



(12) **United States Patent**
Sapiejewski et al.

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(54) **IN-EAR HEADPHONES**

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(57) **ABSTRACT**

(51) **Int. Cl.**
H04R 25/00 (2006.01)

(52) **U.S. Cl.** **381/382**; 381/370; 381/371; 381/374

(58) **Field of Classification Search** 381/370–374,
381/380–382, 182, 162

See application file for complete search history.

An earphone includes a first acoustic chamber including a reactive element and a resistive element in parallel, a second acoustic chamber separated from the first acoustic chamber by an acoustic transducer, and a housing to support the apparatus from the concha of a wearer's ear and to extend the second acoustic chamber into the ear canal of the wearer's ear.

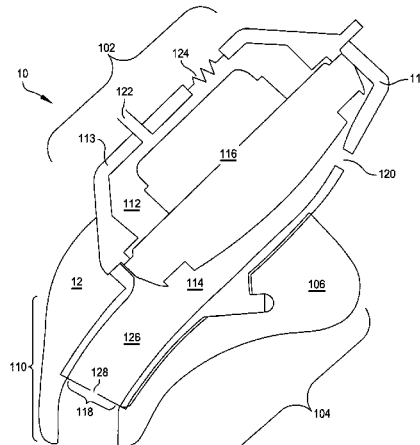
A cushion includes a first material and a second material and is formed into a first region and a second region. The first region defines an exterior surface shaped to fit the concha of a human ear. The second region defines an exterior surface shaped to fit the ear canal of a human ear. The first and second regions together define an interior surface shaped to accommodate an earphone. The first material occupies a volume adjacent to the interior surface. The second material occupies a volume between the first material and the first and second outer surfaces. The first and second materials are of different hardnesses.

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25 Claims, 12 Drawing Sheets



