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(54) ACOUSTIC DEFLECTOR FOR OMNI-DIRECTIONAL SPEAKER SYSTEM

AKUSTISCHER DEFLEKTOR FÜR RUNDSTRAHLENDES LAUTSPRECHERSYSTEM

DÉFLECTEUR ACOUSTIQUE POUR SYSTÈME DE HAUT-PARLEUR OMNIDIRECTIONNEL

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Description

BACKGROUND

[0001] Conventional acoustic deflectors in speaker systems can exhibit artifacts in the acoustic spectrum due to acoustic modes present due to the presence of an acoustic driver and an acoustic deflector. This disclosure relates to an acoustic deflector for equalizing the resonant response for an omni-directional speaker system.

[0002] Examples of conventional acoustic deflectors are disclosed in US 4 348 549, US 6 257 365, US 5 268 538, US 5 995 634 and US 6 597 797.

SUMMARY

[0003] The present invention relates to an omni-directional acoustic deflector according to claim 1 and a speaker system according to claim 4. Advantageous and optional embodiments are recited in dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004]

FIG. 1A is a perspective view of an omni-directional speaker system having a single acoustic driver inside a vertical acoustic enclosure.

FIG. 1B is a cross-sectional view of the omni-directional speaker system shown in FIG. 1A.

FIG. 2 is a cross-sectional view of the omni-directional acoustic deflector and the acoustic driver in the speaker system of FIG. 1A.

FIG. 3 is a plot of the nearfield sound pressure level as a function of frequency for the various omni-directional acoustic deflector geometries shown in FIGS. 4A through 4C.

FIG. 4A is a schematic side view showing an omni-directional acoustic deflector according to a non-claimed example useful for understanding the present invention having a substantially conically shaped deflector with a profile that substantially conforms to a radiating surface of an associated acoustic driver.

FIG. 4B is a schematic side view showing an omni-directional acoustic deflector according to a non-claimed example useful for understanding the present invention having a substantially conically shaped deflector with a profile that results in an acoustic radiation path that increases monotonically with respect to radial distance from a motion axis of an associated acoustic driver.

FIG. 4C is a schematic side view showing an omni-directional acoustic deflector according to the invention having a substantially parabolic shaped deflector having a non-linear profile that results in an acoustic radiation path that increases monotonically

with respect to radial distance from a motion axis of an associated acoustic driver.

FIG. 5A is a perspective view of one example of an omni-directional speaker system having an omni-directional acoustic deflector to reduce the negative effects of resonances on the acoustic spectrum according to principles described herein.

FIG. 5B is a cross-sectional view of the omni-directional speaker system of FIG. 5A.

FIG. 6A is a perspective view of the omni-directional acoustic deflector in the omni-directional speaker system of FIG. 5A.

FIG. 6B is a cross-sectional view of the omni-directional acoustic deflector shown in FIG. 6A.

FIG. 7 is a perspective view of an example of an omni-directional satellite speaker system having a pair of acoustic drivers and a pair of omni-directional acoustic deflectors to reduce the negative effects of resonances on the acoustic spectrum according to principles described herein.

DETAILED DESCRIPTION

[0005] Multiple benefits are known for omni-directional speaker systems. These benefits include a more spacious sound image when the speaker system is placed near a boundary, such as a wall within a room, due to reflections. Another benefit is that the speaker system does not have to be oriented in a particular direction to achieve optimum high frequency coverage. This second advantage is highly desirable for mobile speaker systems where the speaker system and/or the listener may be moving.

[0006] FIGS. 1A and 1B are drawings showing a perspective view and a cross-sectional view, respectively, of a speaker system 100 that includes a single downward firing acoustic driver 102 (FIG. 1B) secured to a vertical acoustic enclosure 104. Each side wall 105 of the enclosure 104 includes a passive radiator 106. In some examples, two opposing passive radiators 106 are configured to be driven by audio signals from an audio source (not shown) such that each opposing pair of passive radiators 106 are driven acoustically in phase with each other and mechanically out of phase with each other, to minimize vibration of the enclosure 104.

[0007] Two opposing pairs of passive radiators 106 (for a total of four passive radiators) may be used, as shown in the figures. The passive radiators 106 may be located on an outer wall 105 of the enclosure 104, as depicted, or instead be located within the enclosure 104 and configured to radiate acoustic energy through slots located in the enclosure 104 (not shown). One or more of the passive radiators 106 may be oriented vertically or horizontally within the enclosure 104.

[0008] The volume within the region above the acoustic driver 102 and inside the enclosure 104, as "sealed" with the passive radiators 106, defines an acoustic chamber. The diaphragms of the passive radiators 106 are driven

by pressure changes within the acoustic chamber.

[0009] The speaker system 100 also includes an omni-directional acoustic deflector 108 having four vertical legs 109 (a/k/a "mounting pillars") to which the enclosure 104 is mounted. Acoustic energy generated by the acoustic driver 102 propagates downward and is deflected into a nominal horizontal direction by an acoustically reflective body 112 of the acoustic deflector 108.

[0010] There are four substantially rectangular openings 110. Each opening 110 is defined by the base of the enclosure 104, the base of the acoustic deflector 108 and a pair of the vertical legs 109. These four openings 110 are acoustic apertures which pass the horizontally propagating acoustic energy. It should be understood that the propagation of the acoustic energy in a given direction includes a spreading of the propagating acoustic energy, for example, due to diffraction.

[0011] The illustrated acoustic deflector 108 has a nominal truncated conical shape. In other examples, the slope of the conical outer surface between the base and vertex of the cone (a/k/a "cone axis") is not constant. The surface has a non-linear slant profile such as a parabolic profile (such as described below with reference to the implementation illustrated in FIG. 5A) or a profile described by a truncated hyperboloid of revolution. The body of the acoustic deflector 108 can be made of any suitably acoustically reflective material. For example, the body may be formed from plastic, stone, metal or other rigid material, or any suitable combinations thereof.

[0012] Reference is also made to FIG. 2 which shows a cross-sectional view of the omni-directional acoustic deflector 108 and the acoustic driver 102. The top surface 200 of the acoustically reflective body 112 is shaped to accommodate the excursions of a central dust cap 202, centered on the face 204 of the acoustic driver 102, during operation of the speaker system. The conventional conical shape of the acoustic deflector 108 results in significant colorization of the acoustic spectrum, especially at higher acoustic frequencies, due to resonances in the volume between the acoustically radiating surfaces (i.e., the face 204 and the dust cap 202) of the acoustic driver 102 and acoustically reflective surfaces (i.e., the conical outer surface and top surface 200) of the acoustically reflective body 112.

[0013] Notably, the profile of the acoustically reflective body 112 is shaped such that a cross-sectional area of the acoustic radiation path (i.e., the volume between the face 204 and the acoustically reflective body 112 and extending from the periphery of the top surface 200 to the openings 110) increases monotonically with respect to radial distance from a motion axis 206 of the acoustic driver 102, which is coincident with the cone axis. That is T2, which corresponds to the separation between face 204 and the acoustically reflective body 112 at an outer radius R2 of the face 204, is greater than T1, which corresponds to the separation between face 204 and the acoustically reflective body 112 at an inner radius R1 of the face 204. This monotonically increasing area can help

to provide an improvement in the acoustic spectrum as compared to configurations in which the cross-section area of the acoustic radiation path remains substantially constant, such as where the profile of the acoustically reflective body substantially conforms the profile of the face/diaphragm of the acoustic driver.

