



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

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(54) **REFLECTIVE SURFACE TREATMENTS FOR OPTICAL SENSORS**

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A61B 5/08 (2006.01)  
A61B 5/145 (2006.01)

(71) Applicant: **Apple Inc.**, Cupertino, CA (US)

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CPC ..... **G01N 21/55** (2013.01); **A61B 5/00** (2013.01); **A61B 5/0059** (2013.01); **G01N 21/4738** (2013.01); **A61B 5/0002** (2013.01); **A61B 5/021** (2013.01); **A61B 5/024** (2013.01); **A61B 5/0816** (2013.01); **A61B 5/14532** (2013.01); **A61B 5/14542** (2013.01); **A61B 5/681** (2013.01); **A61B 5/7203** (2013.01); **G01N 2201/0221** (2013.01); **G01N 2201/0625** (2013.01)

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(58) **Field of Classification Search**  
USPC ..... 600/476  
See application file for complete search history.

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

This patent is subject to a terminal disclaimer.

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(Continued)

(21) Appl. No.: **16/114,003**

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**Related U.S. Application Data**

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(60) Provisional application No. 62/043,294, filed on Aug. 28, 2014.

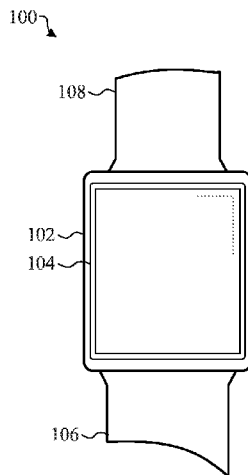
(51) **Int. Cl.**  
**A61B 5/04** (2006.01)  
**G01N 21/55** (2014.01)  
**G01N 21/47** (2006.01)  
**A61B 5/00** (2006.01)  
**A61B 5/021** (2006.01)

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(57) **ABSTRACT**

An electronic device includes one or more light emitters for emitting light toward an object and one or more light detectors for collecting light exiting the object. A reflective coating, surface, or surface finish can be applied adjacent to the area to which light is emitted and/or through which light exits in order to increase the light collected by the light detector. The reflective coating can be oriented so as to reflect light back into the object.

**20 Claims, 6 Drawing Sheets**



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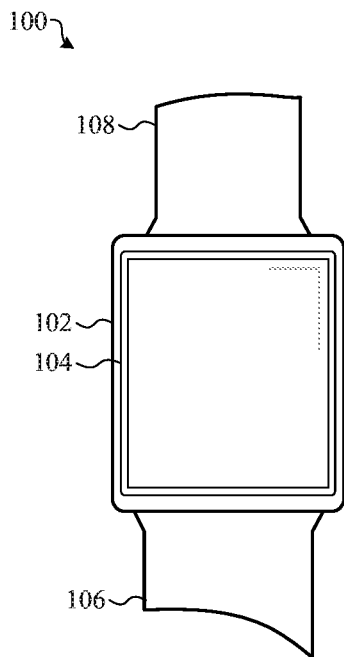


