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Tagami et al.

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(54) **MULTI-LAYERED WIRING LAYER AND METHOD OF FABRICATING THE SAME**

(75) Inventors: **Masayoshi Tagami**, Tokyo (JP); **Yoshihiro Hayashi**, Tokyo (JP)

(73) Assignee: **NEC Corporation**, Tokyo (JP)

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(30) **Foreign Application Priority Data**

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(52) **U.S. Cl.** **257/751**; 257/762
(58) **Field of Search** 257/751, 752, 257/753, 758, 762, 773; 438/626, 627, 628, 643, 644, 645

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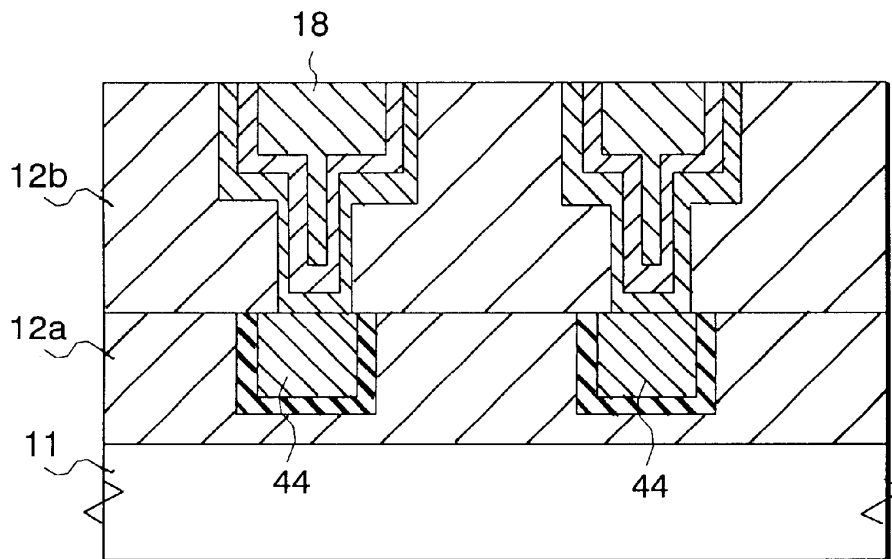* cited by examiner

Primary Examiner—Tom Thomas
Assistant Examiner—Hung Kim Vu
(74) *Attorney, Agent, or Firm*—Scully, Scott, Murphy & Presser

(57) **ABSTRACT**

There is provided a barrier film preventing diffusion of copper from a copper wiring layer formed on a semiconductor substrate. The barrier film has a multi-layered structure of first and second films wherein the first film is composed of crystalline metal containing nitrogen therein, and the second film is composed of amorphous metal nitride. The barrier film is constituted of common metal atomic species. The barrier film prevents copper diffusion from a copper wiring layer into a semiconductor device, and has sufficient adhesion characteristic to both a copper film and an interlayer insulating film.
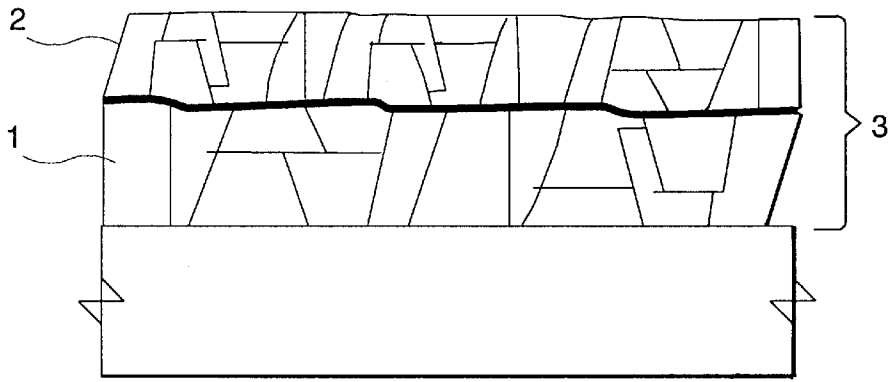
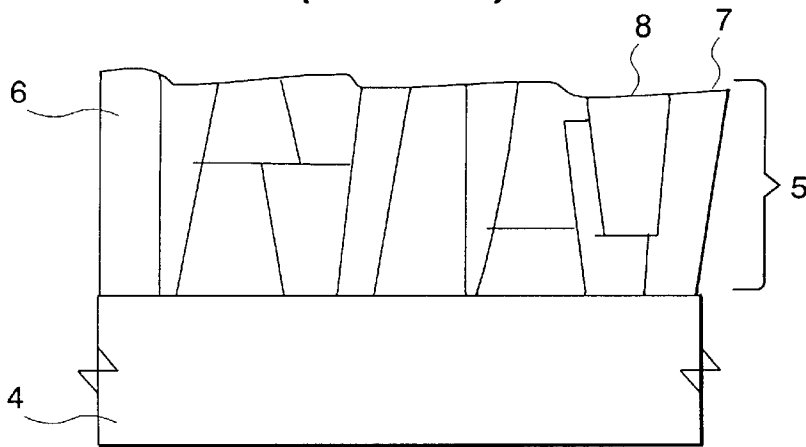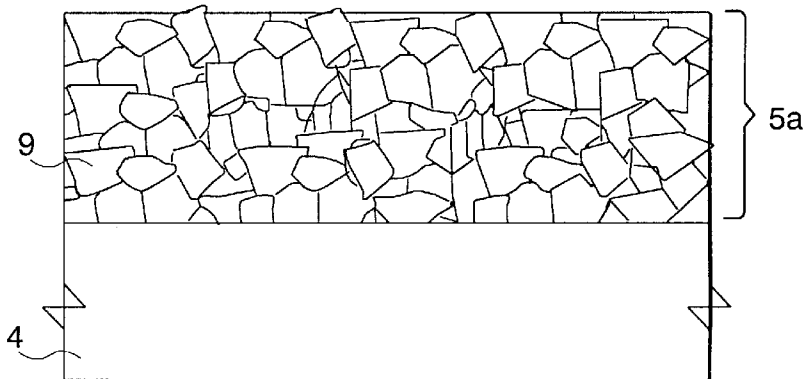**10 Claims, 20 Drawing Sheets**

