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

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(54) **RECHARGEABLE HEARING AID SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

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Primary Examiner—Sinh Tran

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Related U.S. Application Data

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1998.

ABSTRACT

(51) **Int. Cl.**⁷ **H04R 25/00**

(52) **U.S. Cl.** **381/323; 381/328; 381/322**

(58) **Field of Search** 381/322, 323,
381/327, 328, 331, FOR 127, FOR 132,
FOR 133, FOR 135, FOR 137; 429/163,
164, 175, 176, 94, 161, 209, 186

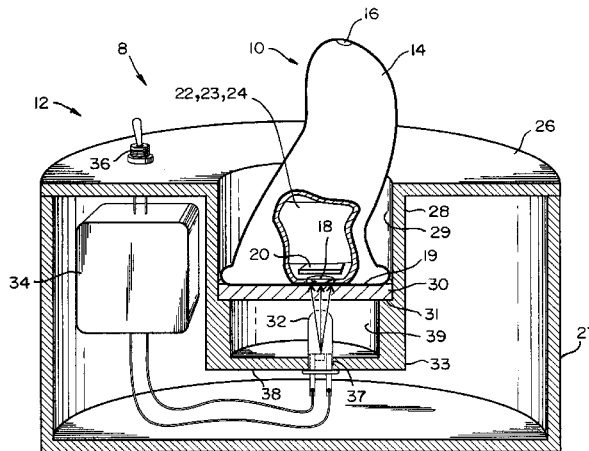
A contactless rechargeable hearing aid system in which a
rechargeable hearing aid may be optically or inductively
recharged by an optical or an inductive recharger. The
optically rechargeable hearing aid may have a dual purpose
optical fiber that may act as a light conduit for the recharging
light, and that may also act as a draw string for the hearing
aid. The rechargeable hearing aid may use a high energy
nickel metal-hydride rechargeable battery or a high energy,
high voltage lithium based rechargeable battery, in conjunc-
tion with a DC to DC voltage regulating circuit for convert-
ing the rechargeable battery's declining DC output voltage
to the fixed DC input voltage needed by the hearing aid's
audio related circuitry. The DC to DC voltage regulating
circuit may also help to present a supply impedance that
matches the input impedance of the audio related circuitry in
the hearing aid. The rechargeable battery may have an
alternately folded cell stack, a spiral wound cell stack or an
accordion folded cell stack, in order to provide, in a mini-
mized volume, the large anode, cathode and electrolyte areas
that may be needed to reduce the rechargeable battery's
output impedance, in order to help reduce internal resistance
losses during use of the battery.

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27 Claims, 14 Drawing Sheets



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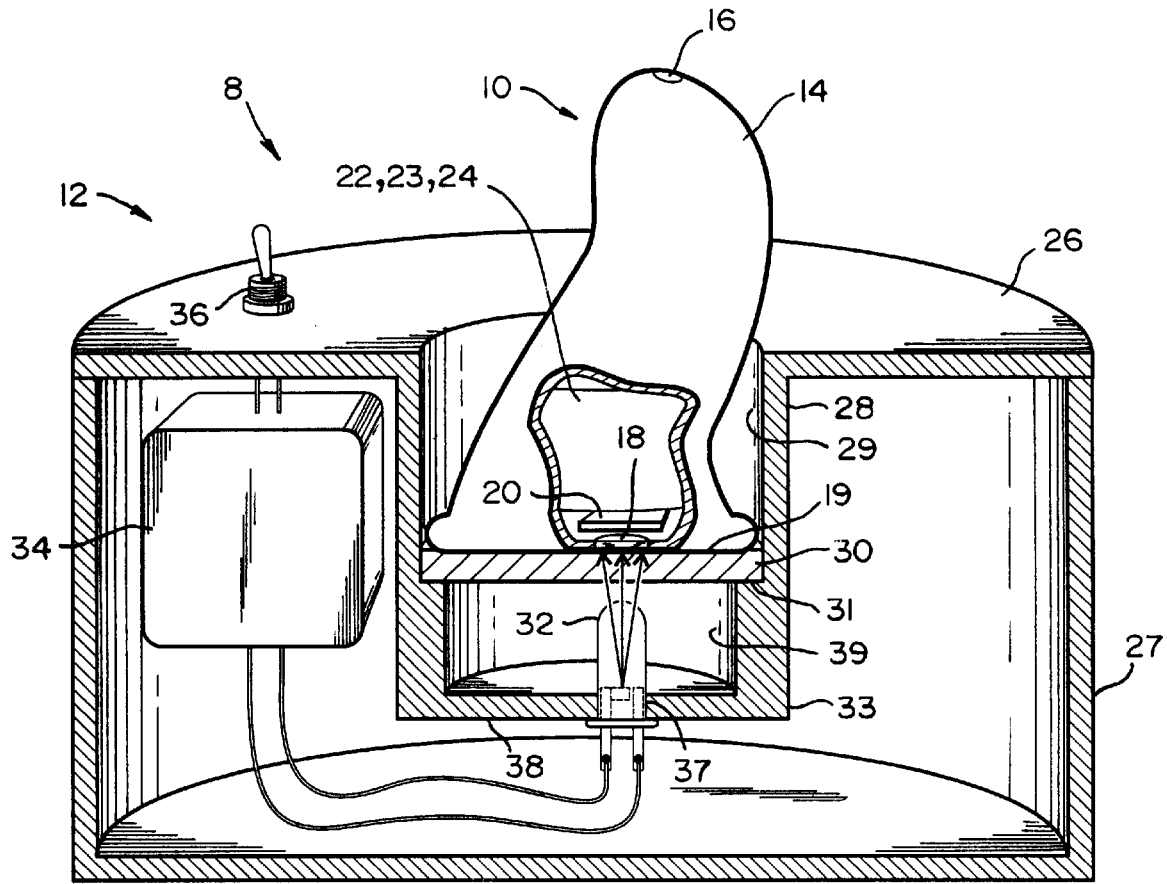


