

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

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(45) **Date of Patent:** **May 20, 2008**

- (54) **MULTILAYER LAMINATED CIRCUIT BOARD**
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- (73) Assignee: **Tamura Corporation**, Tokyo (JP)
- (\*) 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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- (51) **Int. Cl.**  
**H01F 5/00** (2006.01)

- (52) **U.S. Cl.** ..... 336/200; 336/223; 336/232
- (58) **Field of Classification Search** ..... 336/200,  
336/232, 223  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 6,573,821 B2 \* 6/2003 Peels et al. .... 336/200
- 6,917,274 B2 \* 7/2005 Hong et al. .... 336/200
- 6,998,951 B2 \* 2/2006 Itou et al. .... 336/200

\* cited by examiner

Primary Examiner—Anh T Mai

(57) **ABSTRACT**

A multi-layer laminated circuit board 10A of the present invention is formed by laminating together a multi-layer transformer 10, a multi-layer part sheet 30 formed with a multi-layer part, and a wiring sheet 50 formed with a circuit pattern. The multi-layer transformer 10 is incorporated into the multi-layer laminated circuit board 10A, and therefore a package for the multi-layer transformer 10 is omitted, and the wiring between the multi-layer transformer 10 and other components is reduced to a minimum.

**13 Claims, 14 Drawing Sheets**

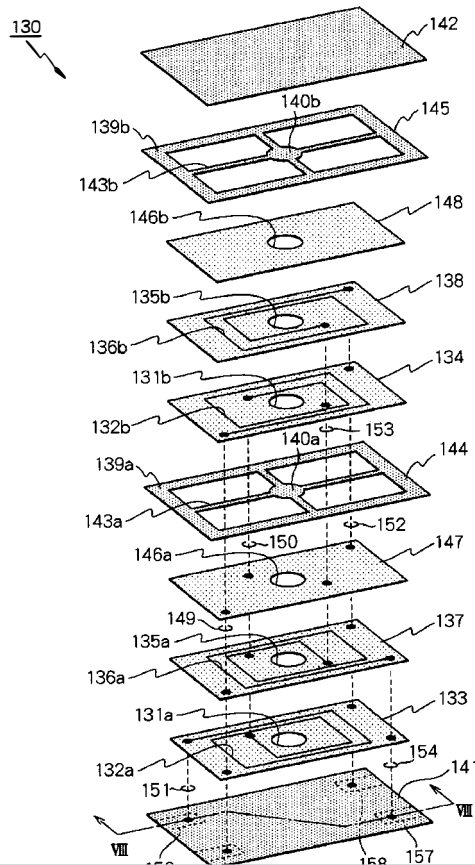
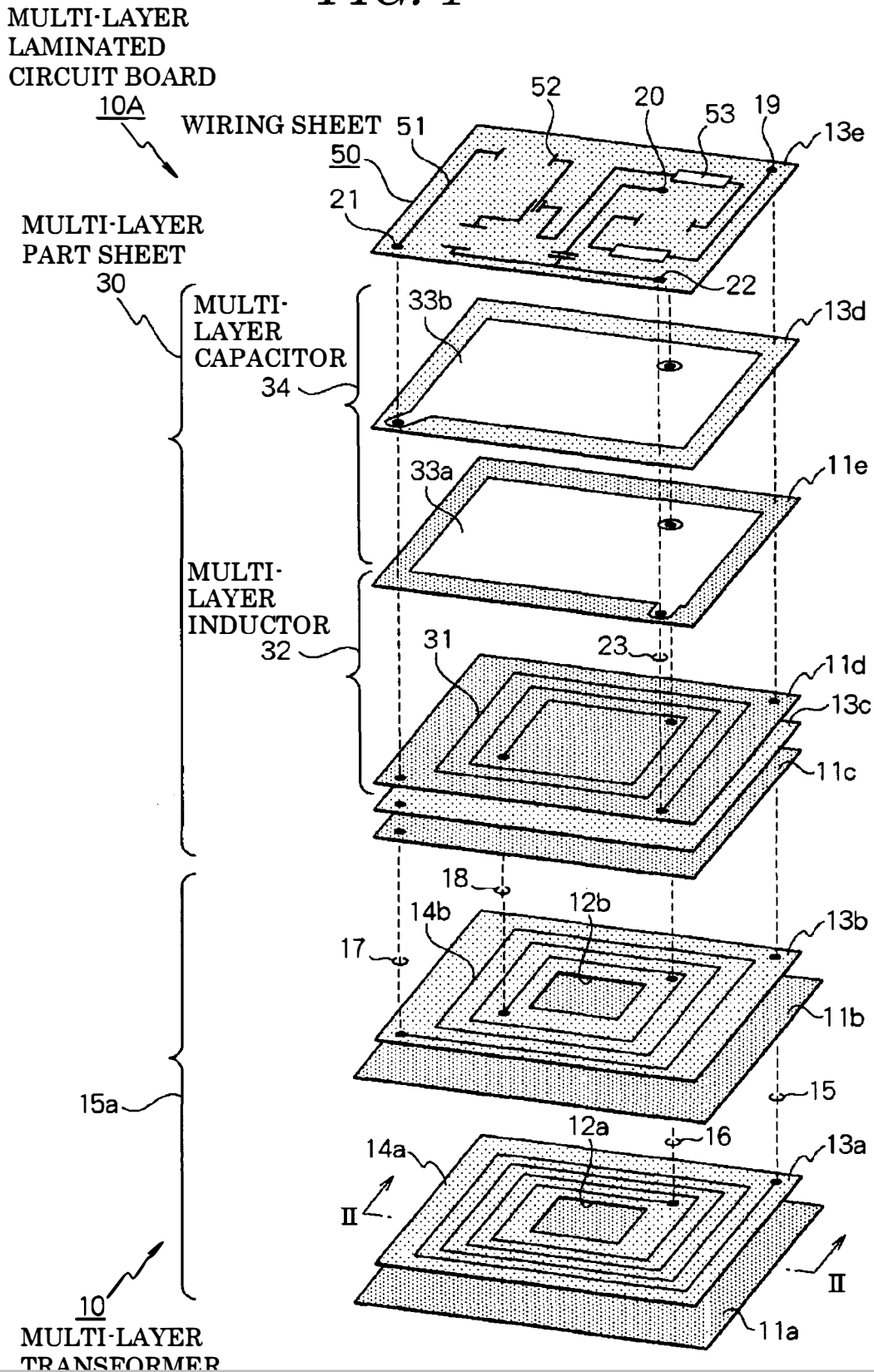