[0014] FIG. 3 is a plot of the acoustic nearfield pressure level as a function of acoustic frequency for various system configurations having deflectors of differing profile shapes. Curve 300 corresponds to the system configuration of FIG. 4A, which includes a substantially conically shaped deflector 400 according to a non-claimed example useful for understanding the present invention having a profile that substantially conforms to a face 402 of the acoustic driver 404 (i.e., the slope of the conical surface of the deflector matches, and remains substantially parallel to, that of the face 402 of the acoustic driver 404), resulting in an acoustic radiation path 406 that remains substantially constant with respect to radial distance from a motion axis 408 of the acoustic driver 404. Curve 302 corresponds to the system configuration of FIG. 4B, which includes a substantially conically shaped deflector 410 according to a non-claimed example useful for understanding the present invention having a profile that results in an acoustic radiation path 412 that increases monotonically with respect to radial distance from a motion axis 414 of the acoustic driver 416 (i.e., the slope of the conical surface of the deflector differs from, and is non-parallel to, that of the face 418 of the acoustic driver 416), similar to the configuration of FIG. 2.

[0015] As shown in FIG. 3, the curve 300 includes a significant acoustic resonance 304 in the acoustic response at about 3.5 kHz, as well as a significant null 306 at about 8.5 kHz. These peaks and nulls can be problematic for tuning, requiring extra tuning time to alleviate. To alleviate these problems it can be desirable to displace those peaks and nulls as high in the frequency range as possible, and to make the peaks and nulls as flat as possible. By comparison, the curve 302 shows improvement in that peak 308 is reduced in magnitude ("flattened") as compared to peak 304, and it is pushed out higher in the frequency range (i.e., to about 3.9 kHz). In addition, null 310 of curve 302 is pushed farther out (higher) in the frequency range (i.e., to about 10 kHz). What this demonstrates is that configuration of FIG. 4B exhibits improved performance and requires less tuning as compared to the configuration of FIG. 4A.

[0016] Referring still to FIG. 3, curve 312 corresponds to the system configuration of FIG. 4C, which includes a substantially parabolic shaped deflector 420 according to the invention having a non-linear profile that, like the deflector of FIG. 4B, results in an acoustic radiation path 422 that increases monotonically with respect to radial distance from a motion axis 424 of the acoustic driver 426. The curve 312 shows improved performance of the configuration of FIG. 4C over the configurations of FIGS. 4A and 4B. In that regard, curve 312 shows a peak 314 that is lower in magnitude and that is pushed out to a

higher frequency, e.g., about 4.5 kHz, as compared to the peaks 304 and 308 of curves 300 and 302, respectively. In addition, curve 312 exhibits a null 316 that is more shallow (i.e., and that is pushed out to a higher frequency, e.g., to about 11.5 kHz, as compared to the nulls 306 and 310 of curves 300 and 302, respectively. This demonstrates that the configuration of FIG. 4C exhibits improved performance (i.e., a flatter response) and requires less tuning as compared to the configurations of FIGS. 4A and 4B.

[0017] FIGS. 5A and 5B are illustrations showing a perspective view and cross-sectional view, respectively, of an example of an omni-directional speaker system 500 having an omni-directional acoustic deflector 502 disposed below a single downward firing acoustic driver 504. The omni-directional acoustic deflector 502 is configured to reduce the negative effects of resonances on the acoustic spectrum as described below. The illustrated speaker system 500 is substantially similar to the speaker system 100 shown in FIGS. 1A and 1B except for the omni-directional acoustic deflector 502 which has different geometric and material features.

[0018] Notably, the acoustically reflective body 504 is provided with a non-linear slant profile (shown as a parabolic profile) that is configured such that a cross-sectional area of the acoustic radiation path (i.e., the volume between the face 510 and the acoustically reflective body 504 and extending from an inner radius 600 (FIGS. 6A & 6B) of the acoustically reflective body 504 to the openings 512) increases monotonically with respect to radial distance from a motion axis 506 of the acoustic driver 508. That is T_2 , which corresponds to the separation between face 510 and the acoustically reflective body 504 at an outer radius R_2 of the face 510, is greater than T_1 , which corresponds to the separation between face 510 and the acoustically reflective body 504 at an inner radius R_1 of the face 510.

[0019] As in the case of the system 100 described above with respect to FIGS. 1A and 1B, this monotonically increasing area can help to provide an improvement in the acoustic spectrum as compared to configurations in which the cross-section area of the acoustic radiation path remains substantially constant, such as where the profile of the acoustically reflective body substantially conforms the profile of the face/diaphragm of the acoustic driver. Additionally, with reference to FIG. 3 (cf. curves 302 and 312), a parabolic profile demonstrates improved performance (i.e., flatter spectrum) even over an acoustically reflective body with a substantially conically shaped profile that is similarly configured such that a cross-sectional area of the acoustic radiation path increases monotonically with respect to radial distance from a motion axis of the acoustic driver.

[0020] FIGS. 6A and 6B are perspective and cross-sectional views, respectively, of the omni-directional acoustic deflector 502. The omni-directional acoustic deflector 502 includes two features which contribute to the improvement in the acoustic spectrum. First, there are

radial extensions 602 from the parabolic surface of the acoustically reflective body 504 to the mounting surfaces 604 of the four legs 606. These "bridging" extensions 602 in the body of the acoustic deflector 502 disrupt the circular symmetry of the acoustically reflective surface and thereby reduce or eliminate the ability of the volume between the acoustic driver 102 and the acoustic deflector 502 (i.e., the acoustic radiation path) to support circularly symmetric modes.

[0021] In other examples, the numbers of legs 606 and extensions 602, or other features radially extending from the motion axis (vertical dashed line 506 (FIG. 5B)) of the acoustic driver 508, are different.

[0022] The second feature of the omni-directional acoustic deflector 30 that results in an improvement in the acoustic spectrum is the presence of one or more acoustically absorbing regions disposed along the acoustically reflective surface. FIG. 6B shows one of these regions at an opening 608 centered on the axis 610 at the top of the acoustically reflective body 504 in which acoustically absorbing material 614 is disposed (FIG. 6B). This acoustically absorbing material 614 attenuates the acoustic energy present near and at the peak of the lowest order circularly symmetric resonance mode. In some implementations, the diameter of the opening 608 is chosen so that the resulting attenuation of the acoustic energy propagating from the acoustic driver 508 (FIG. 5B) is limited to an acceptable level while achieving a desirable level of smoothing of the acoustic spectrum.

[0023] Alternatively or additionally, openings in the form of slots, each containing acoustically absorbing material, may be located along portions of a circumference of the acoustically reflective body 504. And/or, one or a pattern of openings 616 (FIG. 6B) may be provided along a circumference of the acoustically reflective body to allow air flow between the acoustic radiation path and the body cavity 618 of the acoustically reflective body, which may disrupt/inhibit resonance modes.

[0024] In various implementations, the acoustically absorbing material 614 is a foam. In one example, the open region in the body cavity 618 of the acoustic deflector 502, shown in FIG. 6B beneath the parabolic surface, is filled with a single volume of foam such that the foam is adjacent to, or extends into, the opening 608. Alternatively, a separate foam element may be disposed at the opening 608 so that only a portion of the body cavity 618 is occupied by foam. In one example, the foam is coated with a water resistant material. In one implementation, the foam present at the central opening 608 is at one end of a cylindrically-shaped foam element disposed within the body cavity 618.

[0025] In another example, the acoustically absorbing material 614 is an acoustically absorbing fabric or screen. The fabric may be disposed within the opening 608 or inside the internal cavity 618 of the cone adjacent to the opening 608. The fabric is acoustically transparent to a degree; however, the acoustic resistance can be tuned

by using different fabrics. Advantageously, the fabric avoids the need for using one or more large volumes of foam as the inside surface of the acoustic deflector body can be lined with the fabric. In addition, the fabric can be water resistant without the need to apply a water resistant coating. One example of a suitable fabric for some implementations is Saatfil Acoustex 145 available from SaatiTech U.S.A. of Somers, NY or weaved metal mesh screens available from Cleveland Wire Cloth & Manufacturing Company of Cleveland, OH, and/or G. BOPP + CO. AG of Zurich, Switzerland.