FIG. 1
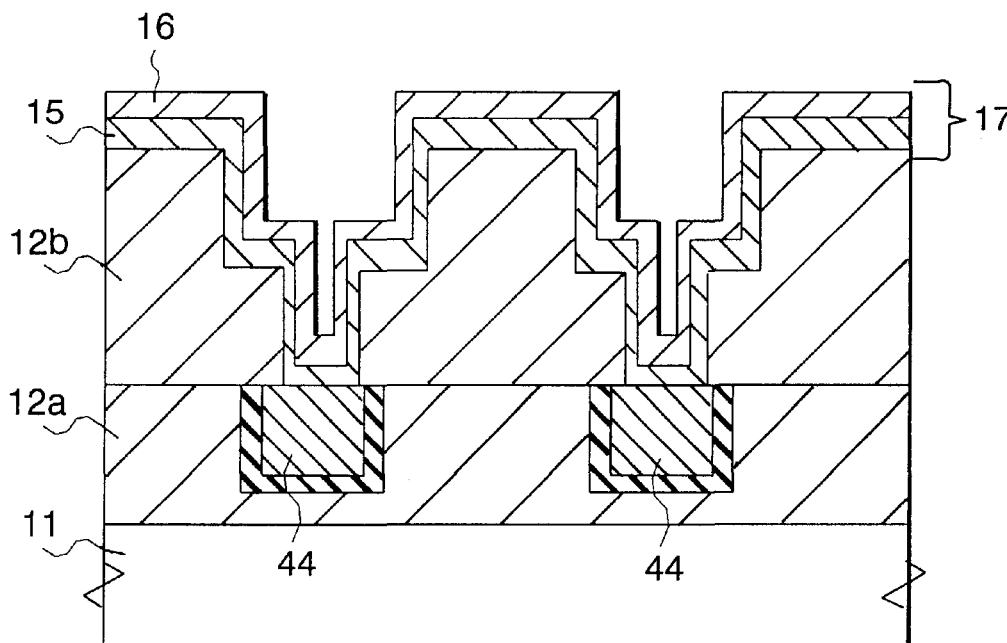*(Prior Art)*

FIG. 2
(Prior Art)

FIG. 3
(Prior Art)

