

June 6, 1933.

L. J. BUCKLEY

1,913,262

DIAPHONIC SOUND PRODUCER

Filed Jan. 26, 1932

2 Sheets-Sheet 1

Fig. 1.

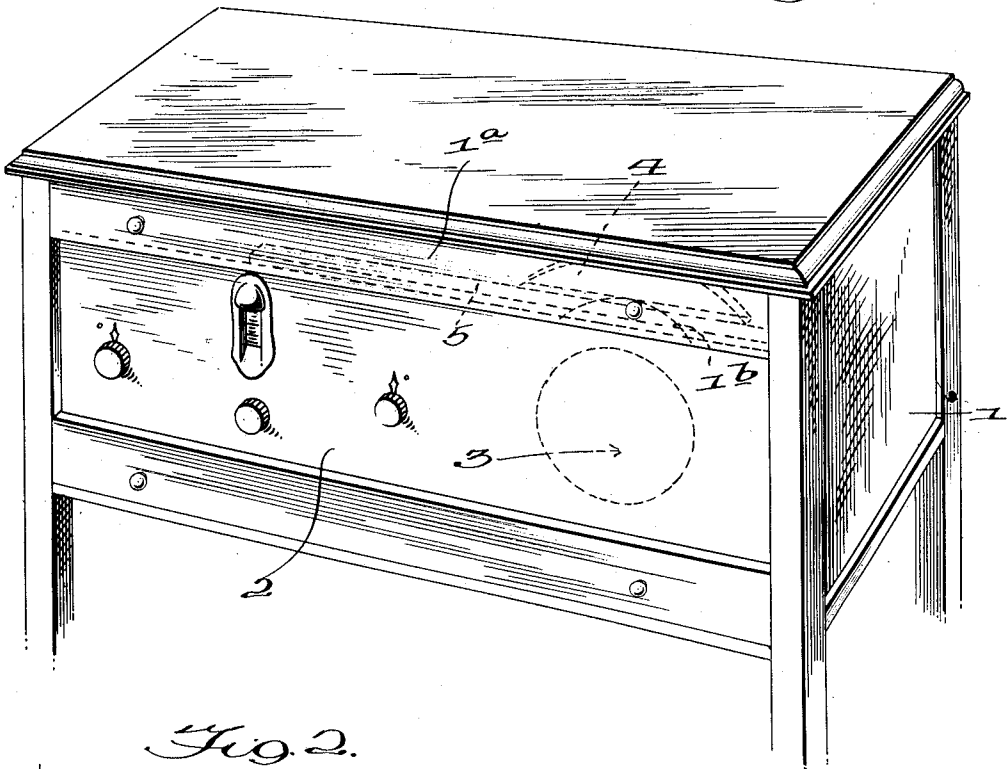


Fig. 2.

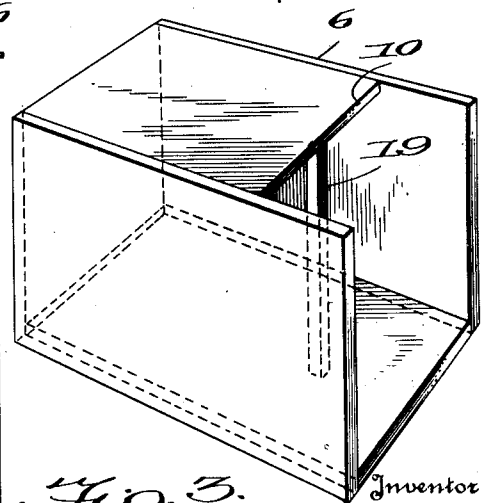
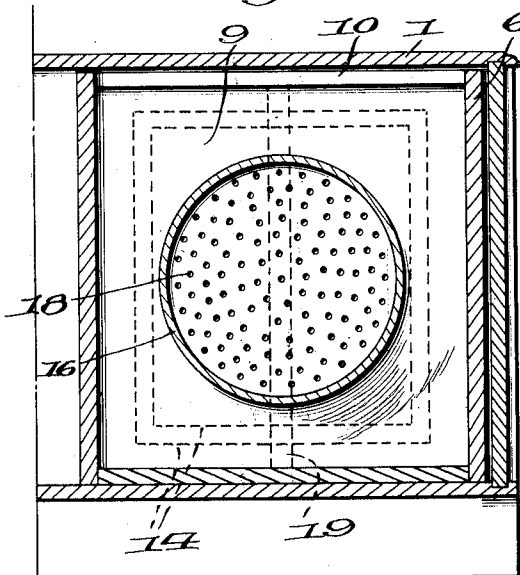


