Nov. 22, 1932. W. MUENCH 1,888,769

LOUD SPEAKER

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Fig. 2

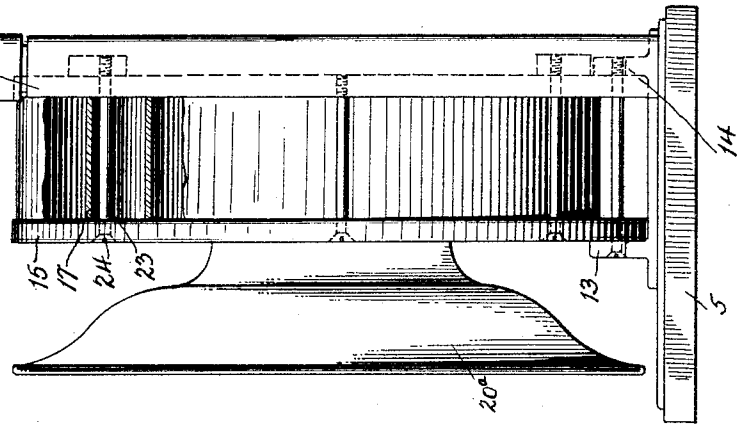
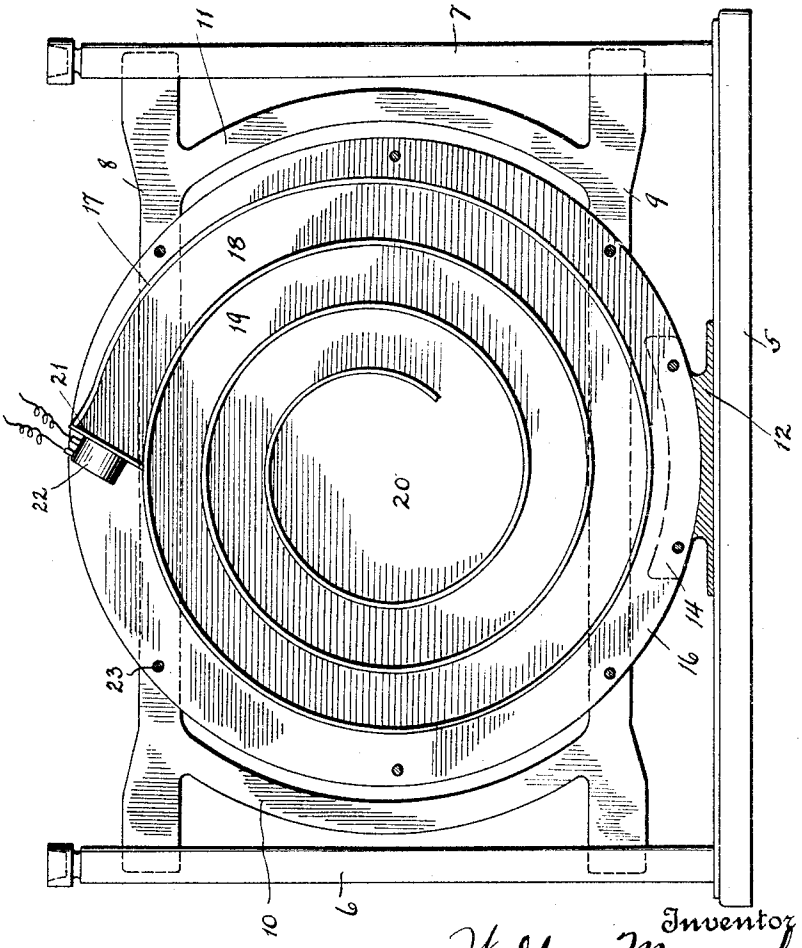


