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(12) **United States Patent**
Inoue

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(54) **NON-CONTACT TYPE POWER RECEIVING APPARATUS, ELECTRONIC EQUIPMENT AND CHARGING SYSTEM USING THE POWER RECEIVING APPARATUS**

(58) **Field of Classification Search**
CPC H02J 7/025
USPC 320/108
See application file for complete search history.

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(73) Assignees: **Kabushiki Kaisha Toshiba**, Tokyo (JP);
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Yokohama-shi (JP)

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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 1076 days.

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(2), (4) Date: **Feb. 19, 2010**

Assistant Examiner — Johali Torres Ruiz

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(30) **Foreign Application Priority Data**

Aug. 21, 2007 (JP) 2007-214503

(57) **ABSTRACT**

(51) **Int. Cl.**

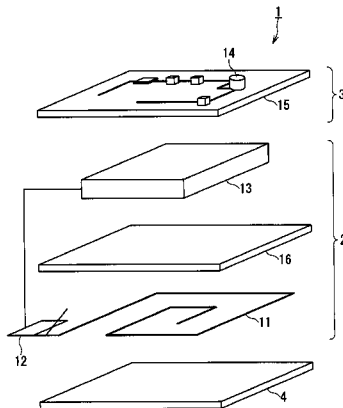
H02J 7/00 (2006.01)
H01F 38/14 (2006.01)
H01F 27/36 (2006.01)
H01F 27/28 (2006.01)
H02J 5/00 (2006.01)

A non-contact type power receiving apparatus including: a power receiving coil having a spiral coil; a secondary battery; an electronic device operated by being supplied with direct voltage from the secondary battery, wherein a composite magnetic body is provided to at least one portion between the secondary battery and the spiral coil, and a portion between the electronic device and the spiral coil. The composite magnetic body includes at least first and other layers of magnetic sheets through an insulating layer in which when a relative magnetic permeability of the first magnetic sheet provided to a side of the spiral coil is μ_d , a thickness of the first magnetic sheet is t_u , an average relative magnetic permeability of the other magnetic sheets other than the first magnetic sheet is μ_o , and a total thickness of the other magnetic sheets is t_o , the composite magnetic body satisfies the following relations: $\mu_d \cdot t_d \leq 60$ [mm]; and $\mu_o \cdot t_o \geq 100$ [mm].

(52) **U.S. Cl.**

CPC **H01F 38/14** (2013.01); **H01F 27/365** (2013.01); **H01F 27/2804** (2013.01); **H01F 2038/143** (2013.01); **H02J 5/005** (2013.01)
USPC **320/108**; **336/200**