[0026] Advantageously, leaving at least a portion of the volume of the cavity 618 within the acoustic deflector body unoccupied by the acoustically absorbing material 614 enables the unoccupied volume to be populated by other system components, such as electronic components, and can thereby reduce the size of the omni-directional speaker system 500.

[0027] In another implementation shown in FIG. 7, an omni-directional satellite speaker system 700 includes a pair of acoustic drivers. Each acoustic driver is secured inside a vertical acoustic enclosure 702. One of the acoustic drivers is configured to provide acoustic energy in an upward direction and the other acoustic driver is positioned to face in an opposite direction so that acoustic energy propagates in a downward direction. The system also includes two omni-directional acoustic deflectors 704, each positioned near the face of a respective one of the acoustic drivers and having acoustic acoustically absorbing material as described in the various examples above. Such a system can be compact and narrow, with the vertical dimension being the longest dimension. In one example, the omni-directional satellite speaker system 700 includes two speaker subsystems, each similar to the speaker system 500 shown in FIG. 5A. One of the speaker subsystems is vertically inverted and adjacent to the other speaker subsystem. An omni-directional satellite speaker system configured in this way can employ smaller active drivers to achieve the same acoustic output of a single active driver system and therefore can have a smaller footprint.

[0028] In general, omni-directional acoustic deflectors according to principles described herein act as an acoustic smoothing filter by providing a modified acoustic resonance volume between the acoustic driver and the acoustic deflector. It will be appreciated that adjusting the size and locations of the acoustically absorbing regions allows for the acoustic spectrum to be tuned to modify the acoustic spectrum. Similarly, the profile of the acoustically reflecting surface may be non-linear (i.e., vary from a perfect conical surface) and defined so as to modify the acoustic spectrum. In addition, non-circularly symmetric extensions in the acoustically reflecting surface, such as the radial extensions described above, can be utilized to achieve an acceptable acoustic spectrum.

Claims

1. An omni-directional acoustic deflector (502), comprising:

an acoustically reflective body (504) having a truncated conical shape including a substantially conical outer surface configured to be disposed adjacent an acoustically radiating surface (510) of an acoustic driver (508) thereby to define an acoustic radiation path therebetween, wherein the acoustically reflective body has a substantially parabolic profile such that a cross-sectional area of the acoustic radiation path increases monotonically and in a nonlinear fashion with respect to a radial distance from a motion axis (506) of the acoustic driver which is coincident with the axis of the acoustically reflective body, such that a second separation (T2) between the acoustically radiating surface and the acoustically reflective body at a second distance (R2) to the motion axis, is greater than a first separation (T1) between the acoustically radiating surface and the acoustically reflective body at a first distance (R1) to the motion axis, the second distance (R2) being greater than the first distance (R1),

wherein the omni-directional acoustic deflector comprises a plurality of legs (606) for coupling the acoustically reflective body to the acoustic driver, the omni-directional acoustic deflector being further **characterised in that**

the acoustically reflective body comprises a plurality of radial extensions (602), each extending into the acoustic radiation path from the acoustically reflective body to a respective one of the plurality of legs (606), such as to disrupt a circular symmetry of the acoustically reflective body around its center, and thereby reduce the ability of the acoustic radiation path to support circularly symmetric modes.

2. The omni-directional acoustic deflector of claim 1, wherein the acoustically reflective body comprises a top surface configured to be centered with respect to a motion axis of the acoustic driver, the acoustically reflective body having an opening (608) in the top surface, and the omni-directional deflector further comprising an acoustically absorbing material (614) disposed at the opening in the top surface.
3. The omni-directional acoustic deflector of claim 1, wherein one or a pattern of openings (616) are provided along a circumference of the acoustically reflective body to allow for air flow between the acoustic radiation path and a body cavity of the acoustically reflective body, thereby to disrupt or inhibit resonance modes.

4. A speaker system comprising:

an acoustic enclosure;
 an acoustic driver disposed coupled to the acoustic enclosure; and
 the omni-directional acoustic deflector (502) as claimed in any one of the foregoing claims, coupled to the acoustic enclosure adjacent the acoustic driver to receive acoustic energy propagating from the acoustic driver.

Patentansprüche

1. Rundstrahlender akustischer Deflektor (502), Folgendes umfassend:

einen akustisch reflektierenden Körper (504) mit einer gekuppten konischen Form, eine im Wesentlichen konische äußere Oberfläche enthaltend, konfiguriert, um angrenzend an eine akustisch strahlende Oberfläche (510) eines akustischen Treibers (508) bereitgestellt zu werden, um dadurch einen akustischen Strahlungspfad dazwischen zu definieren,
 wobei der akustisch reflektierende Körper ein im Wesentlichen parabolisches Profil aufweist, sodass ein Querschnittsbereich des akustischen Strahlungspfades monoton und auf eine nichtlineare Weise in Bezug auf eine radiale Distanz von einer Bewegungsachse (506) des akustischen Treibers, welcher mit der Achse des akustisch reflektierenden Körpers zusammenfällt, wächst, sodass eine zweite Trennung (T2) zwischen der akustisch strahlenden Oberfläche und dem akustisch reflektierenden Körper in einer zweiten Distanz (R2) zu der Bewegungsachse größer ist als eine erste Trennung (T1) zwischen der akustisch strahlenden Oberfläche und dem akustisch reflektierenden Körper in einer ersten Distanz (R1) zu der Bewegungsachse, wobei die zweite Distanz (R2) größer ist als die erste Distanz (R1), wobei der rundstrahlende akustische Deflektor eine Vielzahl an Beinen (606) zum Koppeln des akustisch reflektierenden Körpers mit dem akustischen Treiber umfasst, wobei der rundstrahlende akustische Deflektor weiter **dadurch gekennzeichnet ist, dass**
 der akustisch reflektierende Körper eine Vielzahl an radialen Verlängerungen (602) umfasst, sich jeweils in den akustischen Strahlungspfad von dem akustisch reflektierenden Körper zu einem jeweiligen aus der Vielzahl an Beinen (606) erstreckend, um eine zirkuläre Symmetrie des akustisch reflektierenden Körpers um sein Zentrum herum zu unterbrechen, und dabei die Fähigkeit des akustischen Strahlungspfades zu re-

duzieren, zirkulär symmetrische Modi zu unterstützen.

2. Rundstrahlender akustischer Deflektor nach Anspruch 1, wobei der akustisch reflektierende Körper eine obere Oberfläche umfasst, konfiguriert, um in Bezug auf eine Bewegungsachse des akustischen Treibers zentriert zu werden, wobei der akustisch reflektierende Körper eine Öffnung (608) in der oberen Oberfläche aufweist, und wobei der rundstrahlende Deflektor weiter ein akustisch absorbierendes Material (614) umfasst, bereitgestellt an der Öffnung in der oberen Oberfläche.

3. Rundstrahlender akustischer Deflektor nach Anspruch 1, wobei eine oder ein Muster von Öffnungen (616) entlang einem Umfang des akustisch reflektierenden Körpers bereitgestellt sind, um Luftstrom zwischen dem akustischen Strahlungspfad und einer Körperrückwand des akustisch reflektierenden Körpers zu ermöglichen, um dabei Resonanzmodi zu unterbrechen oder zu unterbinden.

4. Lautsprechersystem, Folgendes umfassend:

ein akustisches Gehäuse;
 einen akustischen Treiber, mit dem akustischen Gehäuse gekoppelt bereitgestellt; und
 den rundstrahlenden akustischen Deflektor (502) nach einem der vorhergehenden Ansprüche, gekoppelt mit dem akustischen Gehäuse angrenzend an den akustischen Treiber, um sich von dem akustischen Treiber verbreitende akustische Energie zu empfangen.