Fig. 1



Inventor
Walter Muench
By his Attorney
Aaron L. Applebaum

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LOUD SPEAKER

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Fig. 4

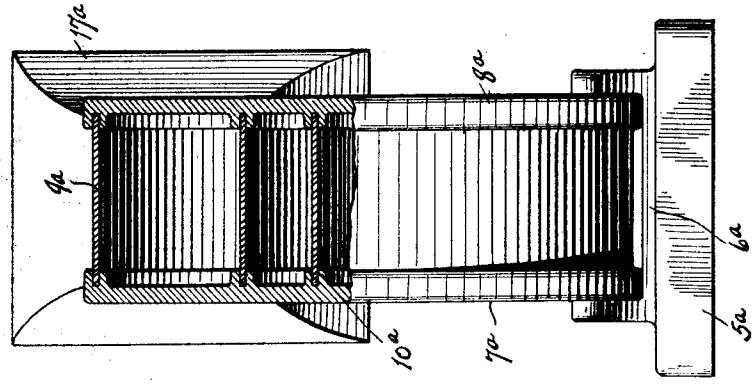
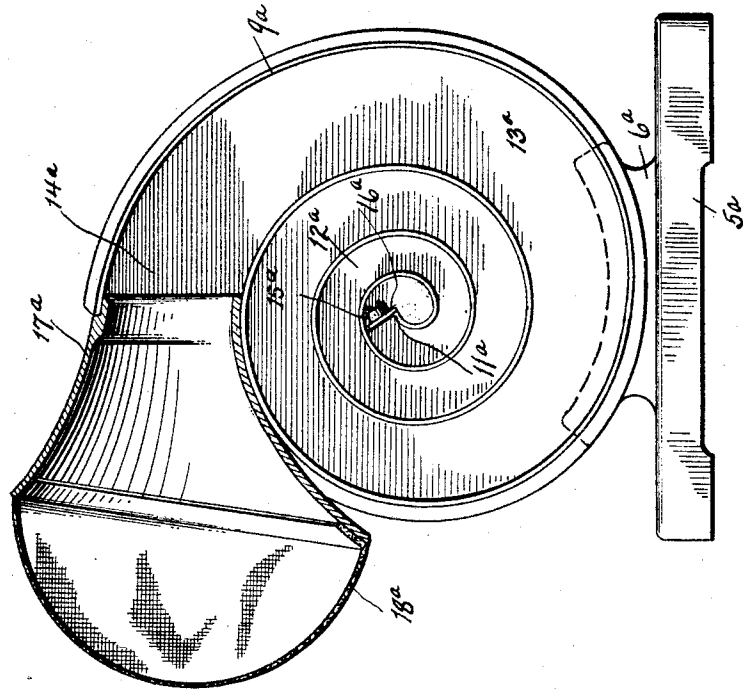


Fig. 3.



