound wave responsive members associated with said speaker.

Fig. 5 is a vertical sectional view of the device showing the members of Fig. 4 in their proper position relatively to the speaker.

Fig. 6 is a central longitudinal sectional view of a modified type of the sound projecting means.

Figs. 7, 8, and 9 are, respectively, a vertical longitudinal section, a plan section, and a vertical transverse section of a modified form of the sound wave responsive structure of this invention.

The present invention includes the subject-matter of the pending application for United States Patent, Serial No. 437,456, filed March 20, 1930, which discloses a series of sound responsive elements of various shapes and sizes disposed in spaced relation to each other within and spaced from the cone of the speaker of a radio receiving set, these several elements serving, as in said application described, to reproduce more accurately the sound waves, etc. to correspond more nearly with their tone values at the source.

The present invention consists broadly in disposing proximately to the speaker of the receiving set, which is preferably equipped with said sound responsive elements described and claimed in the said co-pending application, one or more and preferably a plurality of sounding boards which are vibrated by sound waves transmitted thereto by the speaker as aforesaid and serve to improve vastly the sound wave transmission to the ears of listeners.

In the accompanying drawings, the speaker 1 of a radio receiving set is carried by a skeleton cone 2 and is equipped with a paper cone 3 lying within and spaced from the cone 2.

Within the cone 3, which is sound wave responsive, there is mounted a series of sound responsive elements 4, 5, and 6, preferably composed of a suitable wood, such as California redwood, the element 4 being a circular plate of small diameter disposed concentric with the cone 3 and having its circumferential edge spaced from the latter.

The element 5 is a ring-shaped plate of larger diameter than the element 4, spaced from and disposed parallel with the latter and having its circumferential edge concentric with and spaced from the cone 3, said element 5 being preferably disposed substantially at the mouth of said cone 3.

The element 6 comprises a circular plate parallel with the plates or elements 4 and 5, and is of larger diameter than the latter, parallel with the same, concentric with the

cone and spaced from the mouth of the latter.

Bracket members 7 and 8 serve to couple the several elements 4, 5, and 6 and, conjointly with bolts 9 and spacing sleeves 10, secure the same to the flanges bordering the mouths of the cones 2 and 3.

The present invention in its preferred embodiment, consists essentially in mounting the above described structure in a casing 11 of substantially cube form, said casing 11 comprising a wall 12 of relatively thick wood to which the aforesaid assembly of sound responsive elements is rigidly secured, said wall 12 being provided with perforations 13 around the area covered by said sound responsive assembly. The said wall 12 is preferably square and constitutes a sound responsive element.

Mounted upon said plate 12 is a skeleton wood structure comprising four corner posts 14 joined at their outer ends by similar corner pieces 15, all of said members 14 and 15 being rabbeted and conjointly presenting five frame elements to which five preferably equal square panels 16 are fitted and secured in any suitable manner, said panels 16 preferably consisting of plates of California redwood and constituting sounding boards spaced from and housing the aforesaid assembly, all of said sounding boards being vibrated responsively to sound wave responsive vibration of said assembly and cooperating with the latter to transmit to the ears of listeners the said sound waves.

The plate 12 preferably constitutes the bottom plate of said casing or housing and is spaced from and parallel with the plate or element 6 of said assembly. The said housing for the latter may, obviously, constitute a part of the cabinet of a receiving set or be disposed within the latter.

In using the structure as shown and described, it has demonstrated itself to produce a far more pleasing tone and to transmit to the ears of listeners the sound waves as created at their source in their true tone values.

While the results obtained as above set forth may be well supported by theory, reliance is placed upon demonstrated and demonstrable fact resulting from actual use of the structure.

The invention is shown and described in its preferred embodiment without limitation beyond the definition of the appended claims.

The aforesaid results are improved by varnishing the several sounding boards and other sound responsive elements of the structure.

In Fig. 6 is shown a modified form of construction of what may be termed the sound wave projector comprising the cone 20, of paper or other suitable material, which houses the speaker 21. The sound wave responsive plates 22 to 25 inclusive, preferably made of redwood, in this structure are disposed outwardly of the mouth of the cone 20, the several plates 22, 23, and 24 being ring-shaped and of successively smaller diameter, the outer diameter of the plate 23 being appreciably greater than the inner diameter of the plate 22 and the outer diameter of the plate 24 being appreciably greater than the inner diameter of plate 23. The plate 25 is devoid of an opening and is of appreciably greater diameter than the opening of plate 24.

Theoretically, the larger diameter plates are more readily responsive to tones of low register than are the smaller plates while the latter are more readily responsive to tones of high register so that the entire group of said plates 22 to 25 inclusive, will respond to tones of all registers and convey them in their true value to human ears.

