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

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(54) **COIL MODULE APPARATUS**

(56) **References Cited**

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(73) Assignees: **Sony Ericsson Mobile Communications Japan, Inc.**, Tokyo (JP); **Seiko Epson Corporation**, Tokyo (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 99 days.

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(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2008/0297295 A1 Dec. 4, 2008

(30) **Foreign Application Priority Data**

May 29, 2007 (JP) 2007-141690

(51) **Int. Cl.**
H01F 38/12 (2006.01)

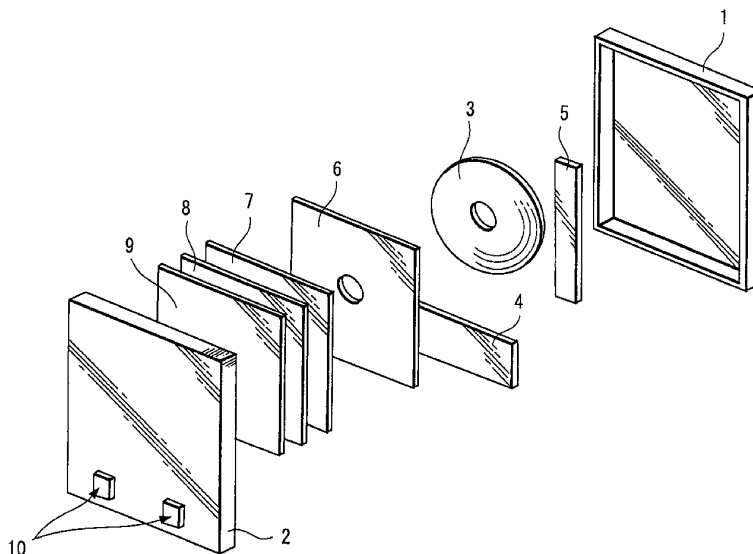
(52) **U.S. Cl.** **336/84 M**

(58) **Field of Classification Search** 336/65,
336/83, 84 R, 84 M, 84 C, 200, 232; 320/108

See application file for complete search history.

A coil module apparatus is provided. The coil module apparatus includes a flat coil, a circuit board, a magnetic sheet, connection terminals, and a case. The flat coil has a flat shape. The circuit board is used for the flat coil. The magnetic sheet is provided so as to cover one surface portion of the flat coil. The connection terminals are provided for connecting the flat coil and the circuit board. The case encloses the flat coil, the circuit board, and the magnetic sheet and encloses the connection terminals so that the connection terminals are partly exposed.