Inventor
Walter Muench
By his Attorney
Aaron L. Applebaum

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LOUD SPEAKER

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Fig. 4

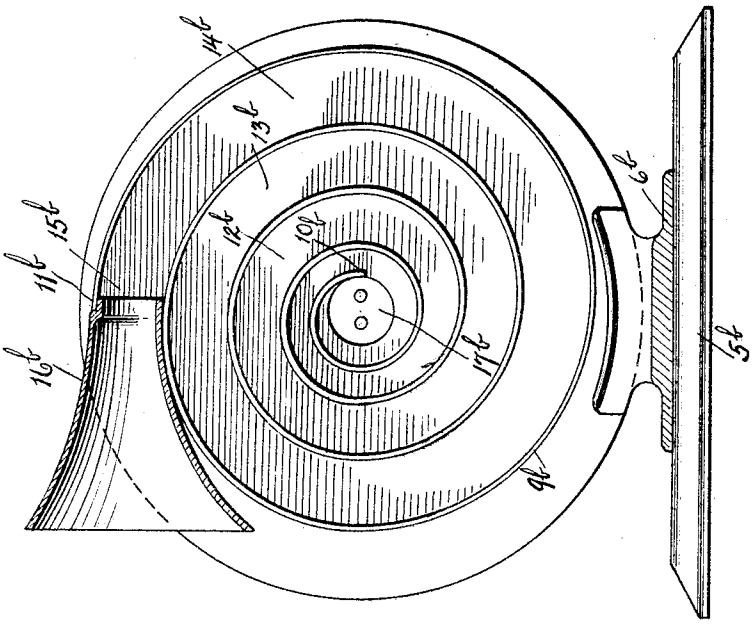
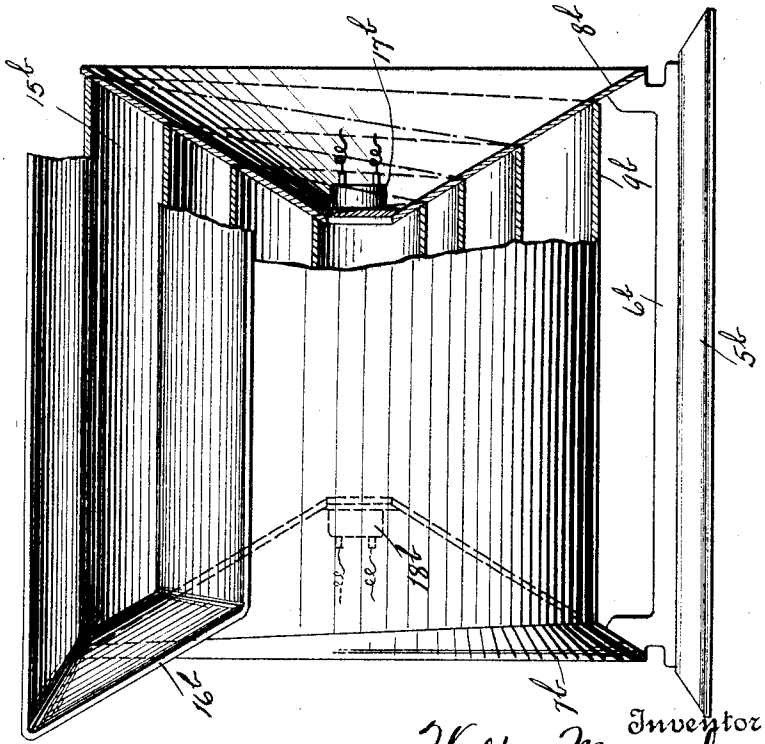