FIG. 4A

FIG. 4B

18

16

15

12b

12a

11

17

44   44

FIG. 4C

18

12b

12a

11

44   44
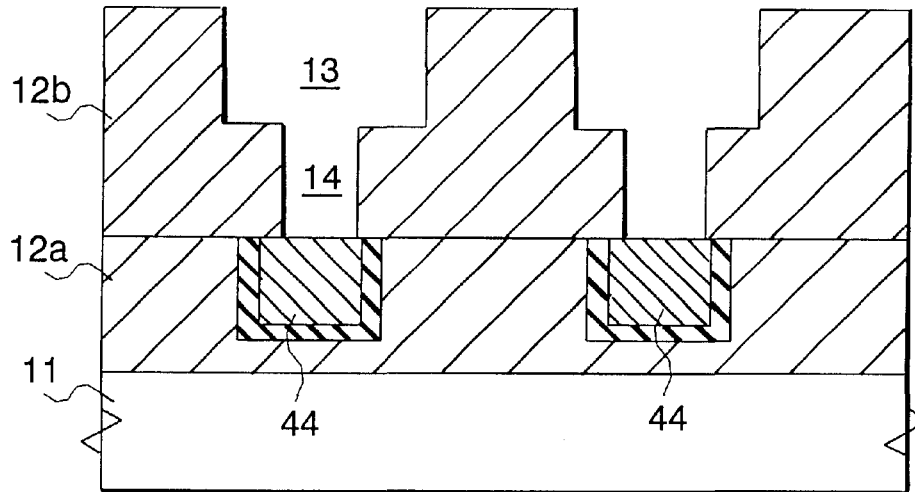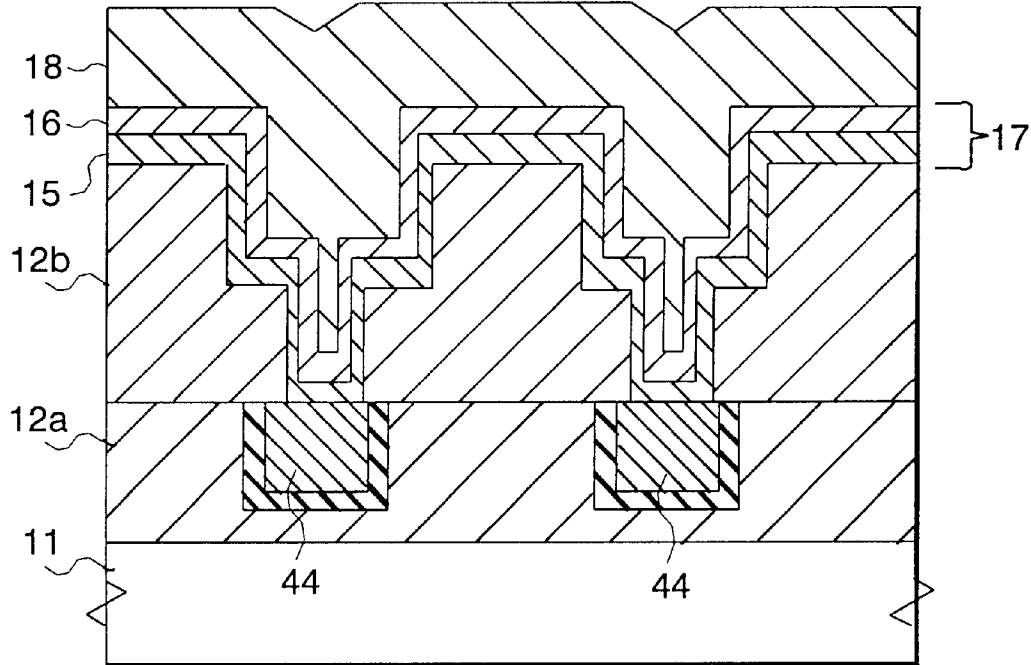
FIG. 4D