17 Claims, 16 Drawing Sheets



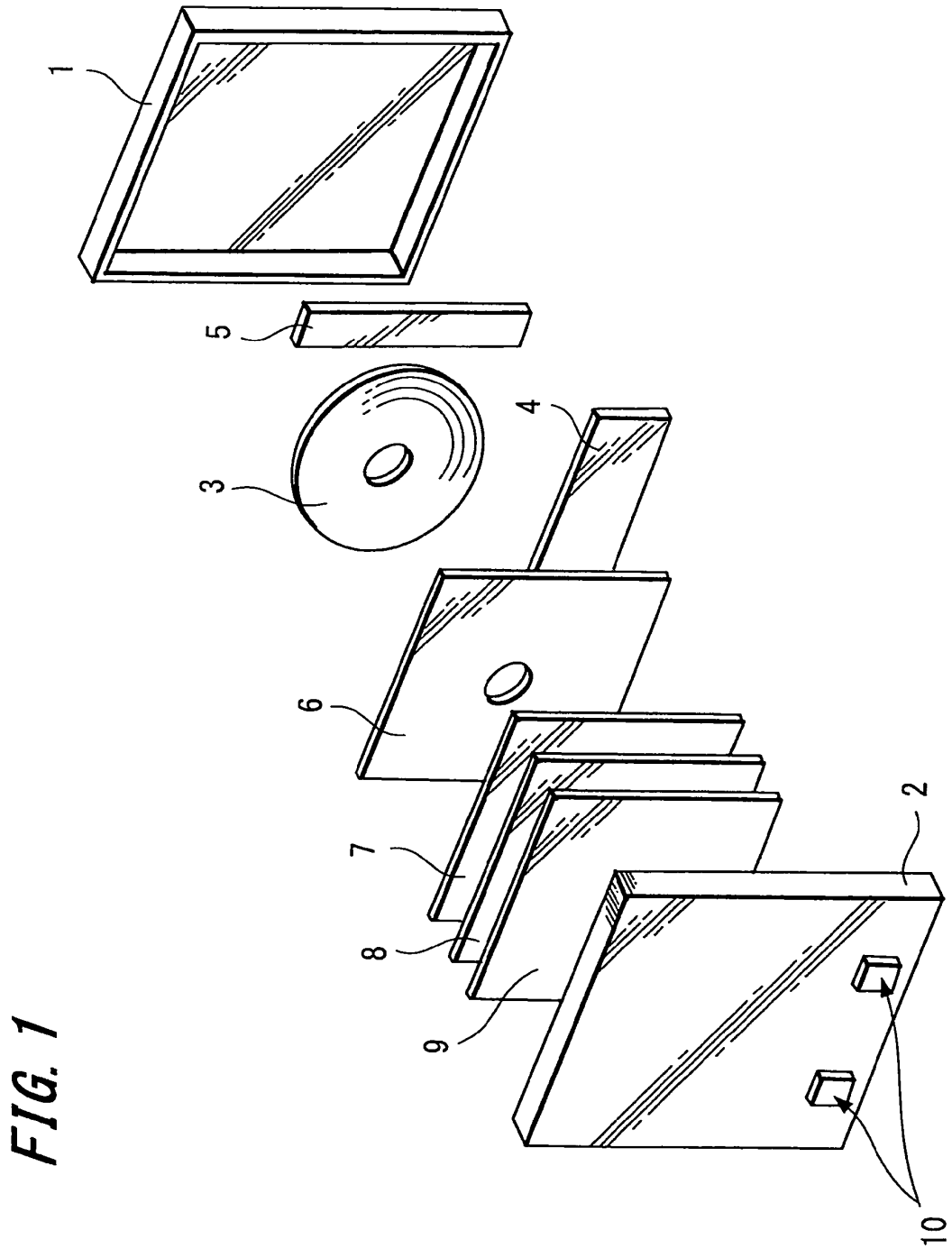


FIG. 1

FIG. 2

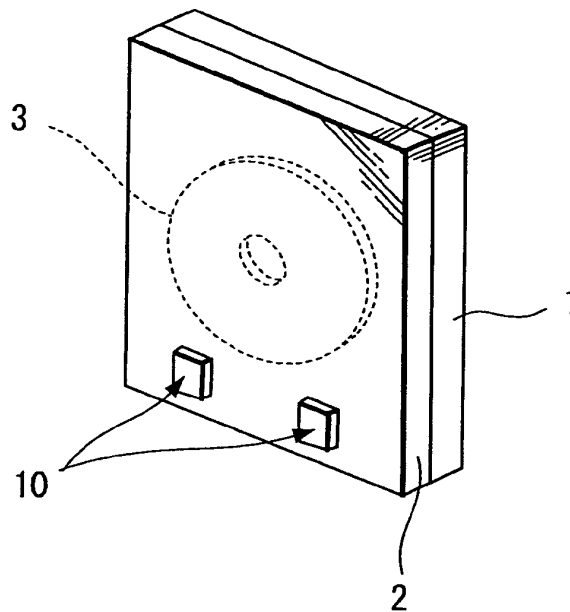


FIG. 3