Fig. 5



Inventor
Walter Muench
By his Attorney
Aaron L. Applebaum

Nov. 22, 1932. W. MUENCH 1,888,769

LOUD SPEAKER

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Fig. 8

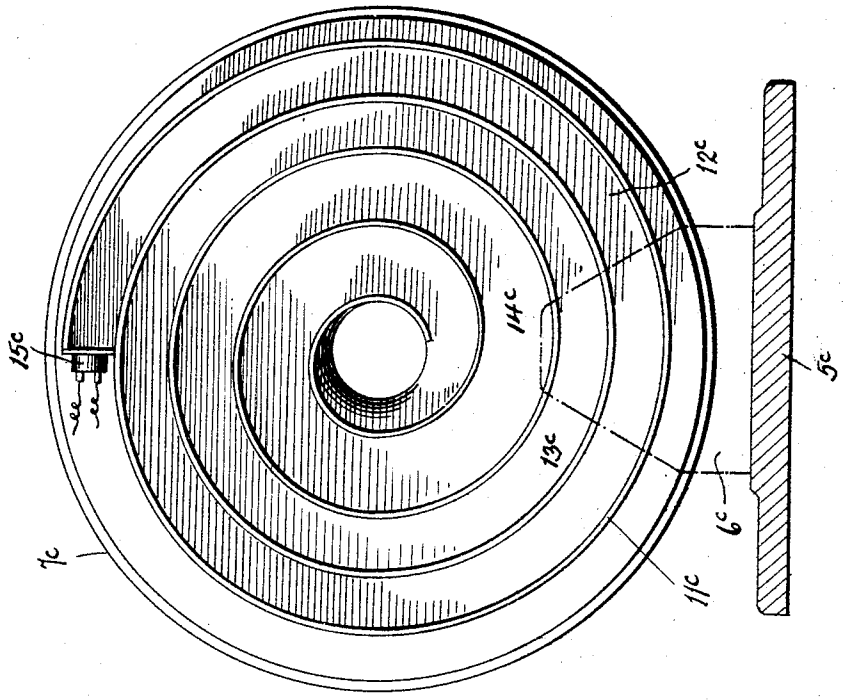
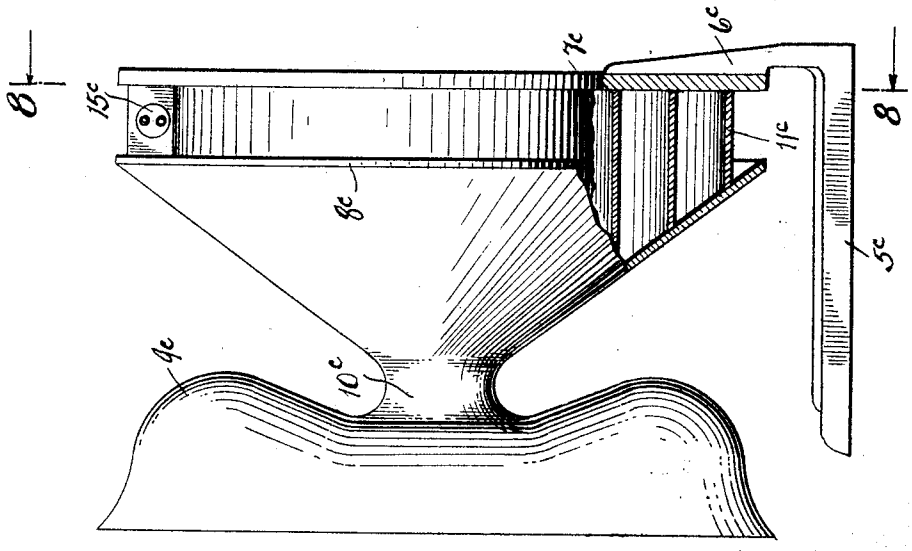


Fig. 7



Inventor
Walter Muench
By his Attorney
Aaron L. Applebaum

Patented Nov. 22, 1932 1,888,769

UNITED STATES PATENT OFFICE

WALTER MUENCH, OF BROOKLYN, NEW YORK

LOUD-SPEAKER

Application filed January 16, 1929. Serial No. 332,848.

This invention relates to loud speakers for radio receiving apparatus and has for its object to provide a novel and improved construction for projecting the sound waves without distortion or interference and thus produce a more natural and clarified tone.

One of the objects of my invention is to produce a loud speaker embodying the principle of a uni-directional, flat spiral between the loud speaker unit and the sound spreader whereby the length of the inner and outer communicating tone chamber may be varied.

Another object of my invention resides in the construction of a loud speaker having a uni-directional flat spiral producing inner and outer communicating tone chambers between a loud speaker unit and a sound spreader in which the cross sectional area of said tone chambers gradually increase, so that exponential sound volume is obtained at the sound speaker.

Primarily, my invention relates to loud speakers preferably of the portable type embodying the principle of a uni-directional, continuous tone chamber formed by a flat, smooth surfaced spiral of non-vibratable material arranged or wound so that the cross sectional area of the inner and outer tone chambers gradually increase from the loud speaker unit to the sound spreader so as to produce an appreciable undistorted amplification of the impressed sound waves in said speaker.

To enable others skilled in the art to more fully comprehend the underlying features of my invention, reference is had to the accompanying drawings wherein

Fig. 1 is a front view showing the sound spreader and front spiral clamping disk removed.

Fig. 2 is a side view partly in section.

Fig. 3 is a side view, partly in section of a modified form of the invention.