FIG. 1

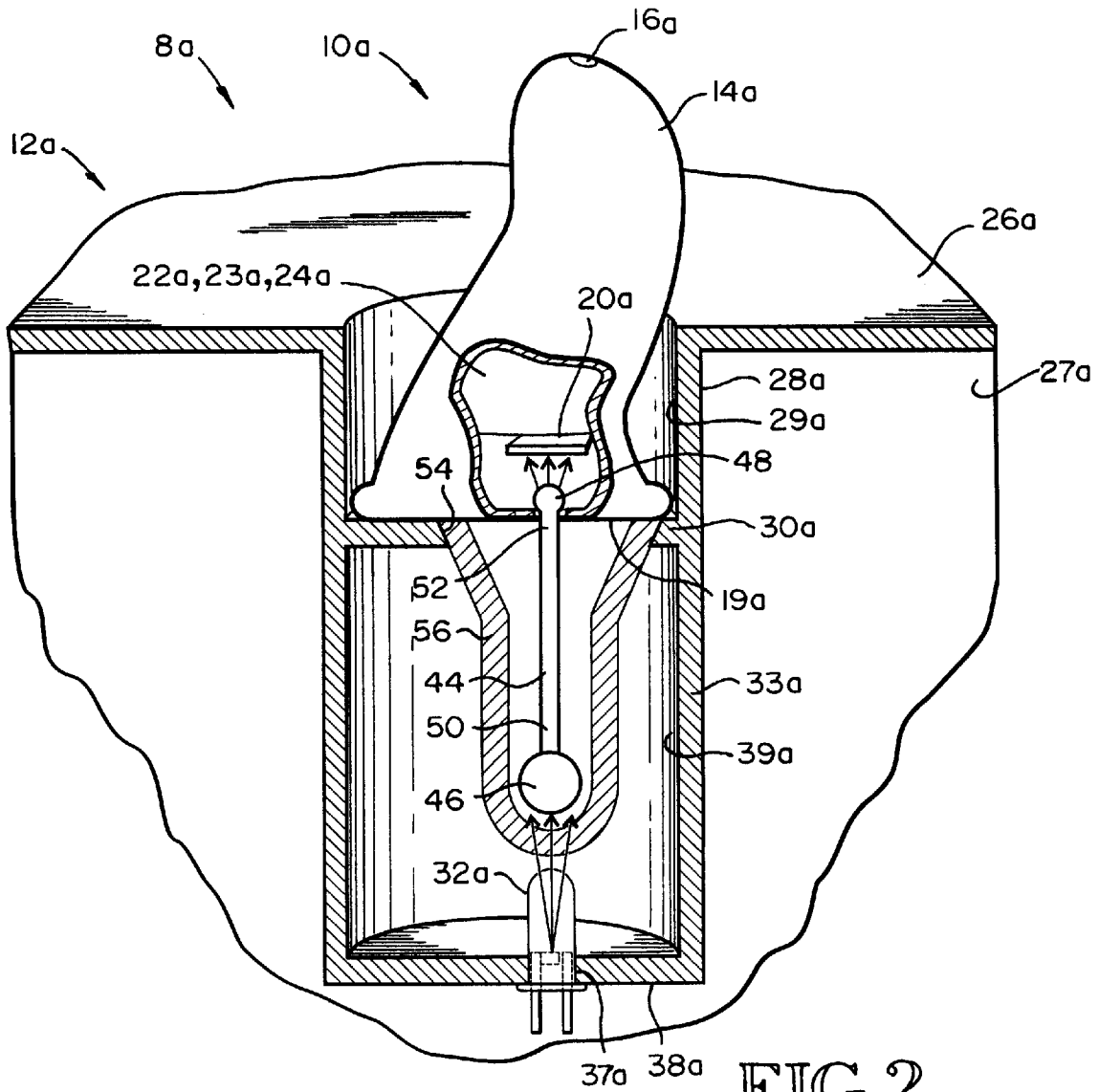


FIG. 2

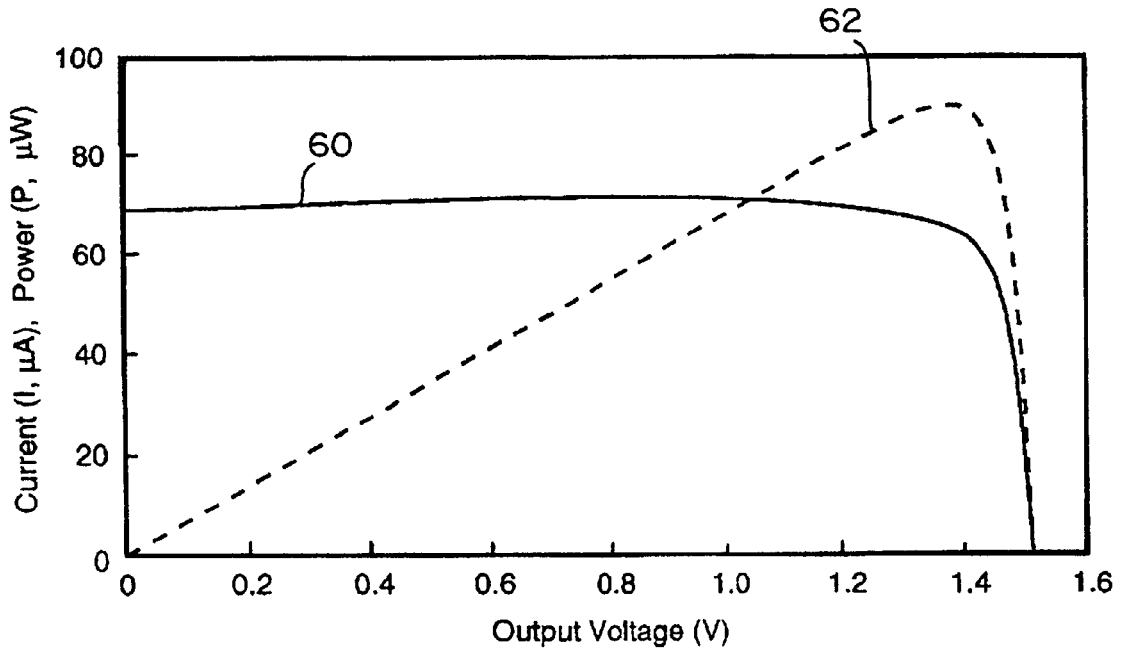


FIG. 3