Revendications

1. Déflecteur acoustique omnidirectionnel (502), comprenant :

un corps réfléchissant acoustiquement (504) ayant une forme tronconique incluant une surface extérieure sensiblement conique configurée pour être disposée adjacente à une surface rayonnante acoustiquement (510) d'un circuit d'attaque acoustique (508) pour définir de ce fait un trajet de rayonnement acoustique entre elles, dans lequel le corps réfléchissant acoustiquement a un profil sensiblement parabolique de sorte qu'une aire de coupe transversale du trajet de rayonnement acoustique augmente de manière monotone et non linéaire par rapport à une distance radiale depuis un axe de déplacement (506) du circuit d'attaque acoustique qui coïncide avec l'axe du corps réfléchissant acoustiquement, de sorte qu'une seconde séparation (T2) entre la surface rayonnante acoustiquement et

le corps réfléchissant acoustiquement à une seconde distance (R2) de l'axe de déplacement soit supérieure à une première séparation (T1) entre la surface rayonnante acoustiquement et le corps réfléchissant acoustiquement à une première distance (R1) de l'axe de déplacement, la seconde distance (R2) étant supérieure à la première distance (R1), dans lequel le déflecteur acoustique omnidirectionnel comprend une pluralité de pieds (606) pour coupler le corps réfléchissant acoustiquement au circuit d'attaque acoustique, le déflecteur acoustique omnidirectionnel étant en outre **caractérisé en ce que**

le corps réfléchissant acoustiquement comprend une pluralité d'extensions radiales (602), chacune d'elles s'étendant dans le trajet de rayonnement acoustique du corps réfléchissant acoustiquement à l'un respectif de la pluralité de pieds (606), de manière à perturber une symétrie circulaire du corps réfléchissant acoustiquement autour de son centre, et à réduire de ce fait la capacité du trajet de rayonnement acoustique pour prendre en charge des modes circulairement symétriques.

2. Déflecteur acoustique omnidirectionnel selon la revendication 1, dans lequel le corps réfléchissant acoustiquement comprend une surface de sommet configurée pour être centrée par rapport à un axe de déplacement du circuit d'attaque acoustique, le corps réfléchissant acoustiquement ayant une ouverture (608) dans la surface de sommet, et le déflecteur omnidirectionnel comprenant en outre un matériau absorbant acoustiquement (614) disposé à l'ouverture dans la surface de sommet.
3. Déflecteur acoustique omnidirectionnel selon la revendication 1, dans lequel une ouverture ou un motif d'ouvertures (616) est fourni(e) le long d'une circonférence du corps réfléchissant acoustiquement pour permettre un écoulement d'air entre le trajet de rayonnement acoustique et une cavité de corps du corps réfléchissant acoustiquement, pour perturber ou inhiber de ce fait des modes de résonance.
4. Système de haut-parleur comprenant :

une enceinte acoustique ;
un circuit d'attaque acoustique disposé couplé à l'enceinte acoustique ; et
le déflecteur acoustique omnidirectionnel (502) selon l'une quelconque des revendications précédentes, couplé à l'enceinte acoustique adjacente au circuit d'attaque acoustique pour recevoir une énergie acoustique se propageant depuis le circuit d'attaque acoustique.