Fig. 4 is an end view partly in section.

Fig. 5 is a front view partly in section of another modified form of the invention.

Fig. 6 is a side view of the form shown by Fig. 5 showing the interior construction, one conical side piece and loud speaker unit being removed.

Fig. 7 is a side view partly in section of a still further modified form of the invention.

Fig. 8 is a view taken on the line 8—8 of Fig. 7.

Referring now to the drawings, 5 designates a substantially rectangular base of any suitable material having a pair of pillars or posts 6, 7 mounted thereon preferably adjacent the rear or back of the base. The pillars or posts carry a frame consisting of top and bottom cross members 8, 9, integral with curved or segmental, connecting members 10, 11, said cross members being retained in suitable slots or grooves formed in the inner side of the posts.

The base 5 has mounted thereon, a flanged rest 12, the front and rear spaced walls 13, 14 of which are concentric to the bottom of front and rear disks 15, 16. Between the disks 15, 16, I provide a broad, flat spiral 17. The two disks and the spiral strip are preferably of non-vibratable material such as metal, wood, glass, bakelite, rubber or celluloid. Under certain conditions, the surfaces of the spiral and the inner surfaces of the side disks are preferably coated or covered with any suitable composition to assure a smooth and glossy finish so as to avoid any possible friction to impede the sound waves.

When metal or a metallic composition is employed in the manufacture of the loud speaker, it is advisable to cover or coat the complete tone chamber with a coating of lacquer, rosin, pitch or rubber. Such coating can easily be applied by dipping in a tank containing the preferred solution. A coating of the solution may be applied to any or all of the forms shown, regardless of the material of construction of the disks and spiral. However, in instances where metal or metallic compositions are employed, a coating of soft or medium soft rubber is highly desirable so as to avoid and overcome all metallic sounds and what is known as blasting sounds common to loud speakers.

The spiral is shown as extending from the top at a point adjacent the periphery of the spiral covering disks, toward the center, forming an outer tone chamber 18 and an inner tone chamber 19. The inner tone cham-

ber does continue in successive spiral turns until it finally terminates in an outlet chamber 20, the diameter of which is at least three times the width of the inner or outer tone chamber. The outlet is in direct communication with a flared sound spreader 20*a*. The inlet of the outer spiral tone chamber is closed by a cover 21 having an opening over which is mounted the usual loud speaker unit 22.

The flat spiral and covering disks are fastened together by means of bolts 23 having countersunk heads 24 passing through the respective front and rear disks and both top and bottom cross members of the frame. Similar bolts join the disks between the cross bars, and the bottom of said disks are joined to the front and rear walls of the base rest in the same manner. All of the bolts are fastened and locked by means of lock nuts at the rear. From the above construction, it will be seen that the locking bolts join the front and rear disks to the frame and the base rest and retain the spiral in position therebetween, thus rendering the device easy to assemble.

In the form of the invention shown by Figs. 3 and 4, a reversal of the principle employed as shown by Figs. 1 and 2, is adopted and permits of different design and construction. The base 5*a* and base rest 6*a* is of a similar construction to support a pair of flat side disks 7*a*, 8*a*. In this instance the frame may be dispensed with, the loud speaker being supported by the base. The flat spiral 9*a* may be glued, cemented or otherwise retained in notches or slits formed in opposed, inwardly extending projections or lugs 10*a* integral with the inner walls of the disks, as shown clearly by Fig. 4. The spiral extends from the axial center 11*a* to a point adjacent the periphery of the disks, thus producing an inner, spiral tone chamber 12*a* and an outer spiral tone chamber 13*a* which merge, the width and cross sectional area of said chambers gradually and uniformly increasing to an outlet 14*a* where the maximum volume of sound is projected. The loud speaker unit 15*a* may be similarly fastened to a disk 16*a*. This form of the invention, permits of the attachment for a removable, flared trunco-coincal, sound spreader 17*a* to the outlet, the outer end of said spreader being preferably provided with a cap 18*a* of a curved screen mesh of wire or textile material which serves for ornamental or decorative purposes. The length of the spiral and the width of the tone chambers may in each instance be varied if so desired in accordance with the intensity of the speaker unit employed and the maximum and minimum sound amplification desired.