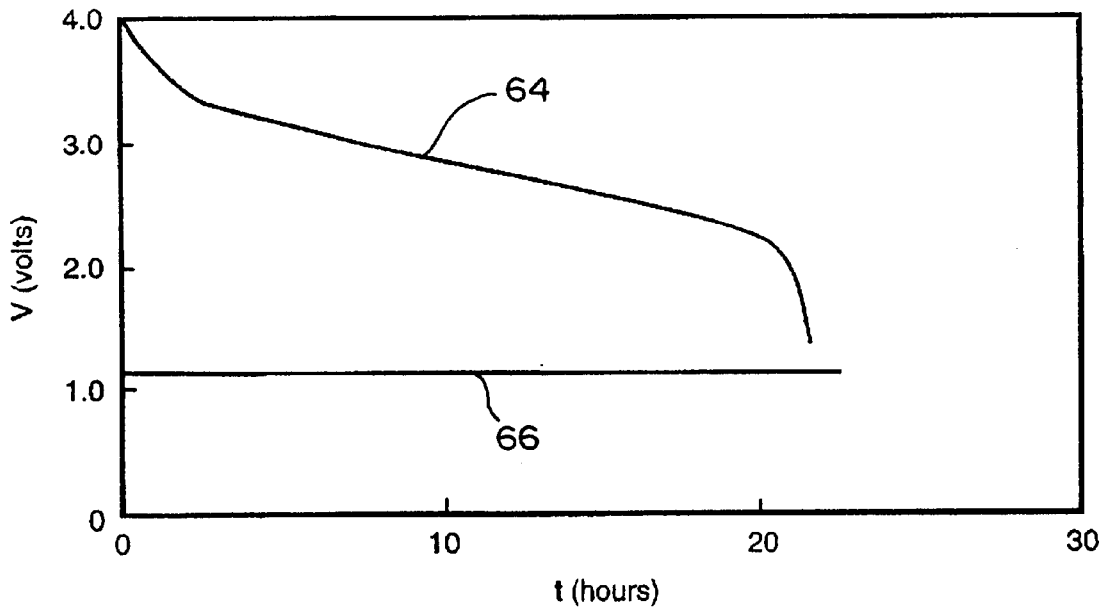


FIG. 4

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