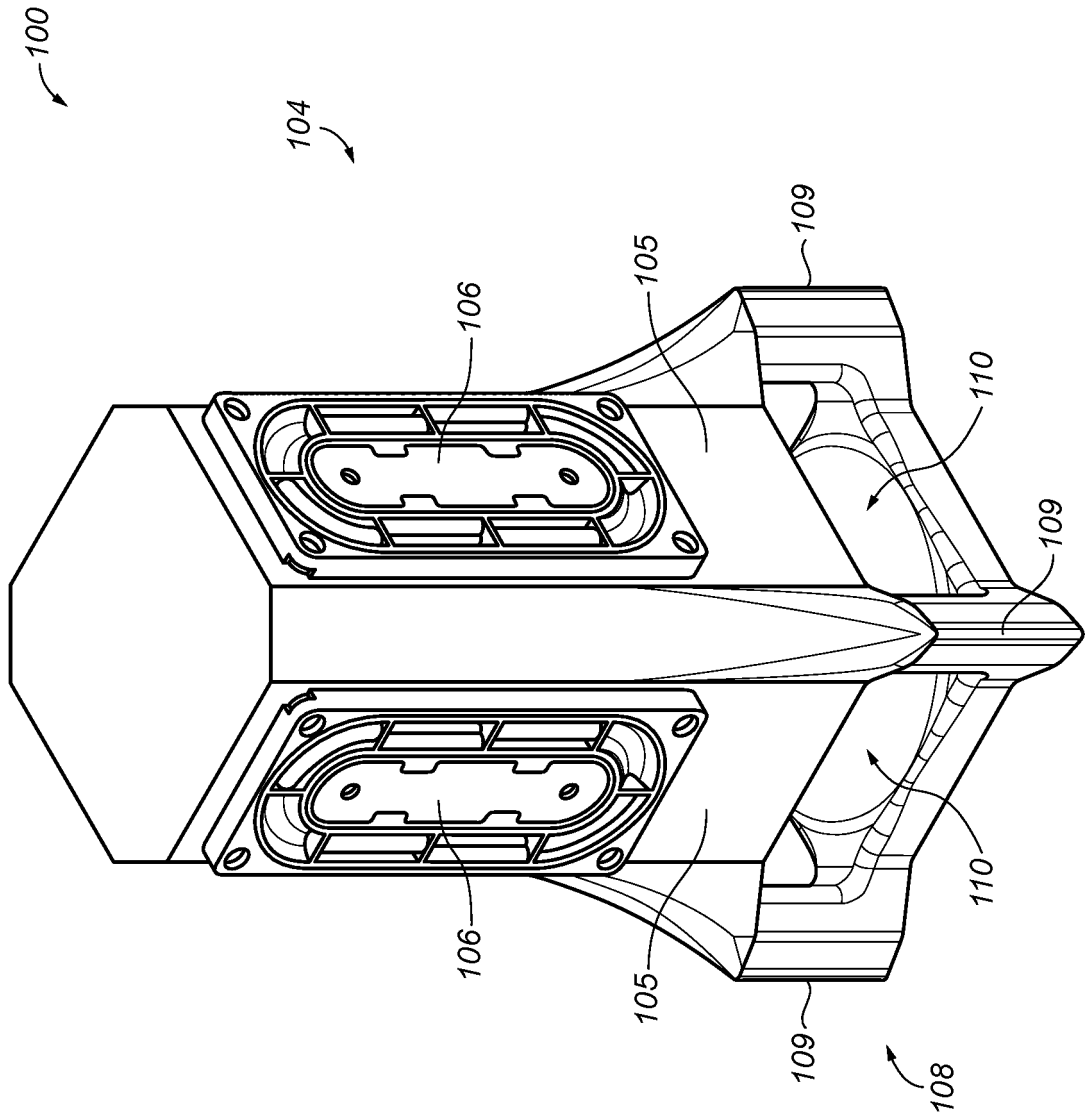


FIG. 1A

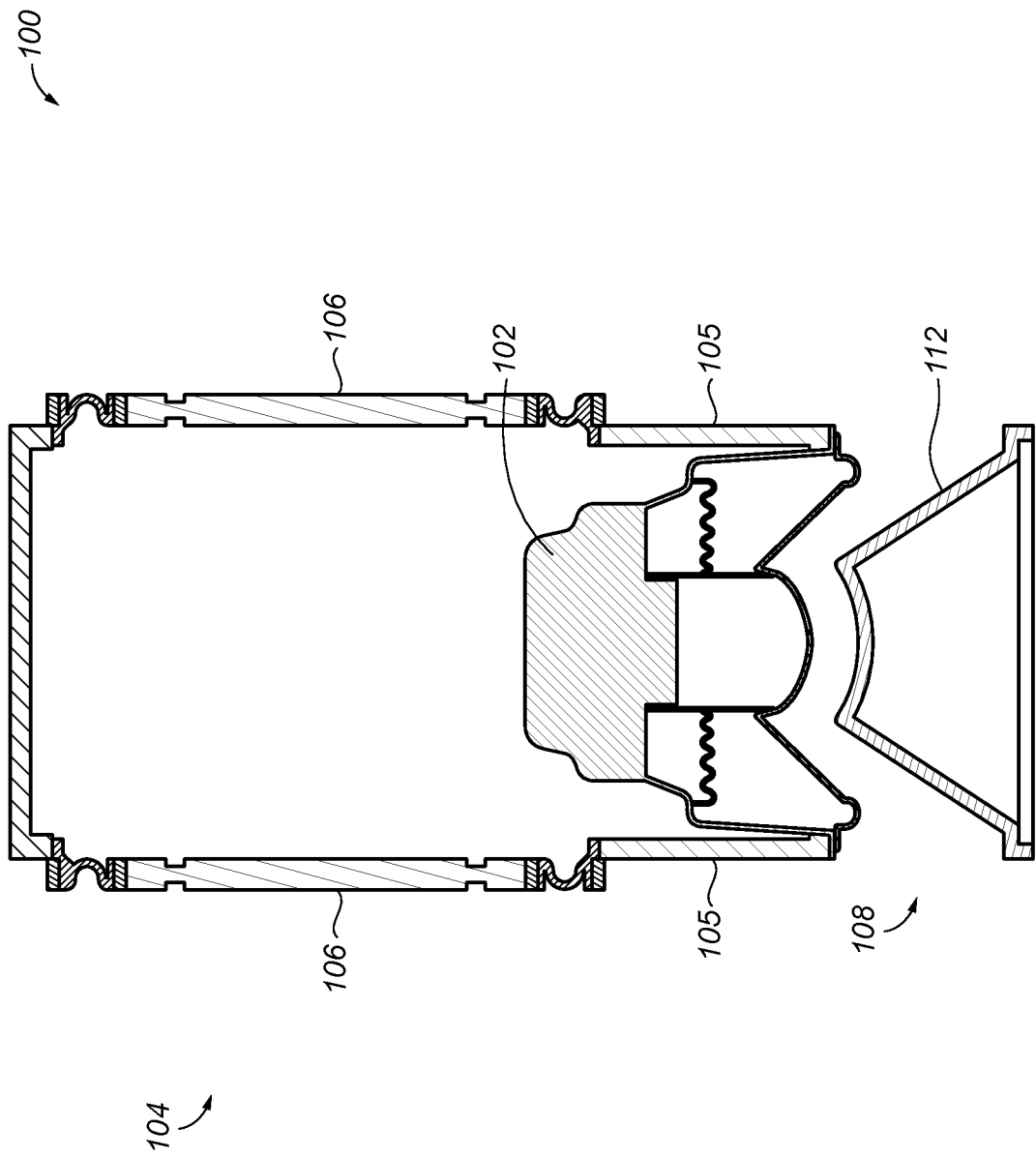


FIG. 1B

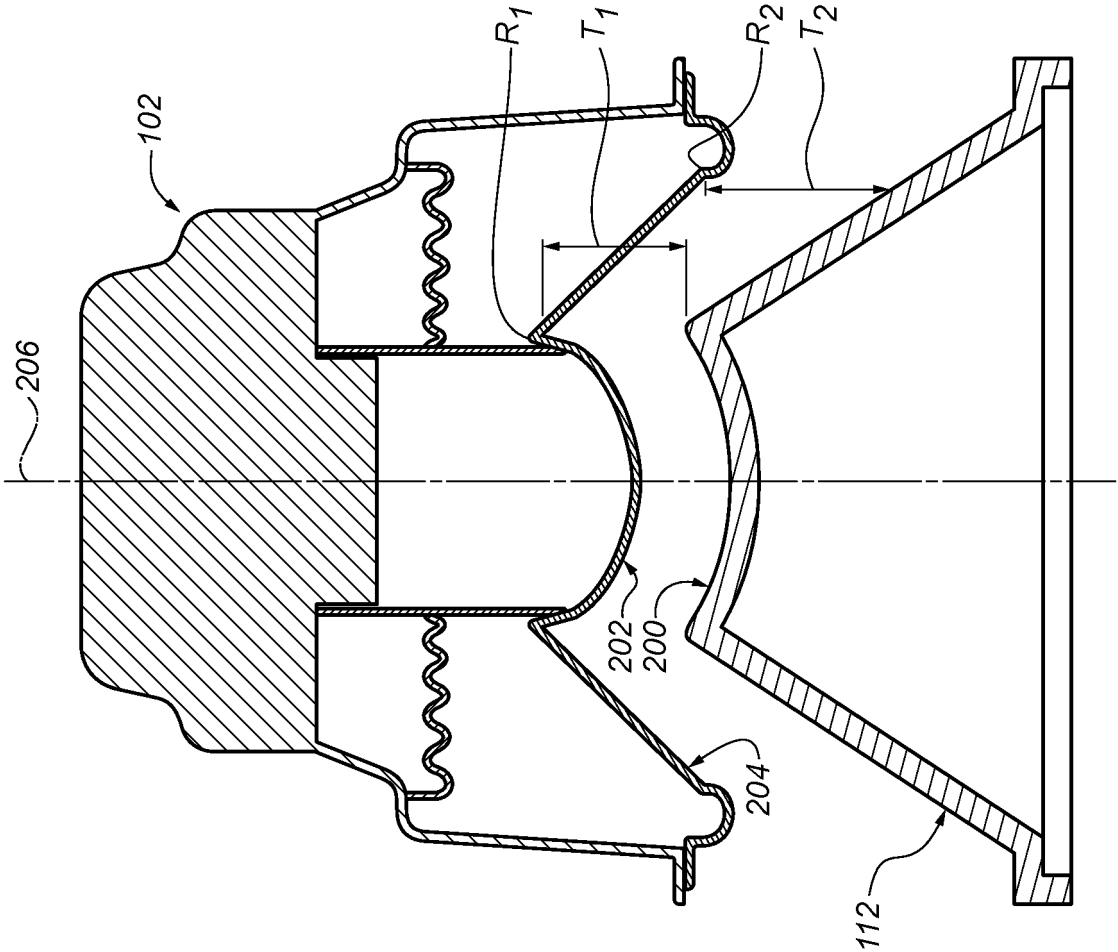


FIG. 2

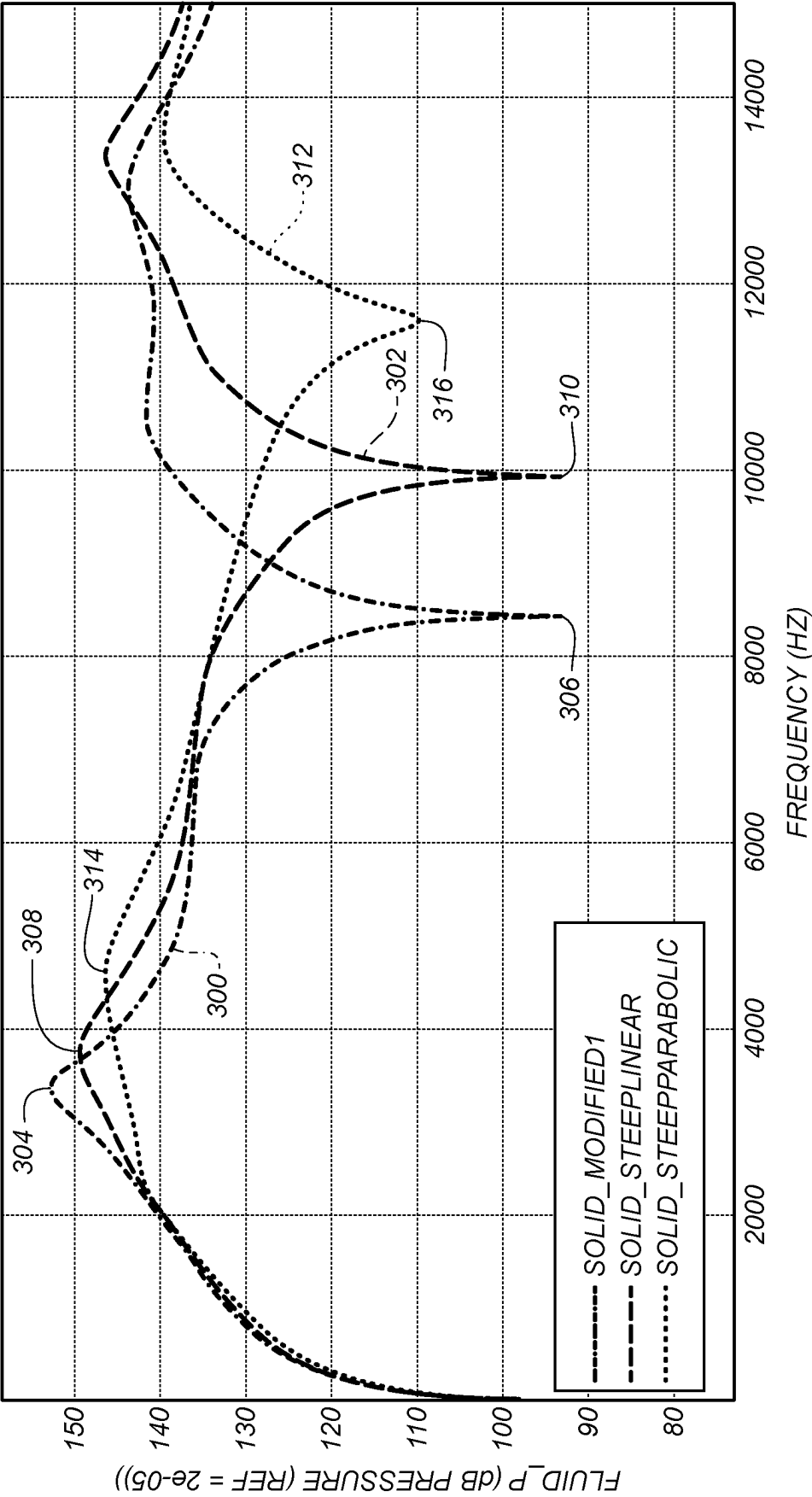