15 Claims, 3 Drawing Sheets



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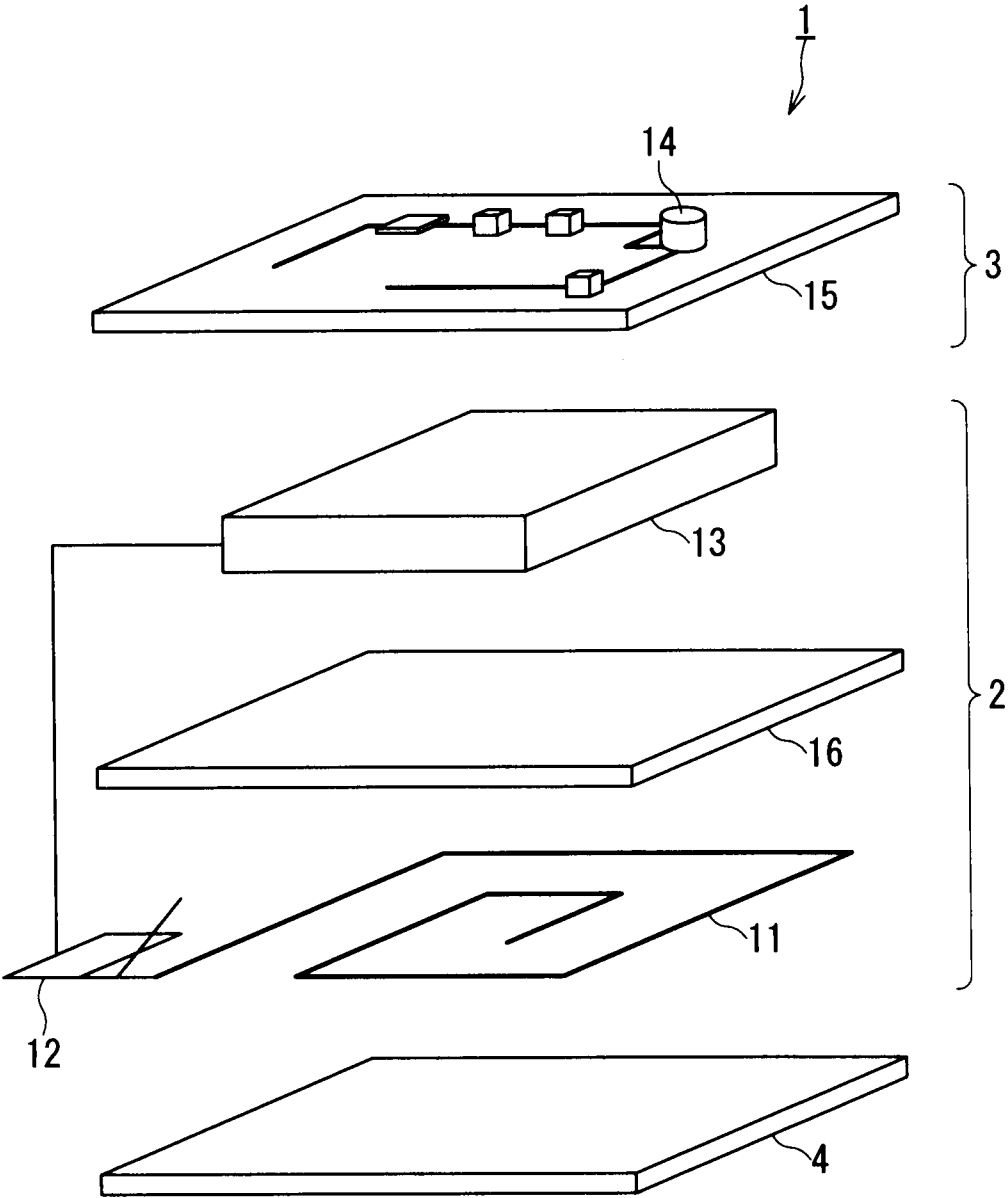