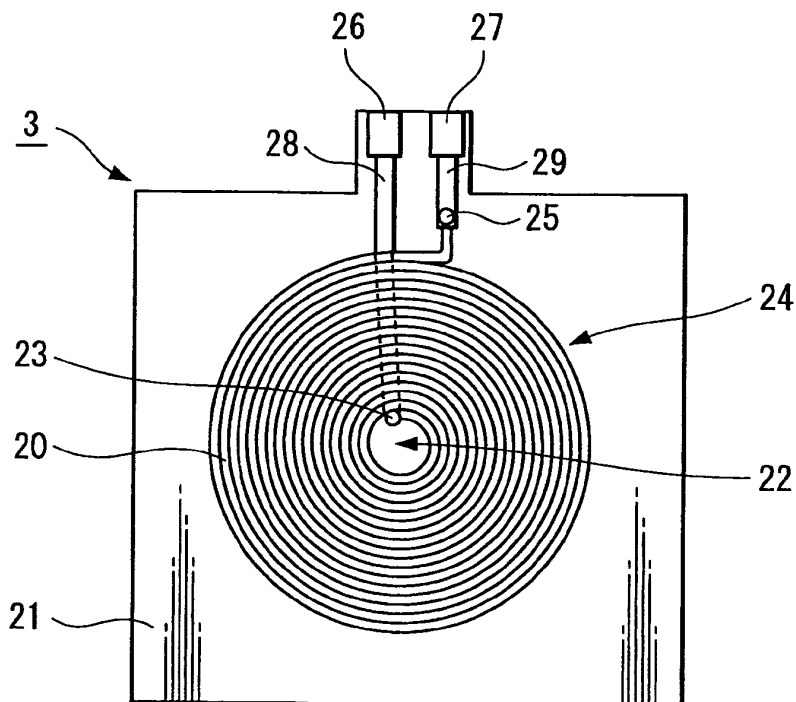


FIG. 4

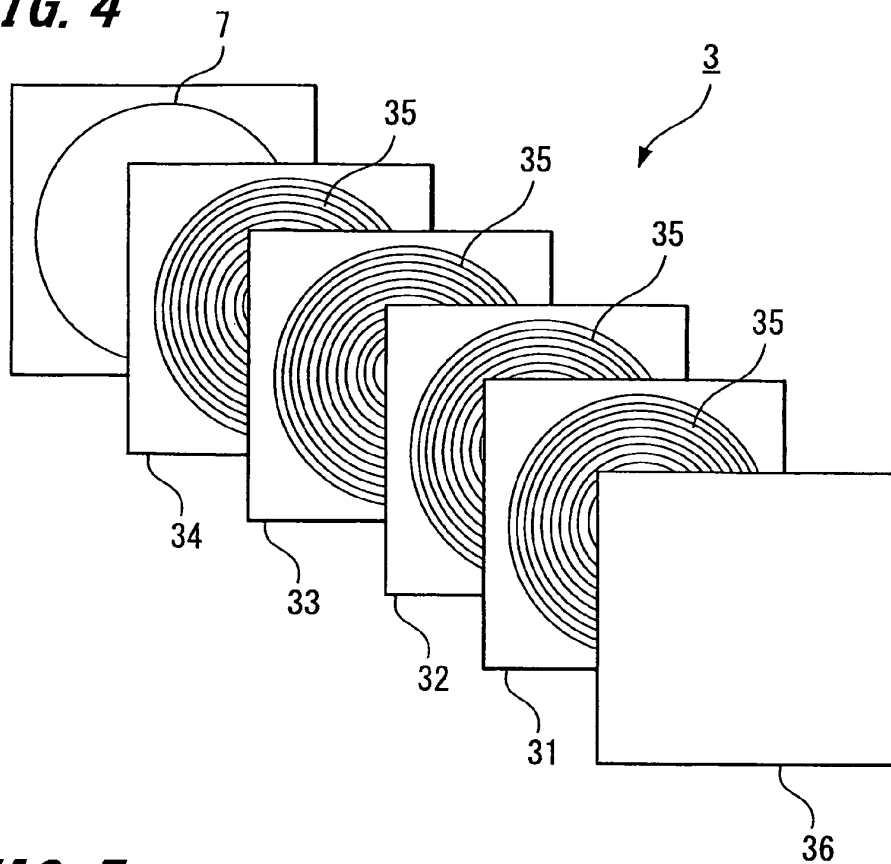


FIG. 5

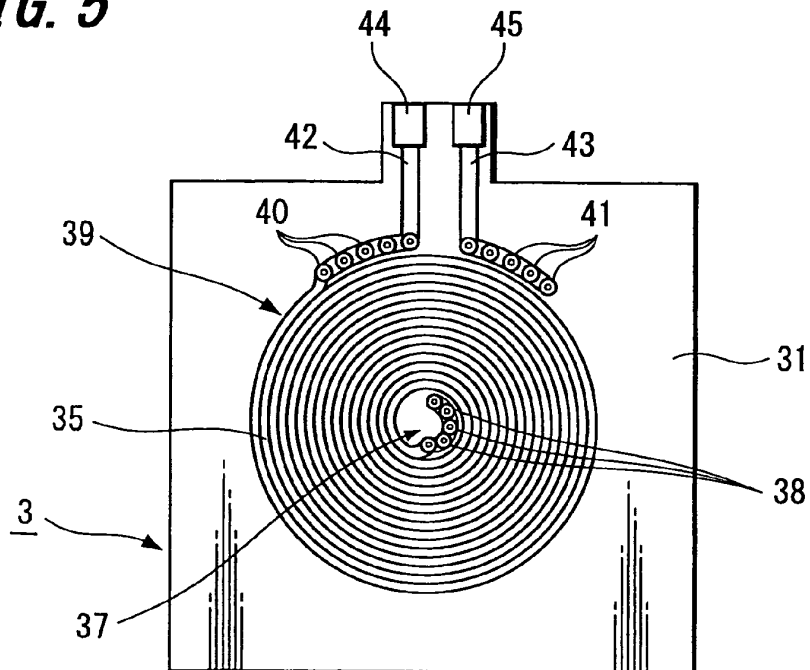


FIG. 6B