FIG. 3

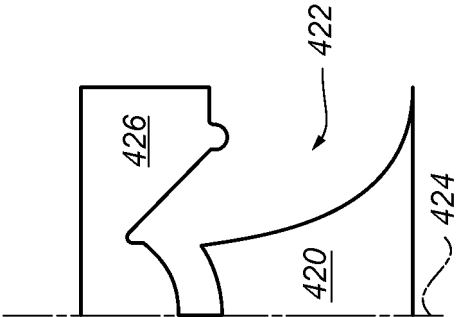


FIG. 4C

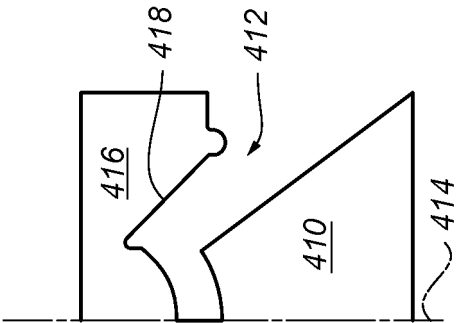


FIG. 4B

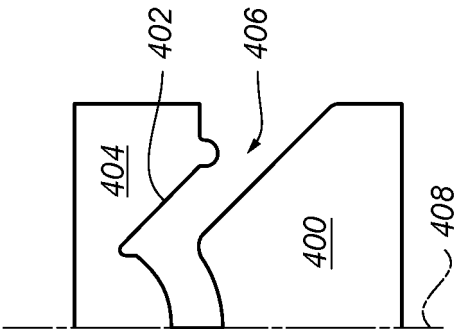


FIG. 4A