In Figs. 7, 8, and 9, is shown a sound wave responsive structure of a modified form adapted for certain uses and places to better advantage than the structure of Figs. 1 to 4 inclusive. Said structure comprises a base-plate 26 upon which is mounted a box-like structure comprising flaring side walls 27, an inclined top wall 28 and a flat end wall 29 having a substantially central circular opening. The cone 20 is secured to said end wall 29 as shown and the several plates 22 to 25 inclusive are also mounted thereon in axial alignment with said cone 20. This box-like structure has very stiff and rigid rounded corners joining the walls 27 and 28 with the end wall 29.

Spaced from this box-like structure is a similar larger structure 30 which substantially houses the former, the side and top walls of the structure 30 being flared to a greater degree than the side and top walls 27 and 28 so that the inverted substantially U-shaped mouth bordered by the outer ends of both said structures is of greater width than at any interior cross-sectional point of the combined structures, said U-shaped space converging gradually toward the end wall 29 which is suitably spaced from the end wall 31 of the outer structure 30.

In said U-shaped space and adjacent the end wall 29, a series of sounding boards or sound responsive plates 32, 33, and 34 are mounted to span said space completely, the plates 32 and 34 having longitudinal slots midway of their side or longitudinal edges and the intermediate plate 33 having parallel slots therein disposed in staggered relation to the slots of the plates 32 and 34 and opposed to solid parts of the latter. These plates and preferably the walls of the box-like structures are also preferably composed of California redwood.

In this structure the vibrations of the cone 20 responsively to those of the speaker, effect responsive vibrations of the plates 22 to 25 inclusive, and of the end walls 29 and 31. The vibrations of the latter cause responsive vi-

brations of the plates 32 to 34 inclusive and, in turn, the vibrations of all of the aforesaid elements cause vibration of the side and top walls of the two box-like structures, the sound waves thus projected through and from the U-shaped space between the two structures meeting and commingling with the sound waves projected from the mouth of the inner structure, the latter being the more direct. The effect of this sound projection is to render it pleasing to the ear because of lack of any harshness or distortion of tones.

The structure of Figs. 7 to 9 inclusive, in a measure is somewhat similar to a double megaphone in appearance.

The several structures hereinabove illustrated and described may also be termed amplifiers in that they vastly increase the volume of tone so that said devices are particularly well adapted for use in theatres or auditoriums wherein so-called "talkie" pictures are exhibited.

We claim as our invention:

1. Sound wave responsive means associated with the speaker of a radio receiving set, including a sounding board carrying said speaker, and sounding boards disposed about said speaker.

2. Sound wave responsive means associated with the speaker of a radio receiving set, including a sounding board carrying said speaker, said sounding board constituting a wall of a housing for said speaker, the remaining walls of said housing constituting sounding boards.

3. Sound wave responsive means associated with the speaker of a radio receiving set, including a sounding board carrying said speaker, and a sounding board disposed substantially perpendicularly to the board carrying said speaker and disposed proximately to and spaced from the latter.

4. Sound wave responsive means associated with the speaker of a radio receiving set, including a sounding board carrying said speaker, and a plurality of sounding boards disposed about and spaced from said speaker.

5. Sound wave responsive means associated with the speaker of a radio receiving set, including a sounding board carrying said speaker, and a plurality of sounding boards of similar dimensions disposed about said speaker substantially equidistantly from the latter and proximately thereto.

6. Sound wave responsive means associated with the speaker of a radio receiving set, including a vibratory cone, a series of sound wave responsive vibratory plates of different diameters and surface areas disposed transversely to the axis of the cone and beyond the mouth thereof in spaced relation to each other, a hollow structure having a flat end wall carrying said cone and said plates and having flaring longitudinal walls.

7. Sound wave responsive means associated with the speaker of a radio receiving set, including a vibratory cone, a series of sound wave responsive vibratory plates of different diameters and surface areas disposed transversely to the axis of the cone and beyond the mouth thereof in spaced relation to each other, a hollow structure having a flat end wall carrying said cone and said plates and having flaring longitudinal walls, and a second hollow structure similar to and of larger dimensions than the first-mentioned hollow structure substantially housing the latter and having its walls spaced therefrom, and a series of slotted sound wave responsive plates spanning the space between the longitudinal walls of said respective structures.

8. The combination with a speaker and sound wave responsive vibratory means associated therewith, of a pair of spaced apart megaphone-like structures arranged one within the other, and each having a flat end wall, said means mounted on the end wall of the inner of said structures, and a series of sounding boards disposed parallel with said end walls and spanning the space between and joining said structures.

In testimony whereof, we have hereunto set our hands this 11th day of August, 1930.

ARNO E. TAUSCHER.
BENNO E. SCHULTZE.