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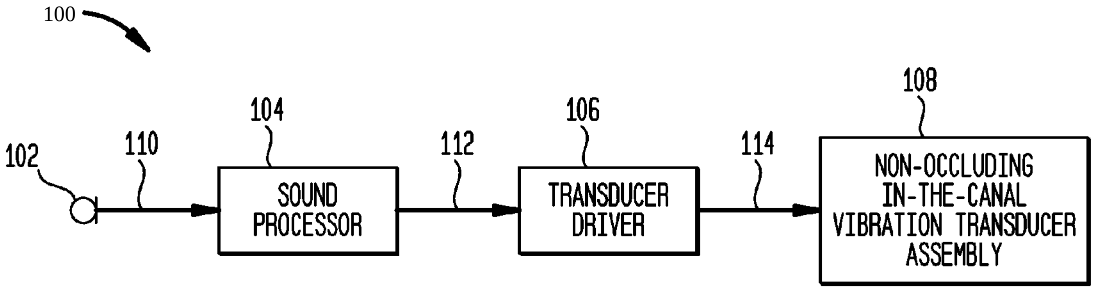
(54) **Title:** HEARING DEVICE HAVING A NON-OCCLUDING IN THE-CANAL VIBRATING COMPONENT

FIG. 1



(57) **Abstract:** A self-retaining bone conduction hearing device having a sound processor (104) and a nonoccluding in-the-canal vibrating component (108) responsive to the sound processor and configured for non-surgical-implantation in a recipient's ear canal. Utilizing bone conduction eliminates the dependency on acoustic stimulation, thereby enabling the hearing device of the present invention to address a wider range of sound frequencies in conductive hearing loss.

WO 2008/014498 A4

AMENDED CLAIMS

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1. A self retaining bone conduction hearing device, comprising:

a sound processor; and

a non-occluding in-the-canal vibrating component responsive to said sound processor and configured for non-surgical-implantation in a recipient's ear canal.

2. The device of claim 1, wherein

the vibrating component comprises a piezoelectric transducer.

3. The device of claim 2, further comprising:

a pre-stressed fiberglass coating substantially surrounding said piezoelectric transducer.

4. The device of claim 1, wherein the vibrating component comprises an aperture configured to permit passage of at least one of bodily fluids, air and sound.

5. The device of claim 4, wherein the vibrating component is substantially cylindrical and said aperture is in the approximate center thereof.

6. The device of claim 5, wherein the vibrating component comprises a rigid core, substantially surrounding said aperture, configured to reduce inward radial expansion.

7. The device of claim 1, further comprising:

a retainer, configured to be positioned in the conchal bowl, coupled to the vibrating component.

8. The device of claim 1, further comprising:

a retainer, configured to be positioned in a post-auricular space.

9. The device of claim 1, wherein the vibrating component is configured to vibrate in at least one of radial directional, longitudinal direction and torsional direction.

10. The device of claim 1, wherein the vibration component comprises a support structure and a plurality of circumferentially spaced vibration transducers.

11. The device of claim 10, wherein the plurality of circumferentially spaced vibration transducers are embedded in the support structure.

12. The device of claim 10, wherein the plurality of circumferentially spaced vibration transducers are secured to the support structure by segment connectors.

13. The device of claim 10, wherein the plurality of circumferentially spaced vibration transducers are connected by elastic segment connectors.

14. The device of claim 1, wherein the vibrating component is configured to be adjustable to conform to a plurality of ear canal dimensions.

15. The hearing device of claim 14, wherein the vibrating component comprises an elastic support structure.

16. The claim 14, wherein the vibrating component comprises an adjustable inner core and an outer vibrating element.

17. The claim 1, further comprising a vibration transducer configured to be position in the conchal bowl and coupled to the vibrating component.