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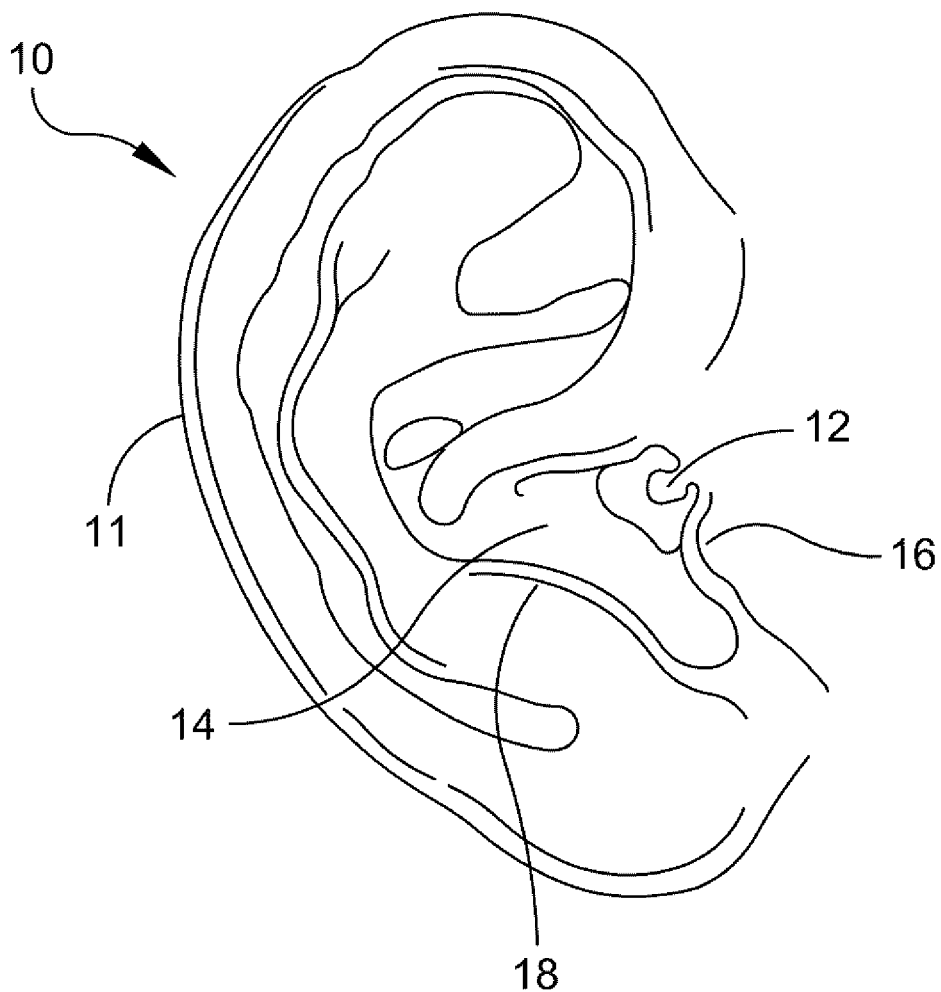
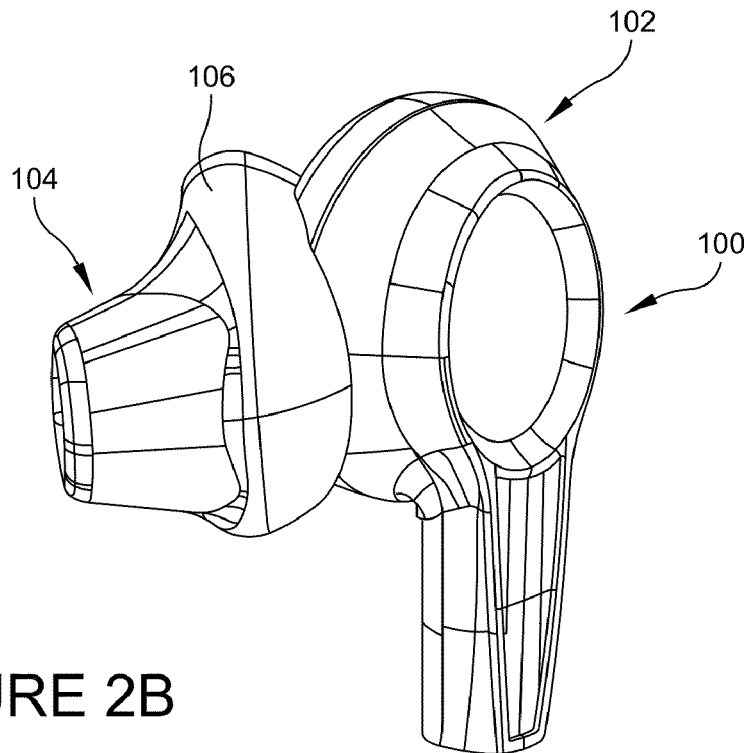
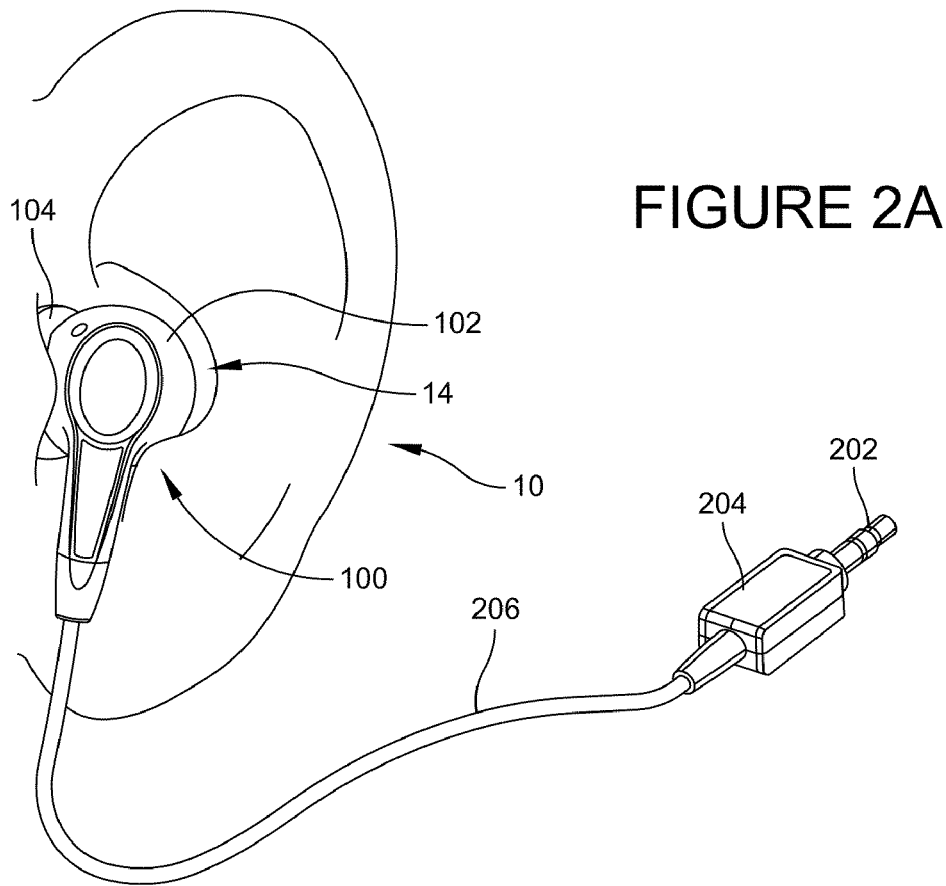