In Figs. 5 and 6 the base 5*b* and base rest 6*b* are designed to support a pair of similar, frusto-conical, shaped sides 7*b*, 8*b*, the maximum diameter of which is determined by the number of turns and width of the spiral forming the tone chambers. The continuous spiral 9*b* extends from a point 10*b* adjacent the inner edge of the sides, to the extreme outer edge 11*b*, the diameter of the inner and adjacent tone chambers 12*b*, 13*b*, 14*b*, gradually increasing to the outlet 15*b* at the top of the loud speaker. In this instance, a wide, flaring spreader 16*b* may be detachably connected to the outlet or end of the outer tone chamber which may or may not be provided with a cap or covering similar to that illustrated by Fig. 3. The loud speaker units 17*b*, 18*b* are positioned opposite to each other within the frusto-cone shaped sides so as to project the sound waves into the central tone chamber.

The form of the invention shown by Fig. 7 comprises a flat base 5*c* having a flat, rear upright 6*c* to which is attached a back cover 7*c*. A front, frusto-cone shaped cover 8*c* is joined and preferably integral with a circular, flared sound spreader 9*c* having a neck 10*c*. In this form, the flat spiral 11*c* is tapered along one edge, to conform with the cover 8*c* of the sound spreader and the opposite straight edge engages the back cover as shown by Fig. 7. The width of the spiral thus increases from its outer to its inner end producing the outer tone chamber 12*c* and inner continuous tone chamber 13*c*, 14*c*. The maximum diameter of the inner tone chamber is at a point adjacent the neck of the sound spreader. The loud speaker unit 15*c* is necessarily located at the entrance to the outer tone chamber thus permitting the volume to gradually increase to the outlet or sound spreader as above described.

In all of the above constructions, represented by the various modifications, it will be noted that the spirals form tone chambers in which the sound waves are projected forward in a unidirectional, circular spiral path, that is from the center of the loud speaker to an outlet at the top or from an inlet at the top to an outlet at the center. By this unidirectional spiral tone chamber arrangement, interferences of sound waves resulting in echoes and sound distortions within the loud speaker are avoided. The solidness of the material permissible in this novel loud speaker renders vibrations and consequent resonance due to the timber of the material used, a very negligible factor in consequence of which sound interference, common to horns and other irregular shaped tone chambers, are overcome. There is an appreciable distance and time factor between the impulse at the loud speaker unit and the sound outlet, the tone and volume being concentrated in its passage through the tone chamber, amplification of the impressed sound waves is thereby made possible. By the use of many spiral turns, but with a small angular rise in the overall length of the spiral strip, exponen-

tial amplification is obtained with a resultant of perfect modulation of tone. Greater volume is possible when the angular rise in the spiral is made larger, though the perfect modulation is not present.

While I have shown and described my invention with some degree of particularity, it will be realized that other modifications and changes may be resorted to under special conditions. I therefore do not wish to be limited and restricted to the exact details shown and described but reserve the right to make such changes and modifications as may fairly fall within the scope of the subject matter now being claimed.

What I claim as new and desire to secure by Letters Patent is:

1. In combination with the cochleate sound channel of a loud speaker, a partition bent into a flat spiral separating adjoining convolutions of said sound channel, and front and rear walls, between which said partition is assembled.

2. In combination with the cochleate sound channel of a loud speaker, a partition bent into a substantially flat spiral forming a wall common to adjoining convolutions of said sound channel, and front and rear walls, between which said partition is assembled.

3. In combination with the cochleate sound channel of a loud speaker, a partition bent into a substantially flat spiral, and side walls uninterruptedly extending over the sides of a plurality of convolutions of said sound channel, said partition being assembled between said walls.