FIG. 1

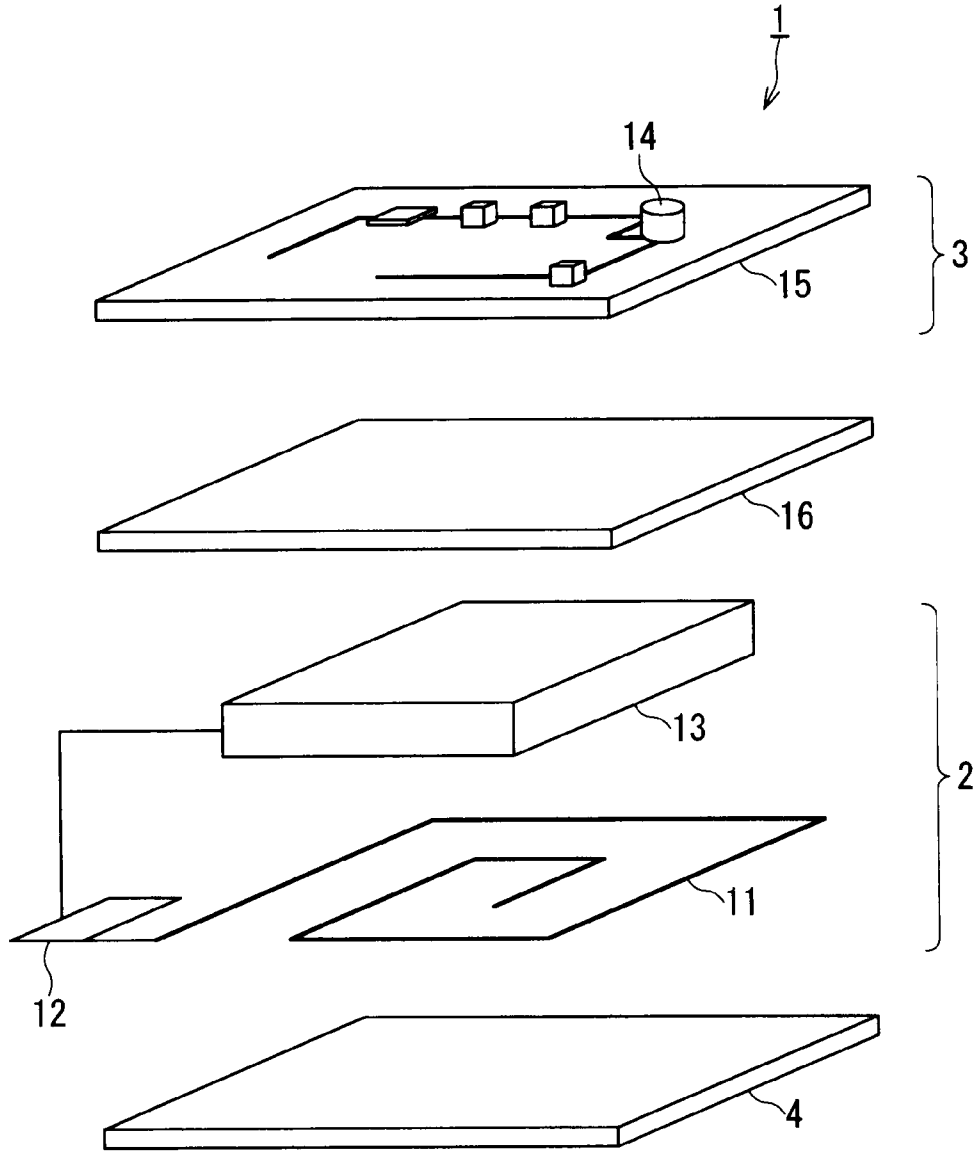


FIG. 2

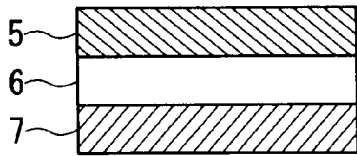


FIG. 3A

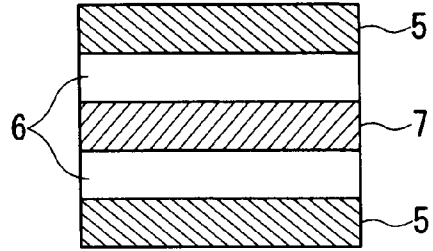


FIG. 3B

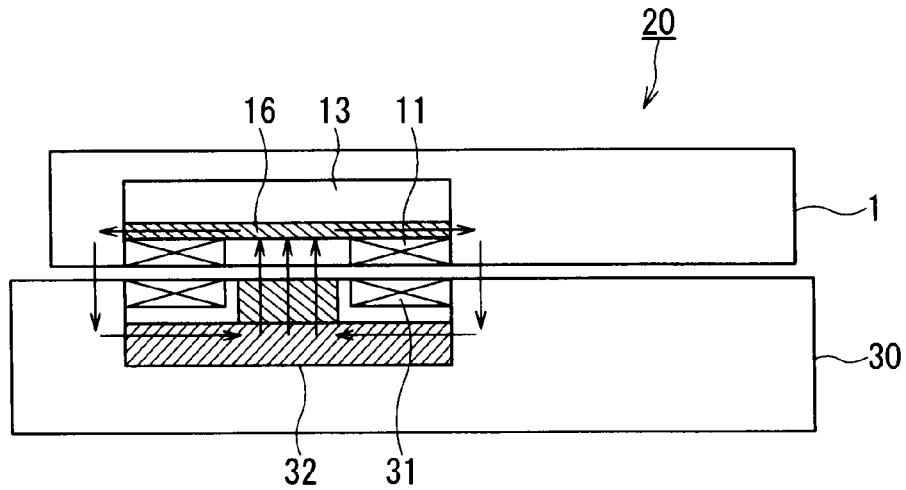


FIG. 4

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