Fig. 3.

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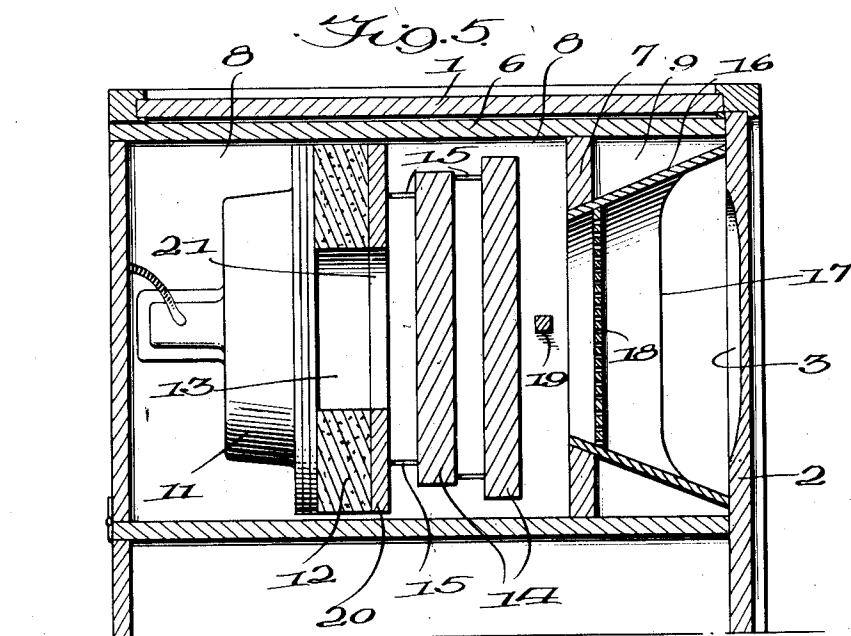
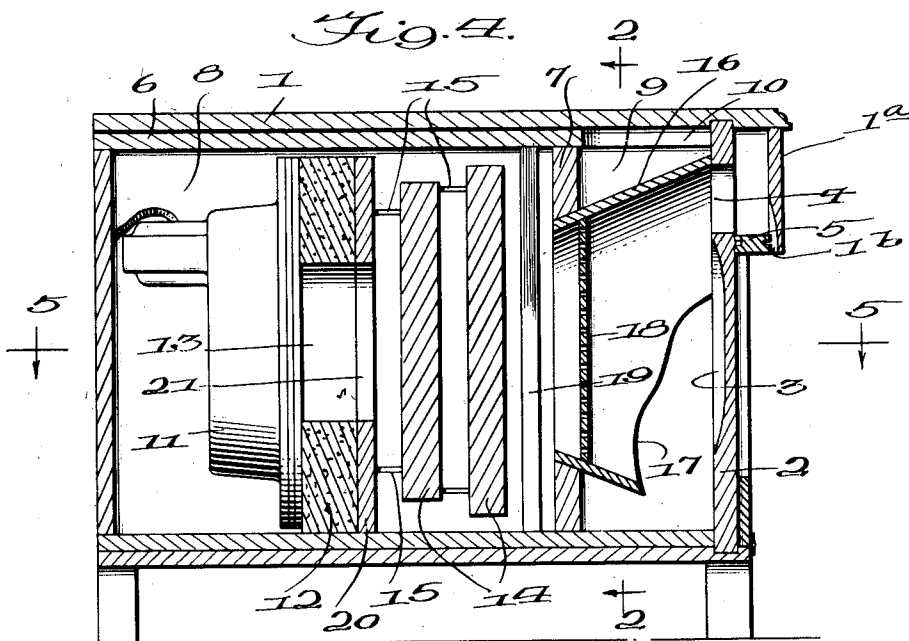
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