FIG. 1A

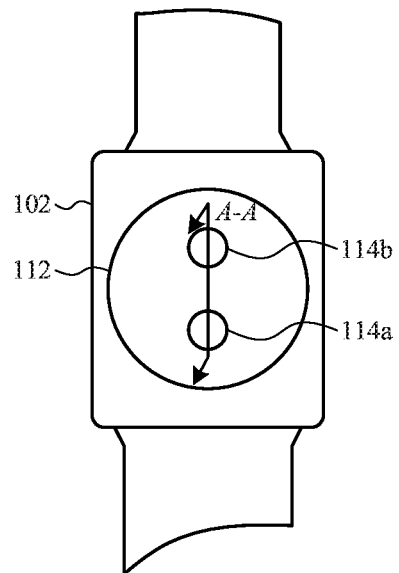


FIG. 1B

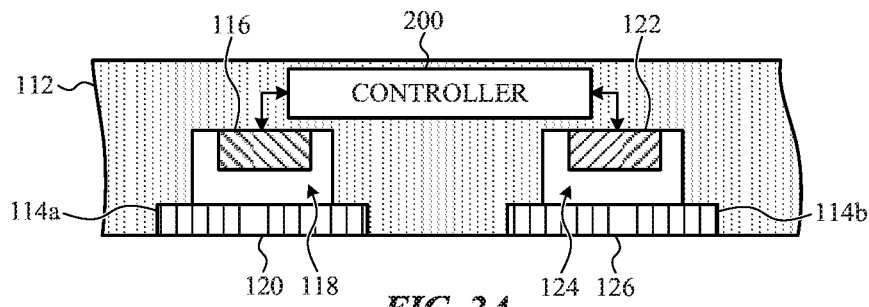


FIG. 2A

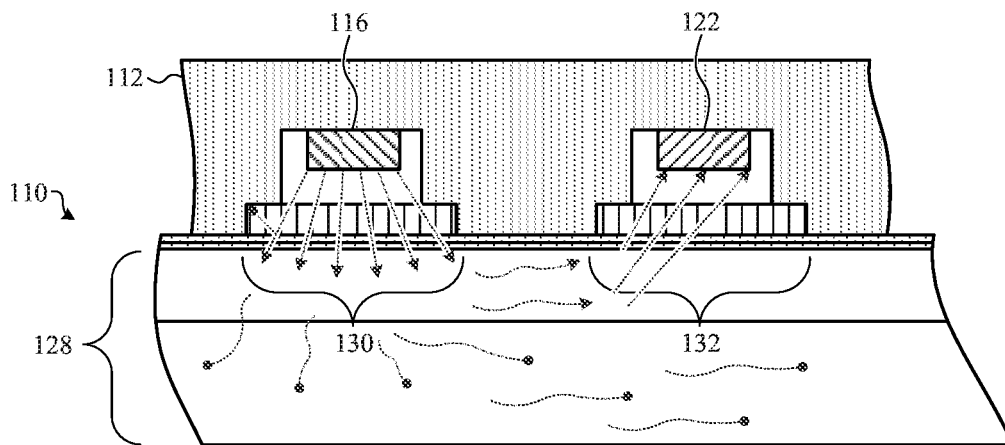


FIG. 2B

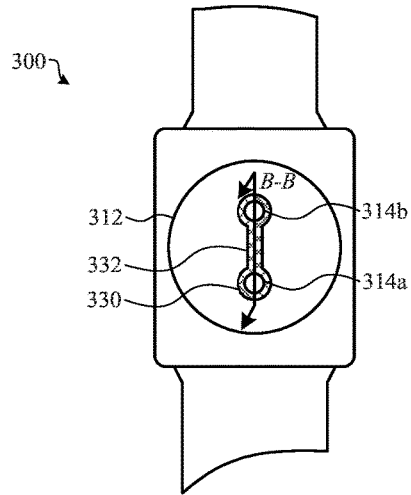


FIG. 3A

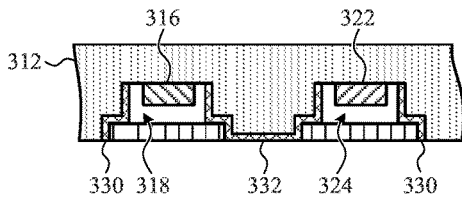


FIG. 3B

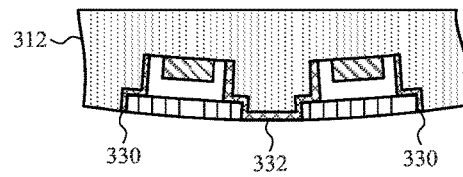


FIG. 3C

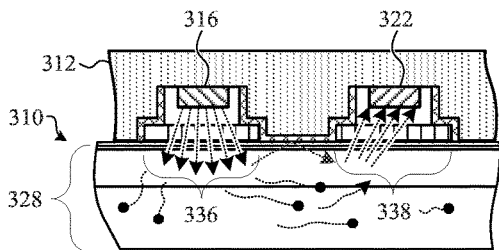


FIG. 3D

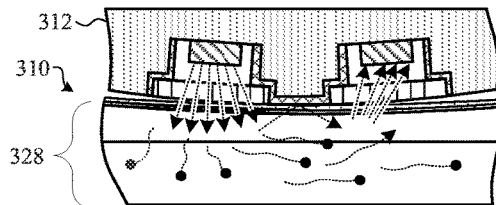


FIG. 3E

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