18. A bone conduction hearing device including a sound processor configured to generate stimulation command signals, comprising:

a vibration component configured to be positioned in an ear canal and transmit vibration to the skull in response to the stimulation command signals, the vibration component further configured to allow passage of at least one of bodily fluids, air and sound.

19. The device of claim 18, wherein

the vibrating component comprises a piezoelectric transducer.

20. The hearing device of claim 19, further comprising:

a pre-stressed fiberglass coating substantially surrounding said piezoelectric transducer.

21. The hearing device of claim 19, wherein the vibrating component is substantially cylindrical and includes an aperture substantially in the center thereof for passage of the at least one of bodily fluids, air and sound.

22. The hearing device of claim 21, wherein the vibrating component comprises a rigid core substantially surrounding said aperture configured to reduce inward radial expansion.

23. The hearing device of claim 21, further comprising:

a retainer configured to be positioned in the conchal bowl.

24. The self retaining bone conduction hearing device of claim 21, further comprising

a retainer configured to be positioned in a post-auricular space.

25. The self retaining bone conduction hearing device of claim 21, wherein

the vibrating component is configured to vibrate in at least one of radial directional, longitudinal direction and torsional direction.

26. The self retaining bone conduction hearing device of claim 21, wherein
the vibration component includes a support structure and a plurality of circumferentially spaced vibration transducers.

27. The self retaining bone conduction hearing device of claim 26, wherein
the plurality of circumferentially spaced vibration transducers are embedded in the support structure.

28. The self retaining bone conduction hearing device of claim 26, wherein
the plurality of circumferentially spaced vibration transducers are secured to the support structure by segment connectors.

29. The self retaining bone conduction hearing device of claim 26, wherein
the plurality of circumferentially spaced vibration transducers are connected by elastic segment connectors.

30. The self retaining bone conduction hearing device of claim 18, wherein
the vibrating component is configured to be adjustable to conform to a plurality of ear canal dimensions.

31. The self retaining bone conduction hearing device of claim 30, wherein
the vibrating component includes an elastic support structure.

32. The self retaining bone conduction hearing device of claim 30, wherein
the vibrating component comprises an adjustable inner core and an outer vibrating element.

33. The hearing device of claim 18, further comprising:
a vibration transducer coupled to the vibrating component and configured to be positioned in the conchal bowl.

34. The hearing device of claim 18, wherein the vibrating component is configured to transmit vibration directly to the bone defining the ear canal.

35. A method of improving sound percept in a recipient, comprising:

positioning a vibration component in an ear canal such that the vibration component does not occlude the ear canal; and

transmitting vibrations to the skull in response to stimulation command signals from a sound processor.

36. The method of claim 35, wherein positioning a vibration component in an ear canal comprises:

non-surgically positioning the vibration component in the ear canal.

37. The method of claim 35, wherein transmitting vibrations to the skull comprises:

transmitting vibrations to directly to the bone defining the ear canal.

38. The method of claim 35, wherein positioning a vibration component in an ear canal comprises:

positioning a piezoelectric transducing vibration component.

39. The method of claim 35, further comprising:

positioning in the conchal bowl a retainer coupled to the vibration component.

40. The method of claim 35, further comprising:

positioning in a post-auricular space a retainer coupled to the vibrating element.

41. The method of claim 35, further comprising:

positioning a vibration transducer in the conchal bowl.

42. The method of claim 35, further comprising:

adjusting the diameter of the vibration component to conform to the ear canal and be non-surgically held therein.

43. The method of claim 35, wherein positioning a vibration component in an ear canal comprises:

positioning a substantially cylindrical vibration component that includes an aperture substantially in the center thereof for passage of the at least one of bodily fluids, air and sound.

44. The method of claim 35, wherein transmitting vibrations to the skull comprises:

transmitting vibrations in a radial directional.

45. The method of claim 35, wherein positioning a vibration component in an ear canal comprises:

positioning a vibration component which includes a support structure and a plurality of circumferentially-spaced vibration transducers.