LEO J. BUCKLEY, OF BINGHAMTON, NEW YORK

DIAPHONIC SOUND PRODUCER

Application filed January 26, 1932. Serial No. 588,986.

This invention relates to an improvement in diaphonic tone producers adapted to house loud speakers, and is designed to perfect the tones and decrease the static and metallic disturbances in the reception in the loud speakers. It is an improvement on my former applications on Sound boards, Serial No. 570,489, filed October 22, 1931, now Patent No. 1,870,171, dated August 2, 1932 and on Loud speaker cabinets, Serial No. 570,490, filed October 22, 1931.

The improved features and advantages in my present invention which I have found from actual tests therewith are as follows:

First.—I have materially decreased static and metallic noises about 75 per cent.

Second.—I have succeeded in clarifying the voice sounds of all of its nasal tones to a very decided extent.

Third.—I have accomplished the same results in reducing the harshness of the tones of the instruments and also making it possible for the reception thereof without a blur, quaver, semi-quaver, or stutter. The conjunct measures and rapid notes following each other are not minced, but are delivered in clear distinction.

Fourth.—The reception is in perfect rendering when turned down to the lowest or softest point and remains so to the full volume.

Fifth.—There is an indirect delivery of the reception which is very soothing and pleasing to the ear.

Sixth.—There is an increased volume and added brilliance through the use of a megaphone with the equipment.

Seventh.—The volume control operating from the face of the sound board allows the toning to be done by the operator which regulates the tone without the slightest break in the tempo or sound. Where one or more speakers are attached to one radio receiving set and used in different parts of the home or building, the volume of each may be regulated as desired without interfering with the set or other reproducers.

Eighth.—The tone in the reception is perfected and delivered with the same accuracy and resonance as in the transmission.

Ninth.—It eliminates all distortion, blur or false disturbances of the voice, instruments and sound and clarifies the reception of the wind effect so noticeable in organ recitals to a resonant tone.

Tenth.—It gives a perfect blending of the bass in contrast with the treble, reproducing both deep bass and high treble in all their fullest brilliancy.

Eleventh.—In the tone chamber I have a sound box for the loud speaker which may be made and tuned as sensitive as a fine old violin. This is made possible by sound posts in the tone chamber which allows the tuning of the tone to be made as soft and sweet as any musical instrument.

Twelfth.—It makes it possible to have an all wood cabinet with the elimination of any possible interference of a metallic nature in the reception; the all wood cabinet allows for the reproduction of authentic designs of any period furniture.

Thirteenth.—The equipment is capable of reproducing fine tone and expression, and of producing all of the tones of any scale in perfect tune.

Fourteenth.—It reproduces with great accuracy the reverberant sound such as that of an echo of a large hall.

Fifteenth.—In addition to removing the blur and nasal effects from the voice, I have also corrected the stutter, quaver and semi-quaver which is very pronounced in the voices without the use of the sound box and dynamic equipment.

The sounds are delivered from the loud speaker from where they pass indirectly through or around acoustic boards into a megaphone from whence they are delivered into a sound chamber and pass into the room through a sound board in which the tone is again filtered. The sound is delivered to the ear with the effect of a rich mellow tone coming indirectly. It is greatly beneficial to persons afflicted with poor hearing as the sound is centralized to a direct source and clarified of disturbances.

In the accompanying drawings:

Fig. 1 is a perspective view of a form of

radio cabinet to which the invention may be applied;

Fig. 2 is a partial transverse sectional view therethrough taken on the line 2—2 of Fig. 4;

Fig. 3 is a perspective view of the sound box.