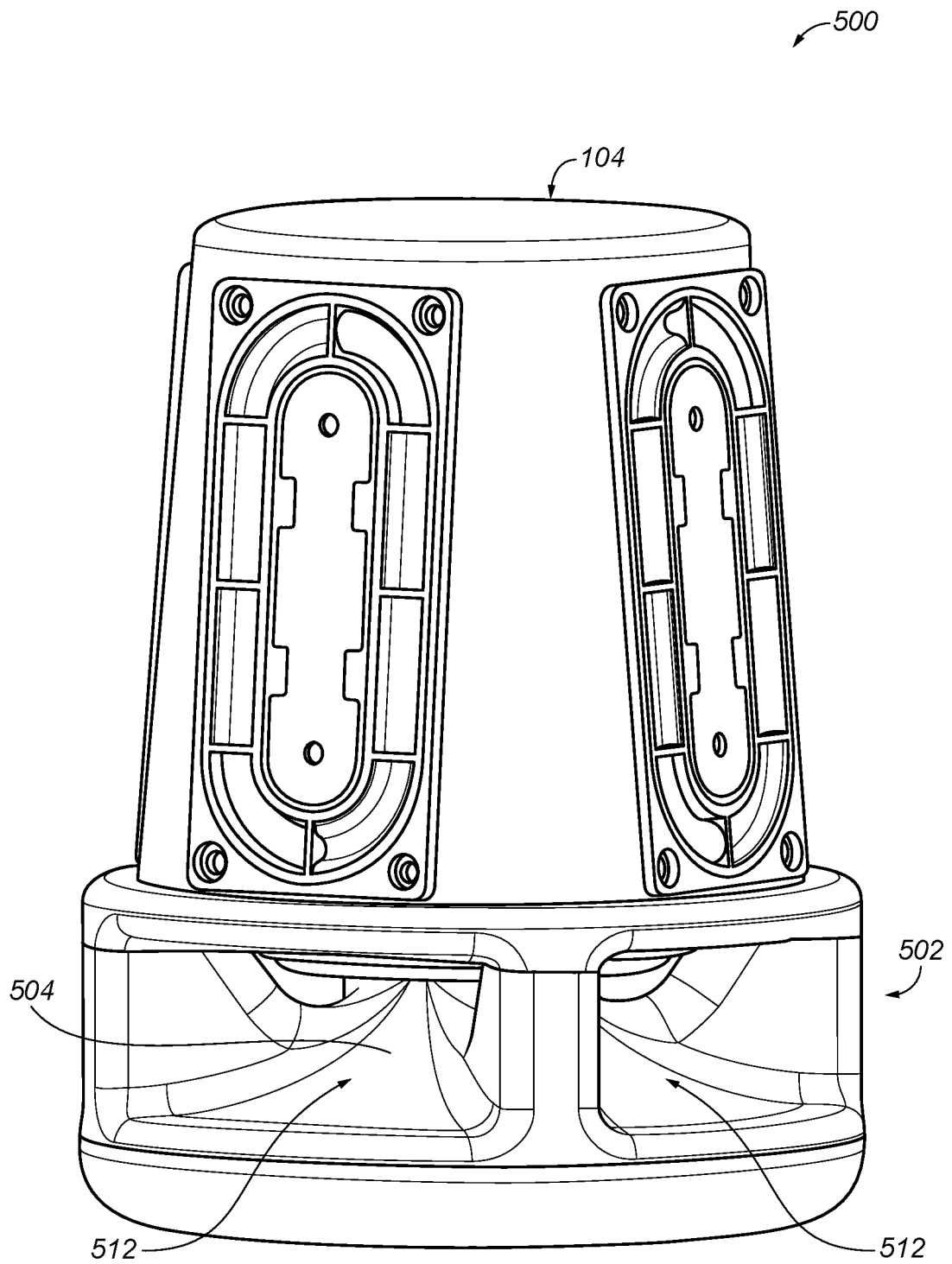


FIG. 5A

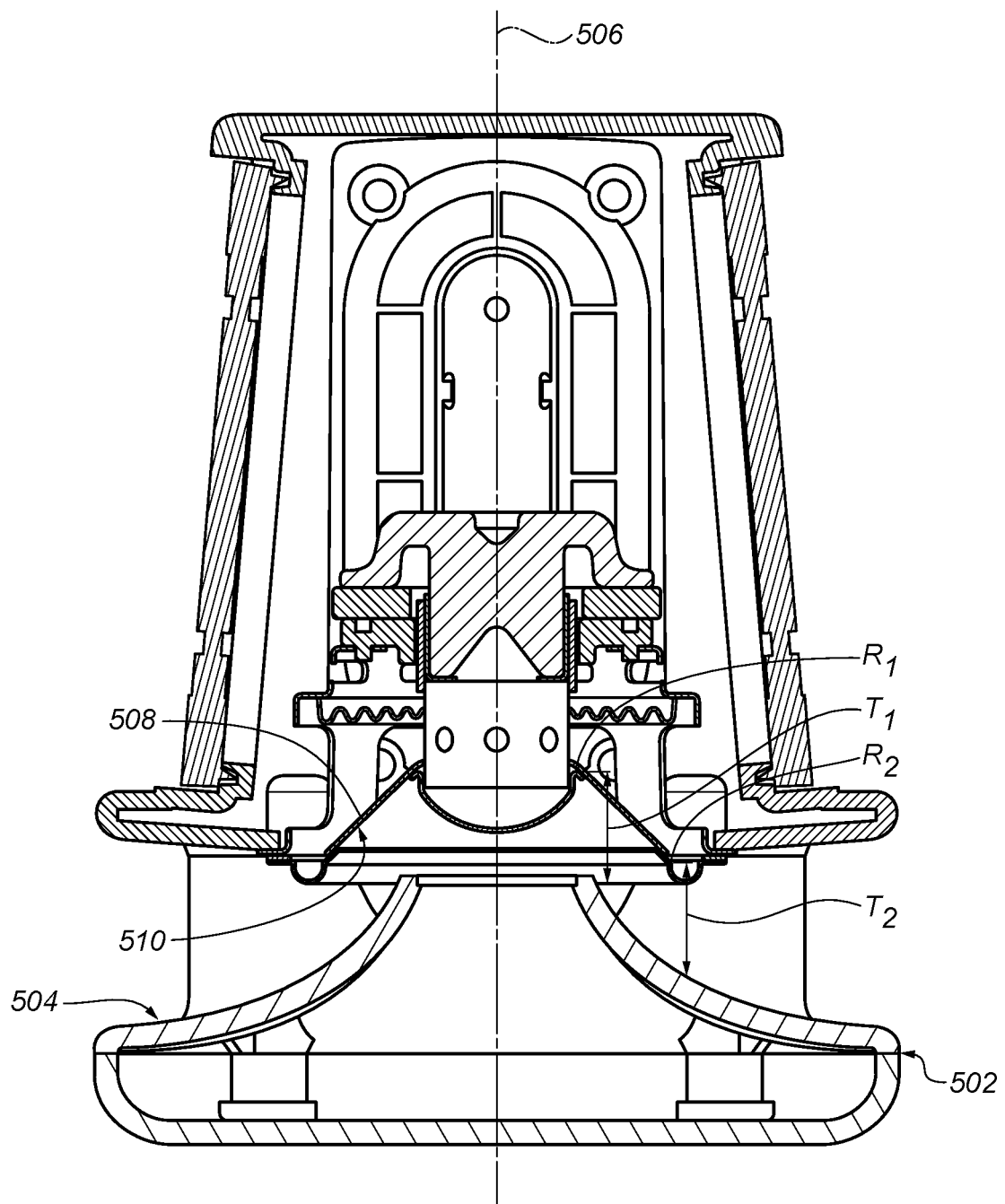


FIG. 5B

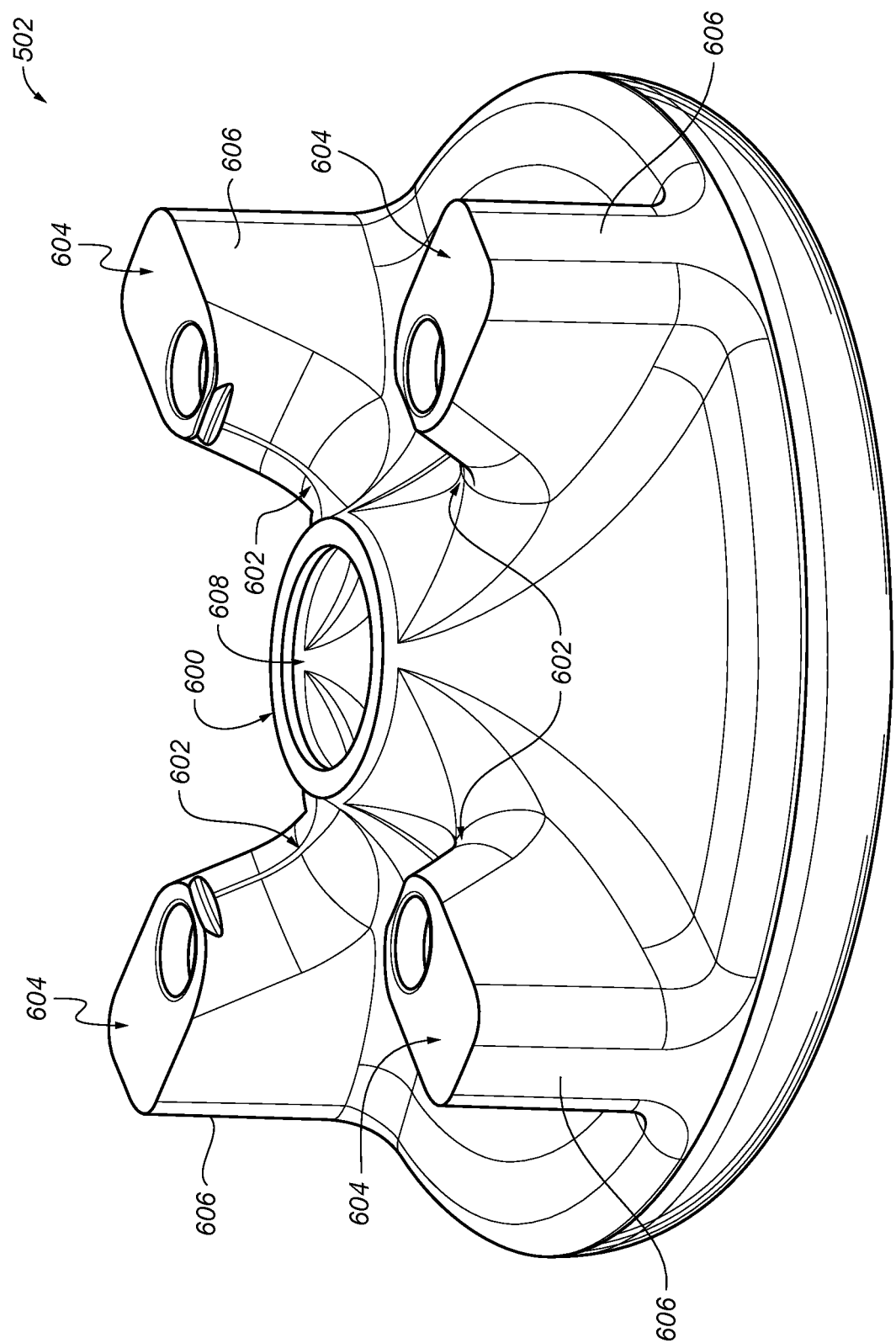


FIG. 6A

