

## Hearing device that amplifies sound using a tympanostomy tube

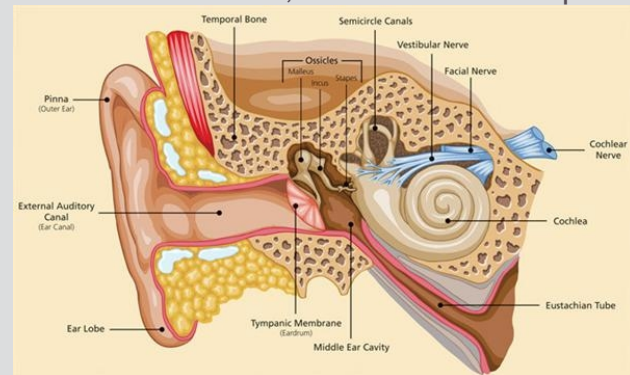
Tech ID: 24605 / UC Case 2014-242-0

### BRIEF DESCRIPTION

Non-invasive hearing technologies have inherent problems, including occlusion, feedback, and low satisfaction rates with sound quality and aesthetics. Middle ear implants and cochlear implants can provide acceptable sound quality, however, drawbacks of these types of devices includes high cost and the requirement for invasive surgery. To overcome these issues, researchers at UC, Irvine developed the Direct Hearing Device (DHD; previous patent). The DHD is a non-invasive hearing device that couples to the umbo at the tympanic membrane (TM; the deepest part of the eardrum) and drives the TM and attached ossicular chain to facilitate sound transmission. Researchers have continued to improve this device by exploring the best embodiment for contact between their DHD and the TM.

### FULL DESCRIPTION

Researchers at UC, Irvine have developed and improved a hearing aid apparatus for patients with moderate to severe hearing loss. This hearing aid device is comprised of a direct-DHD having a silicon mold on one end, the silicon having an attached magnet; and a tympanostomy tube with a ferromagnetic cap on the other end, the tympanostomy tube being insertable into a TM. Once the DHD is placed inside an ear canal, such that the magnet attached to the silicone mold is in contact with the ferromagnetic cap of the tympanostomy tube, the magnet of the DHD will lock with the ferromagnetic cap to establish a stable connection for mechanical actuation of the TM. Finally, the tympanostomy tube with the ferromagnetic



cap transmits the driving force of the DHD onto the middle ear ossicles. This stable connection and driving force eliminates occlusion and feedback, and amplifies sound thereby improving a patient's quality of hearing.

### SUGGESTED USES

We are currently looking for a commercial partner to further develop this product to improve the quality of hearing in patients with hearing loss.

### ADVANTAGES

- » Noninvasive procedure to implant the hearing device.
- » Low cost.
- » Eliminates occlusion and feedback improving patient's quality of hearing.
- » Significantly improved connection between the DHD and the TM to provide a secure attachment and more efficient transfer of mechanical energy to the middle ear.

### CONTACT

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### INVENTORS

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### OTHER INFORMATION

### CATEGORIZED AS

- » **Medical**
- » Devices
- » Other

### RELATED CASES

2014-242-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,794,704	10/17/2017	2014-242

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Micro-electromagnetically Actuated Latched Switches
- ▶ Manometer for Monitoring and Assessing Upper Extremity Rehabilitation
- ▶ Magnetic Recovery Method Of Magnetically Responsive High-Aspect Ratio Photoresist Microstructures
- ▶ Use Of Micro-Structured Plate For Controlling Capacitance Of Mechanical Capacitor Switches
- ▶ Drug Combinations For Treatment Of Tinnitus, Vertigo, and Headache
- ▶ Magnetically Actuated Micro-Electro-Mechanical Capacitor Switches In Laminate

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