Fig. 4 is a longitudinal sectional view partially in side elevation through the complete assembly; and

Fig. 5 is a horizontal sectional view there-
through on the line 5—5 of Fig. 4.

A radio cabinet is designated generally by the numeral 1, and is provided with a front panel 2 which is shown as also supporting the dials of the radio receiving set. This panel is provided, in the back face thereof, with a dished out portion 3 extending however only part way through to the front face. This gives a very clear effect to the reception as it centralizes the delivery to one source. However, the front panel 2 may have a cork insert having a series of perforations therein, or the cork may be used between two veneers, the rear veneer being perforated, or fillers of glued-up saw dust, end wood, or other material may be used instead of the cork, all as set forth in my former application, Serial No. 570,489, filed October 22, 1931 now Patent No. 1,870,171, dated August 2, 1932.

Above the portion 3 is an enlarged aperture 4 through the panel 2. An adjustable slide 5 may be provided in this opening which may have lengthwise sliding movement to be opened or closed as desired for regulating the volume. A rail 1a is secured on the front side of the aperture 4 and has a semi-dished portion 1b in the back face thereof, disposed in front of the aperture 4 and opening downward to the lower edge of the rail 1a. This opening is concealed from view by leaving the front face of the rail intact. The adjustable slide 5 regulates this opening. Where one or more speakers are attached to one receiving set, and used in different parts of the house or building, this slide may be adjusted to control the volume without interfering with the set or other speakers.

Mounted within the cabinet 1 is a sound box 6 which is separated by a board 7 into a tone chamber 8 and a sound chamber 9, the top of the sound chamber 9 being open as at 10.

The loud speaker, designated generally by the numeral 11, is mounted within the tone chamber 8 and at its front is disposed a non-vibrating disk 12 which is made of such non-vibrating materials as glued saw dust, soft end wood, or the like, and is securely fastened to the front of the loud speaker. This disk is of very substantial thickness, being approximately $1\frac{1}{2}$ inches thick in the forms which I have used, and has one or more holes or perforations 13 extending therethrough.

Disposed in front of the disk 12 and spaced forwardly therefrom and from each other are one or more acoustic boards 14 held in spaced relation by spacers 15, two of such boards being provided in the form shown in Figs. 4 and 5, and being shown as imperforate, although they may be perforated, if desired for some sets.

These acoustic boards pertain to the science of refracted sounds and varied effects may be realized by the use of two or more boards and of different woods in various sizes. The larger these boards are made, the more resonant will be the tones. The static and metallic noises are greatly decreased between the disk 12 and these acoustic boards. These boards may be spaced at different distances apart in order to adjust the tone. These acoustic boards may be made round or of any other shape, and should be made of a resonant wood, medium hard wood being preferred. They may be faced in dome, disk or flat surface, but the latter gives the more natural reception.

A megaphone 16 has a small end extending through the board 7 and open to the tone chamber 8 at the front side of the acoustic boards 14 while the large end of this megaphone is open to the sound chamber 9 and extends to the back face of the front panel 2, just behind the dished portion 3 and aperture 4.

This aperture 4 furnishes a direct passage of the sound through the front panel. The lower side of the megaphone is cut away as at 17 to allow the air to force the sound to the upper part of the megaphone when the adjustable slide 5 is opened for more volume. The warm air which travels with the sound from the tone chamber 8 provides an easy method to trace the direction of the sound, and this is very noticeable when the aperture 4 is opened by the slide 5. Mounted within the megaphone 16 near the small end thereof is a perforated filter disk 18 which is made of soft wood and relatively thin to act as an absorber for static and metallic noises and perfects the roundness of the tones.

One or more sound posts 19 may be mounted in the tone chamber 8 between the acoustic boards 14 and the small end of the megaphone 16 to regulate the tone of this chamber. The tone may be modified and perfected by using different posts and of different woods.