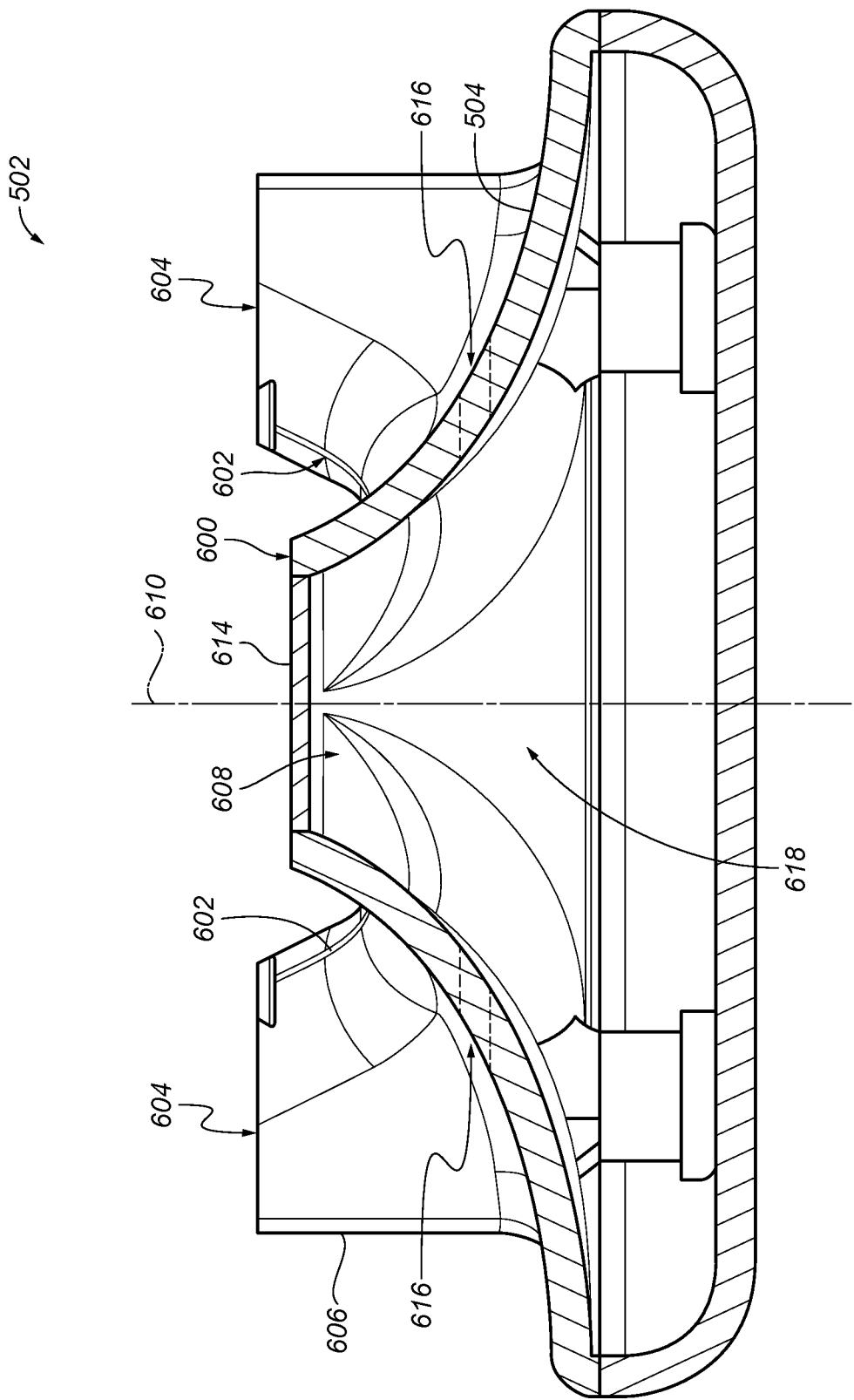


FIG. 6B

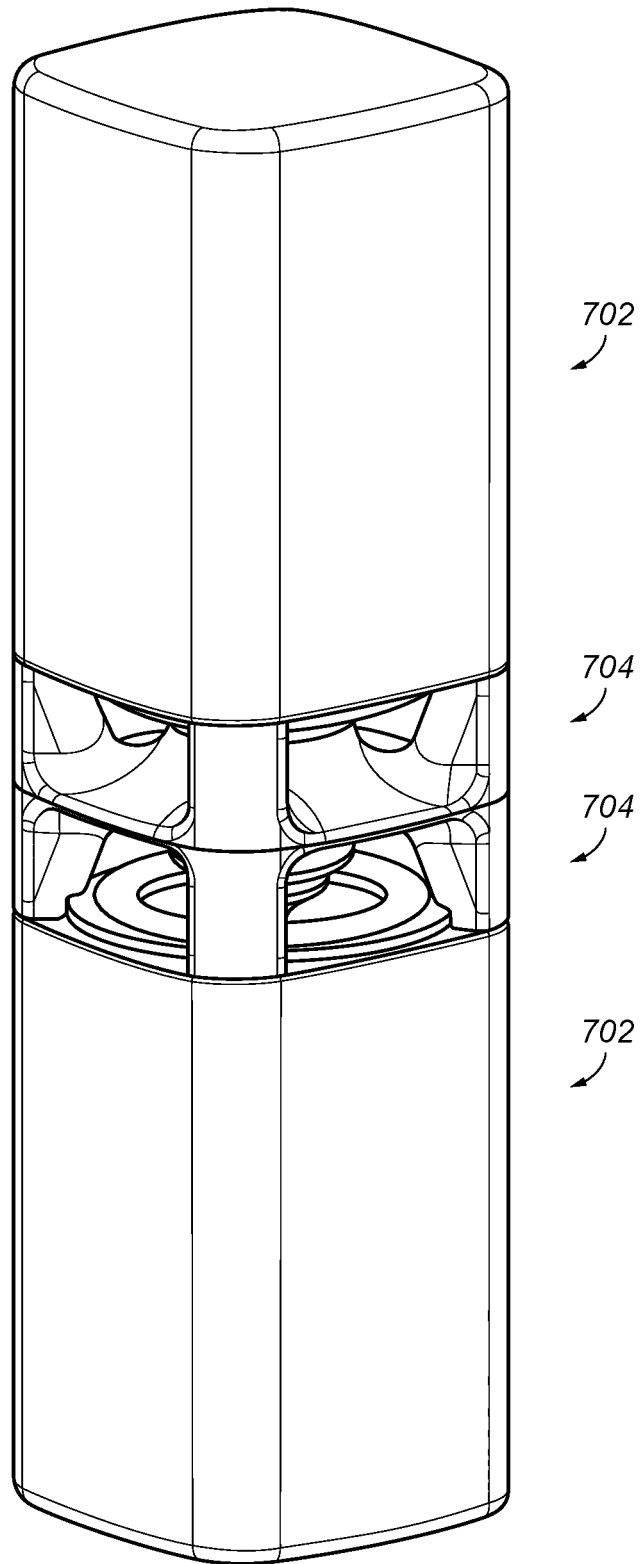


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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