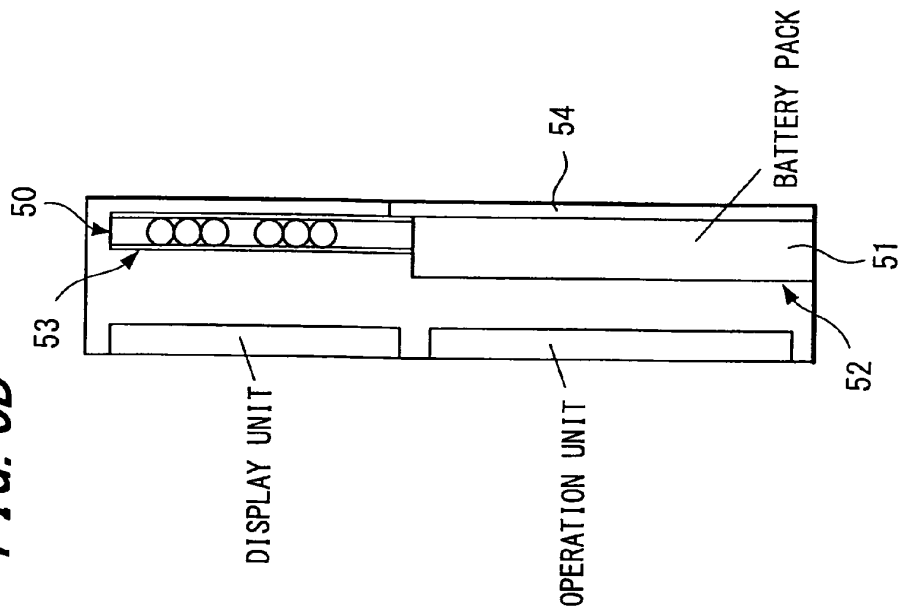
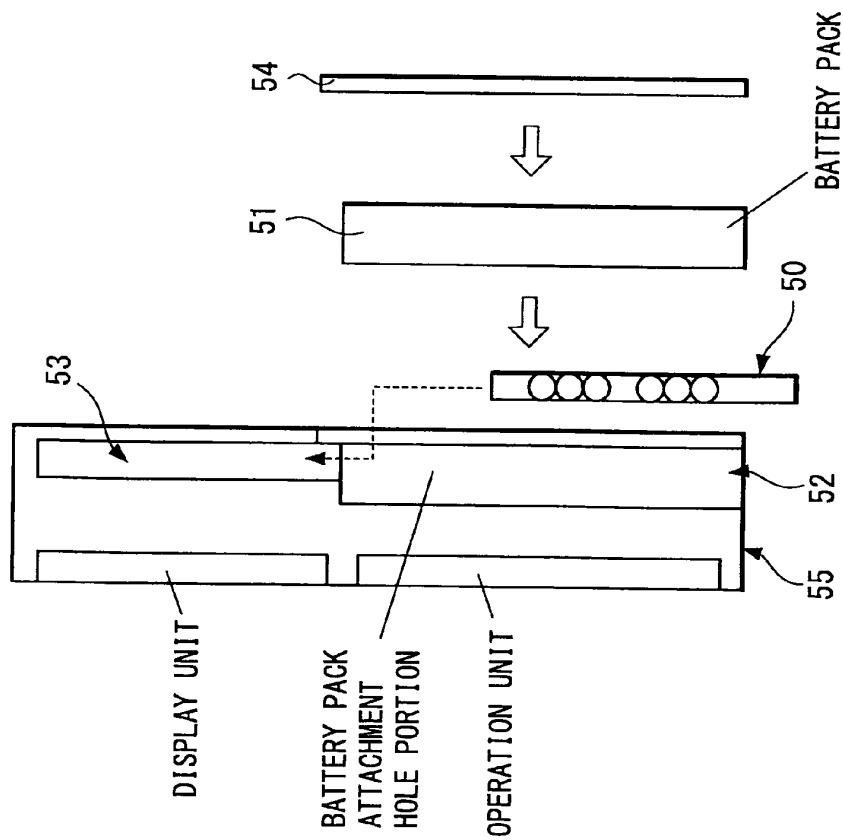


FIG. 6A



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