Where the wood of the tone chamber is of proper resonance these posts may be omitted.

In addition to the acoustic boards 14 one or more partitions 20 may be placed in front of the loud speaker and with a circular aperture 21, these partitions add to the completeness of the tone of the reception.

I claim:

1. In combination, a sound box having a reproducer therein, a resonant imperforate acoustic board spaced slightly in front of

the reproducer, and a transverse partition in said box in front of said acoustic board.

2. In combination, a sound box having a sound reproducer therein, a non-metallic imperforate acoustic board disposed within said box and spaced slightly forwardly of the reproducer, and a partition in said box spaced in front of the acoustic board and having an opening therethrough.

3. In combination, a sound box having a sound reproducer therein, a tone chamber enclosing the reproducer and having a delivery end, and a wooden acoustic board transversely disposed a substantial distance back from the delivery end in the tone chamber and in front of the sound reproducer.

4. In combination, a sound box, a partition in said box forming a tone chamber, a sound reproducer in said chamber, said partition having an opening therein, an imperforate resonant wooden acoustic board spaced a substantial distance back from said opening and spaced slightly forwardly of the reproducer.

5. In combination, a sound box, a tone chamber therein having a delivery end, a sound reproducer in said chamber, an imperforate resonant wooden acoustic board spaced a substantial distance back from the delivery end of the tone chamber and spaced slightly forwardly of the reproducer, a cover for the delivery end of the tone chamber and a megaphone disposed behind the cover with its small end directed toward the acoustic board.

6. In combination, a sound box having a transverse partition therein forming a tone chamber, a sound reproducer in the tone chamber and a plurality of imperforate acoustic boards mounted within the tone chamber and spaced from each other and to the front of the reproducer.

7. In combination, a sound box having a tone chamber therein, a sound reproducer in the tone chamber, a plurality of imperforate acoustic boards mounted within the tone chamber and spaced from each other and to the front of the reproducer, and a relatively thick non-vibrating disk interposed between the acoustic boards and the reproducer, and having one or more perforations therethrough.

8. In combination, a sound box having a tone chamber therein, a sound reproducer in the tone chamber, a plurality of imperforate acoustic boards mounted within the tone chamber and spaced from each other and to the front of the reproducer, a relatively thick non-vibrating disk interposed between the acoustic boards and the reproducer and having one or more perforations therethrough, and a perforated partition interposed between the non-vibrating disk and the acoustic boards.

9. In a sound box having tone and sound chambers therein, the tone chamber being

adapted to receive a sound reproducer, a megaphone mounted in the sound chamber with its small end in open communication with the tone chamber, and a perforated filter disk covering the small end of the megaphone.

10. In a sound box having a sound chamber provided with a side thereof open and the other sides closed, a megaphone disposed within the sound chamber and a perforated filter disk covering the small end of the megaphone.

11. In a device of the character described, a panel having an aperture therethrough, a rail disposed in front of the opening and having a semi-dished portion in the back face thereof open to the lower edge of the rail and in alignment with the aperture, and an adjustable slide arranged between the panel and rail for adjusting the aperture.

12. In a device of the character described, a panel disposed vertically in front of a sound reproducer and having a dished out portion in the back face thereof toward the reproducer.

13. In combination, a sound-box having a sound reproducer therein, a vertical closure panel for said box, said panel having a portion of its rear surface facing the reproducer dished out to provide a reduced thickness in front of said reproducer.

14. In combination, a sound-box having a sound reproducer therein, a closure panel for said box, said panel having a portion of its rear surface dished out to provide a reduced thickness in front of said reproducer, and a perforated filter disk between said reproducer and said dished portion.

15. In combination, a sound box, a sound reproducer, a closure panel for said box arranged vertically in front of the reproducer, said panel having a front surface in a plane and a rear surface dished out forming a relatively thin sheet.

In testimony whereof I affix my signature.
LEO J. BUCKLEY.