FIGURE 1



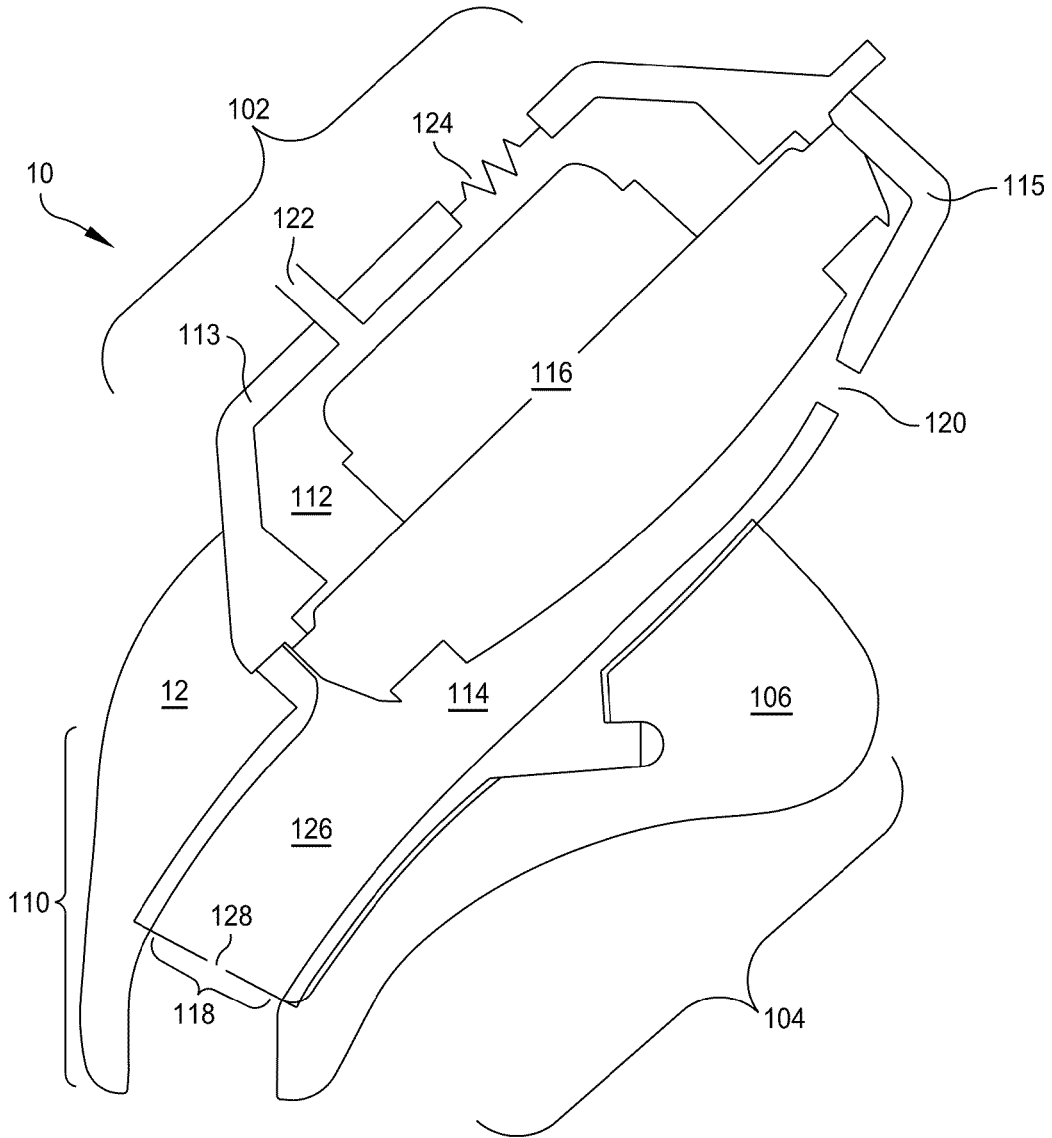


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