FIG. 5

FIG. 6

DOCKET ALARM
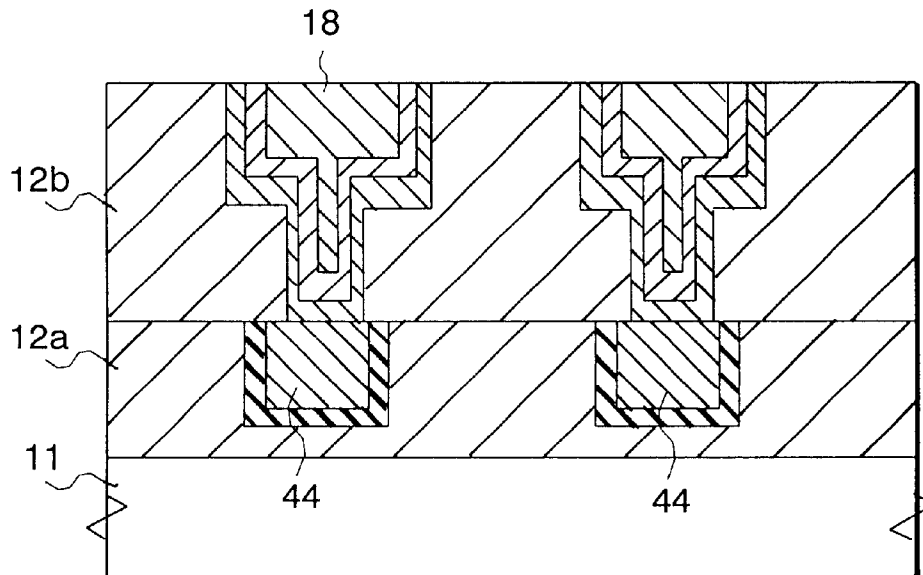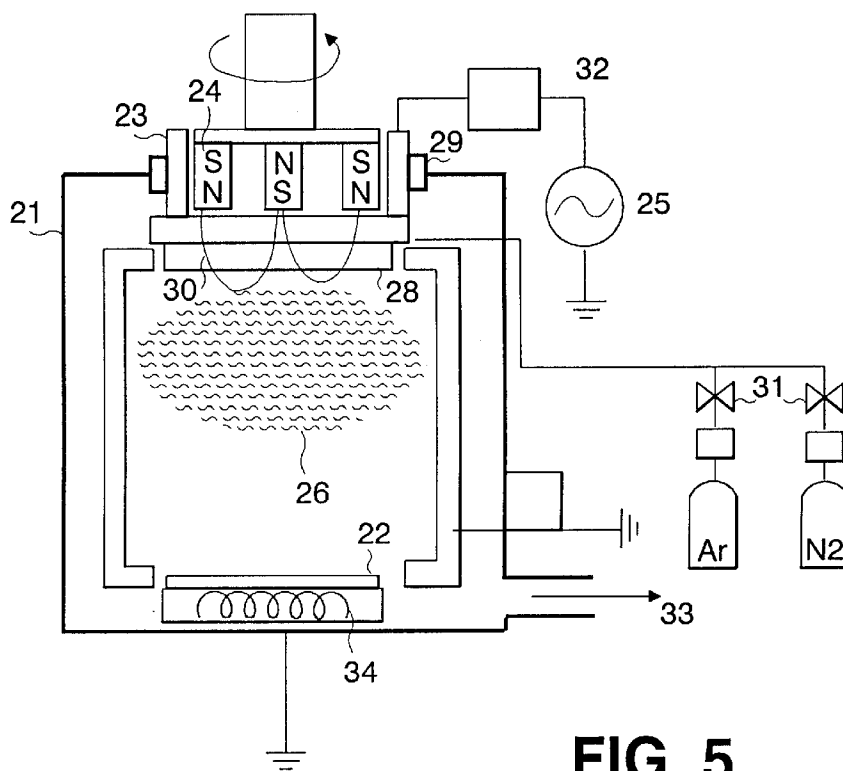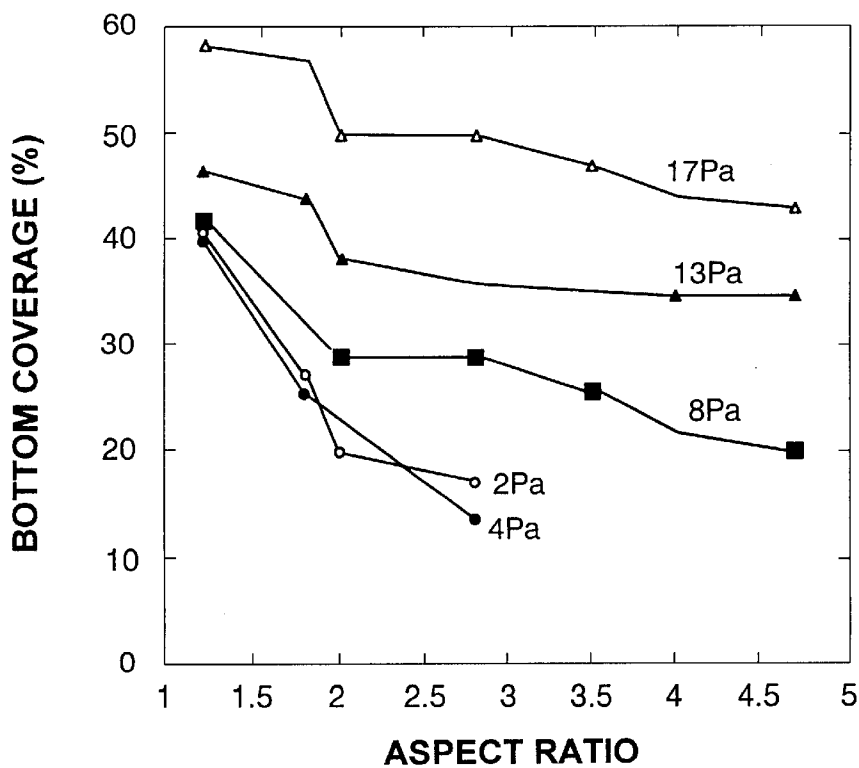
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