FIG. 1



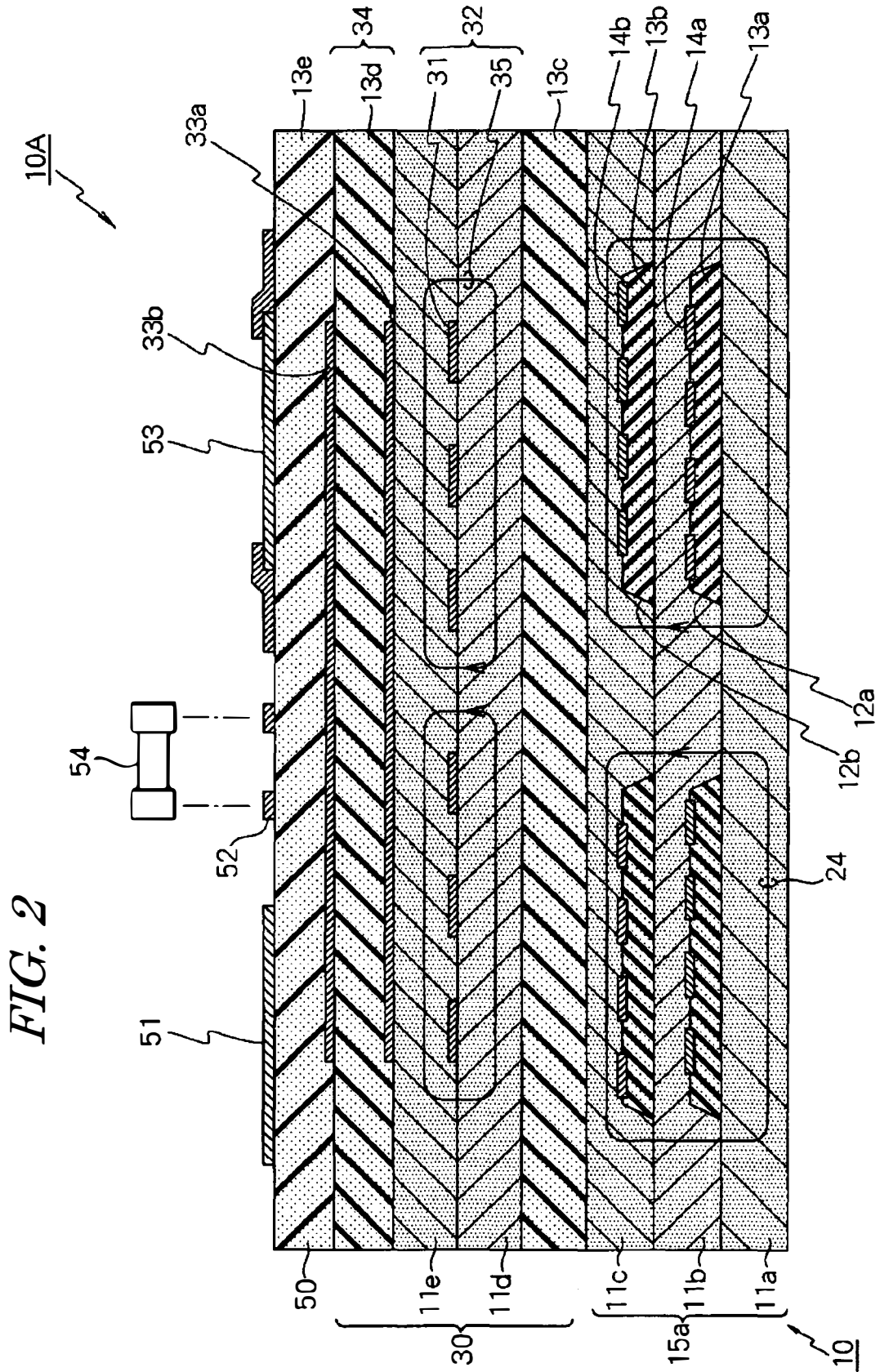


FIG. 2

FIG. 3