4. In combination with the cochleate sound channel of a loud speaker, a partition separating adjoining convolutions of said sound channel, and flat side walls substantially radially extending over the sides of a plurality of said convolutions, said partition being assembled between said walls.

5. In combination with the cochleate sound channel of a loud speaker, a spirally disposed partition forming a wall common to adjoining convolutions of said sound channel, and side walls angularly assembled with said partition and extending over the sides of a plurality of said convolutions, said partition being assembled between said side walls.

6. In combination with the cochleate sound channel of a loud speaker, a spirally disposed partition forming a wall of substantially uniform thickness common to adjoining convolutions of said sound channel, the cross-section of said cochleate channel gradually increasing from the inlet to the outlet of said channel, and front and rear walls between which said partition is assembled.

7. In combination with the cochleate sound channel of a loud speaker, a spirally disposed partition separating adjoining convolutions of said sound channel, and side walls angularly facing said partition and radially extending over the sides of a plurality of said convolutions, the cross-section of said cochleate channel gradually increasing from the inlet to the outlet of said channel, said partitions being assembled between said side walls.

8. In combination with the cochleate sound channel of a loud speaker, a spirally disposed partition forming a wall common to adjoining convolutions of said sound channel, said spirally disposed partition being coated to reduce sound propagation through the walls between adjoining convolutions.

9. A loud speaker, comprising two substantially registering side walls, and a flat spiral partition assembled between said walls, said partition separating the convolutions of a cochleate sound channel.

10. A loud speaker, comprising two substantially registering side walls, and a spiral partition disposed and clamped between said walls, said partition separating the convolutions of a cochleate sound channel.

11. A loud speaker comprising a side wall, a cone-shaped side wall substantially registering with said first wall, and a flat partition spirally disposed between said walls and forming a cochleate sound channel between and with said walls.

12. A loud speaker comprising two substantially registering side walls, a flat spiral partition coaxially disposed and assembled between and flanged by said walls and forming a cochleate sound channel between and with said discs, and a sound reproducer and a sound spreader connected with the end of smallest and largest cross-section, respectively, of the channel extending between said walls and partition.

13. A loud speaker comprising a side wall, a cone-shaped side wall substantially registering with said first wall, a flat partition spirally and coaxially assembled between, flanged by and forming a channel between said walls and forming a cochleate sound channel between and with said discs, and a sound reproducer and a sound spreader connected with the end of the smallest and largest cross-section, respectively, of said channel.

14. A loud speaker comprising a pair of side walls, one of which has the shape of a cone, a flat partition spirally and coaxially disposed between and flanged by said walls and forming a cochleate channel between and with said walls, and a sound reproducer and a sound spreader connected with the ends of said channel.

15. A loud speaker comprising registeringly disposed cone-shaped side walls and a spirally disposed flat partition forming a sound channel between and with said cone-shaped walls.

16. A loud speaker comprising registeringly disposed inverted cone-shaped side

walls and a spirally disposed flat partition forming a sound channel between and with said cone-shaped walls.

17. A loud speaker comprising coaxially disposed inverted cone-shaped side walls, a spirally disposed flat partition forming a cochleate sound channel between and with said cone-shaped walls, and a sound reproducer and a sound spreader connected with the end of the smallest and largest cross-section, respectively, of said channel.

18. In a loud speaker, oppositely disposed substantially flat side walls and partitions extending between and abutting upon said walls and dividing the space between said walls into adjoining sound channels.

19. In a loud speaker, oppositely disposed side walls and partitions extending between and abutting upon said walls and dividing the space between said walls into adjoining angular sound channels.

20. In a loud speaker, a partition common to adjoining passages of the sound channel, and a rubber-like coating on said partition.

21. In a loud speaker, a metallic partition common to adjoining passages of the sound channel, and a rubber-like coating on said partition.

In testimony whereof I affix my signature.

WALTER MUENCH.