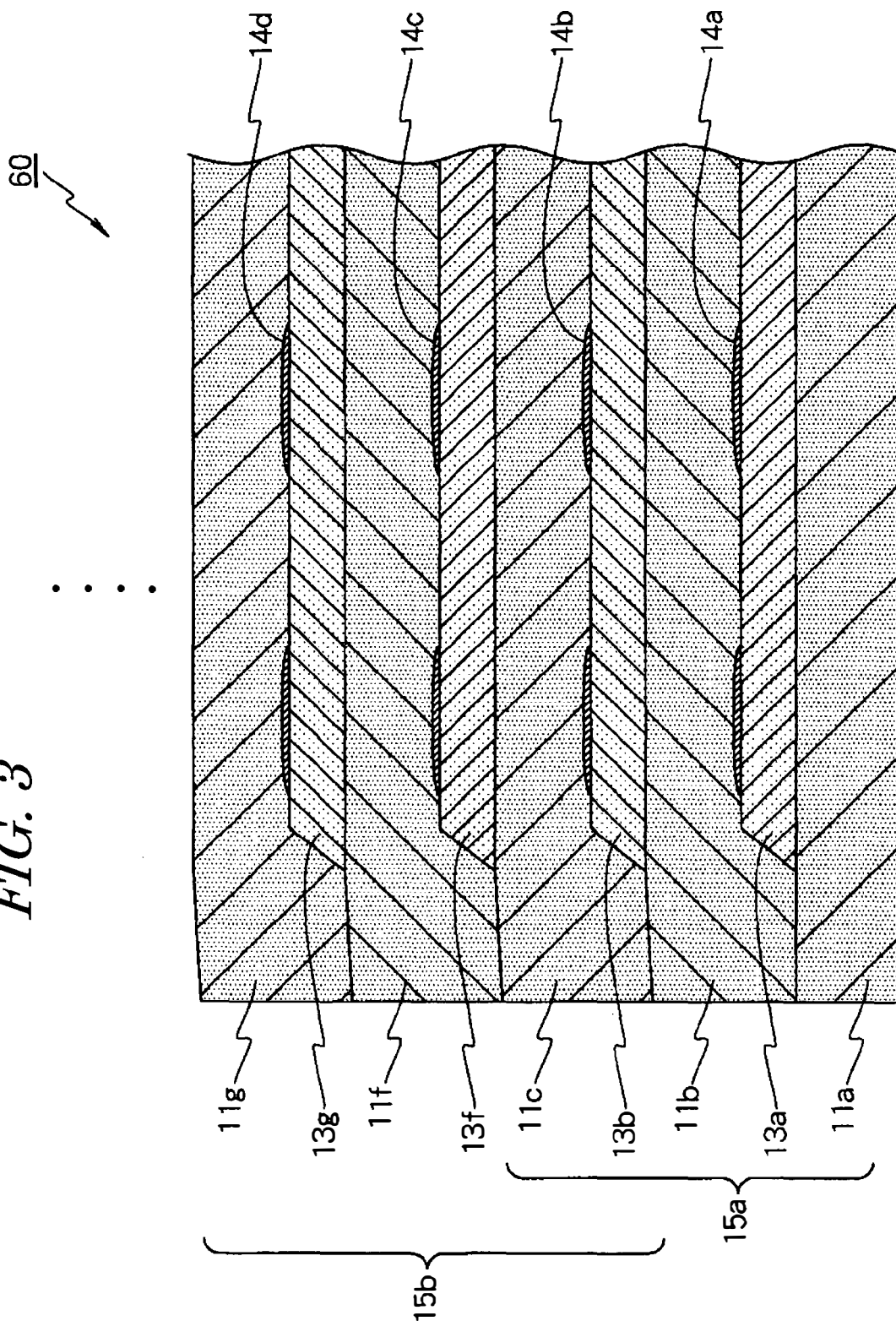
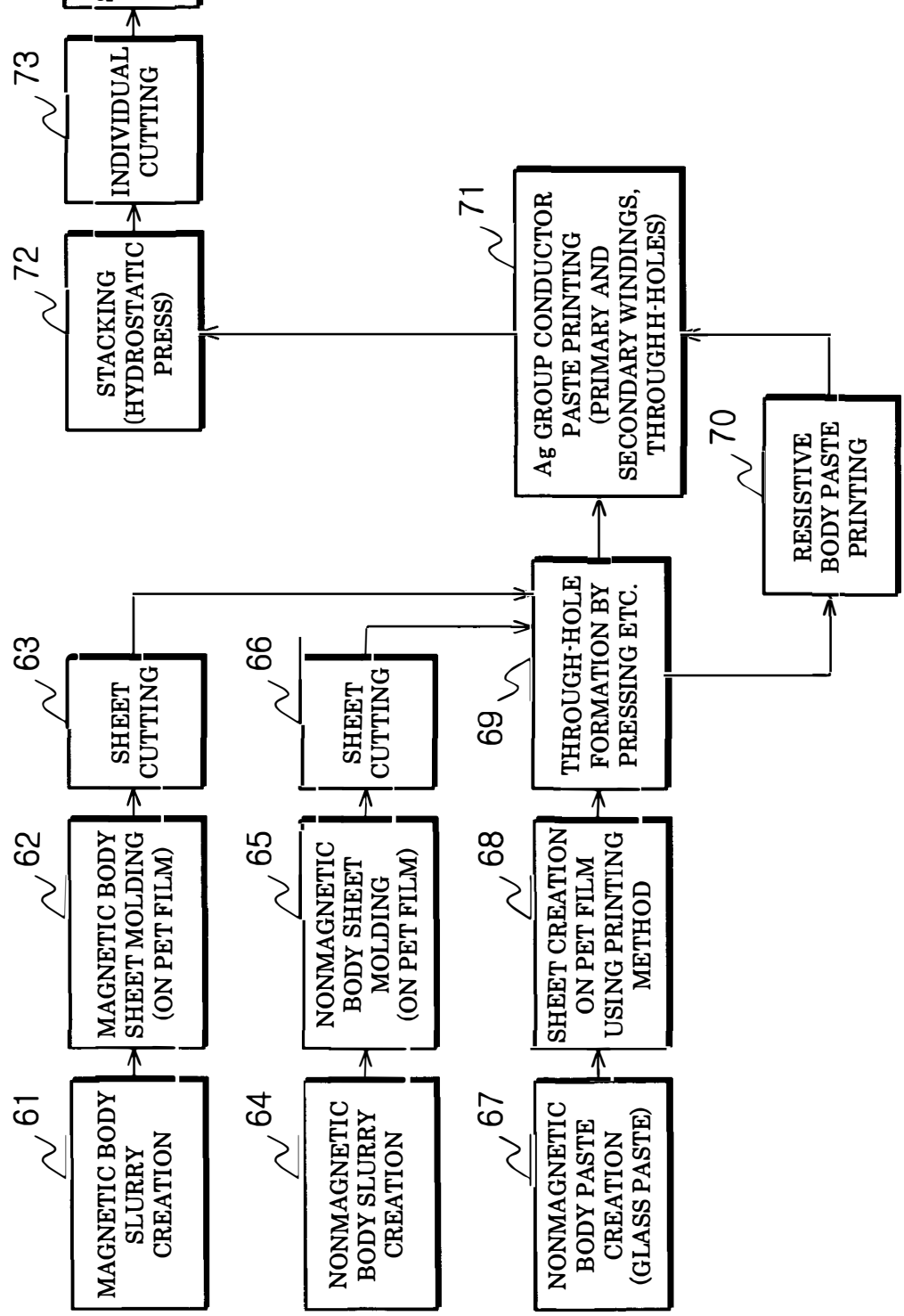


FIG. 4



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