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

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(54) **LIQUID CRYSTAL DISPLAY DEVICE WITH SPACERS FORMED ON A PLANARIZING FILM DISPOSED OVER COLOR FILTERS**

(56) **References Cited**

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(73) Assignee: **Hitachi, Ltd., 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 0 days.

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(21) Appl. No.: **10/228,320**

*Primary Examiner*—Huyen Ngo

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(74) *Attorney, Agent, or Firm*—Reed Smith LLP; Stanley P. Fisher, Esq.; Juan Carlos A. Marquez, Esq.

(65) **Prior Publication Data**

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(57) **ABSTRACT**

**Related U.S. Application Data**

(63) Continuation of application No. 09/542,870, filed on Apr. 4, 2000.

A liquid crystal display device includes a pair of opposing substrates, a liquid crystal layer sandwiched between the opposing substrates, plural scanning signal lines disposed on one of the opposing substrates, plural video signal lines intersecting the plural scanning signal lines and disposed on the one of the opposing substrates, plural pixels arranged in a matrix formed by the plural scanning signal lines and the plural video signal lines, plural spacers for establishing a spacing between the opposing substrates, color filters disposed on another of the opposing substrates, and a planarizing film disposed over the color filters.

(30) **Foreign Application Priority Data**

Apr. 14, 1999	(JP)	11-106382
Apr. 14, 1999	(JP)	11-106383

(51) **Int. Cl.**<sup>7</sup> ..... **G02F 1/1343; G02F 1/1339**

(52) **U.S. Cl.** ..... **349/156; 349/106; 349/139**

(58) **Field of Search** ..... **349/106, 139, 349/156**

**5 Claims, 25 Drawing Sheets**

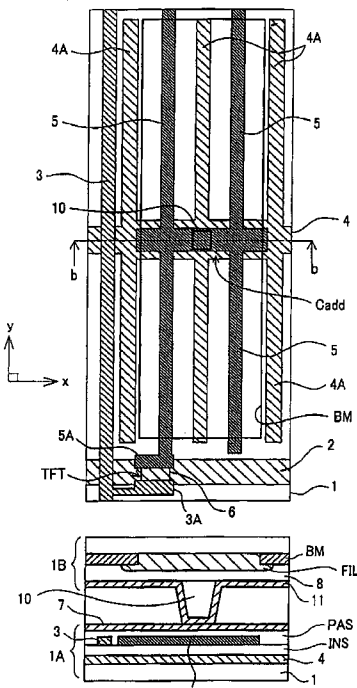


FIG. 1A

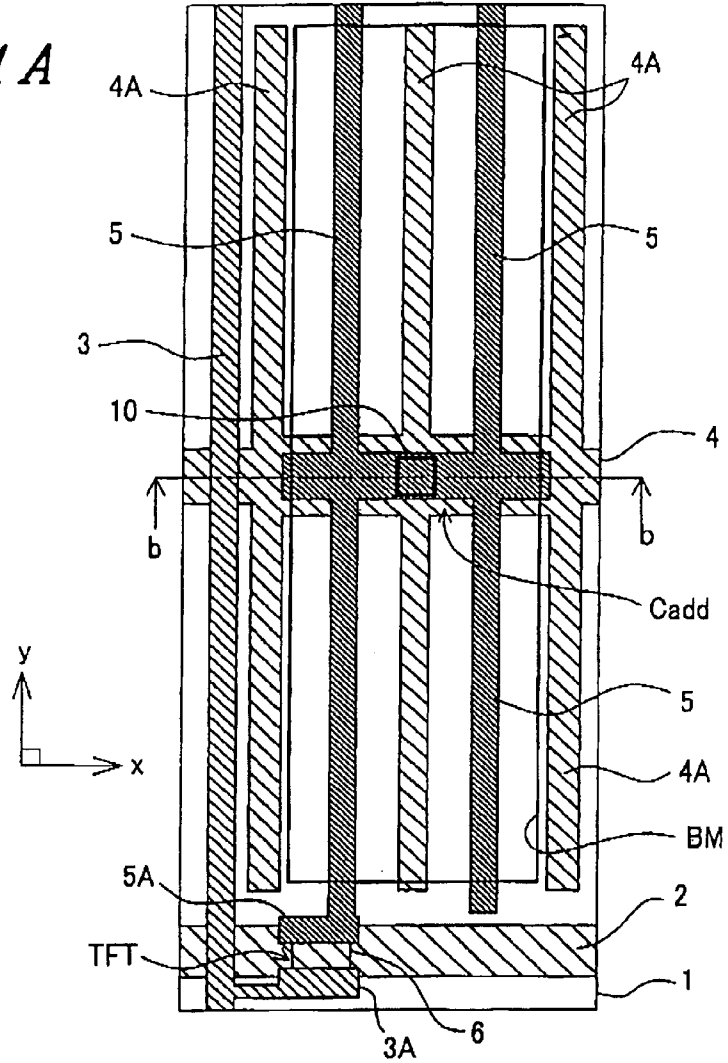
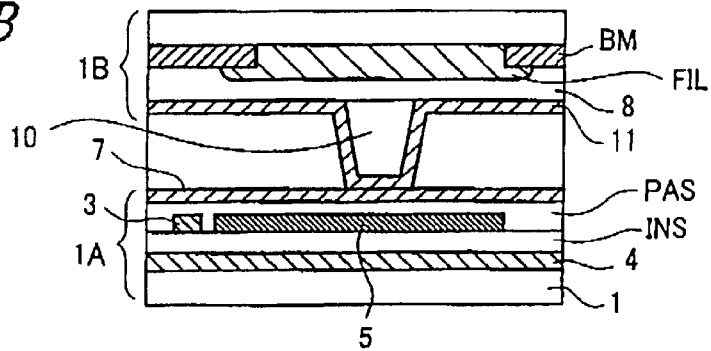
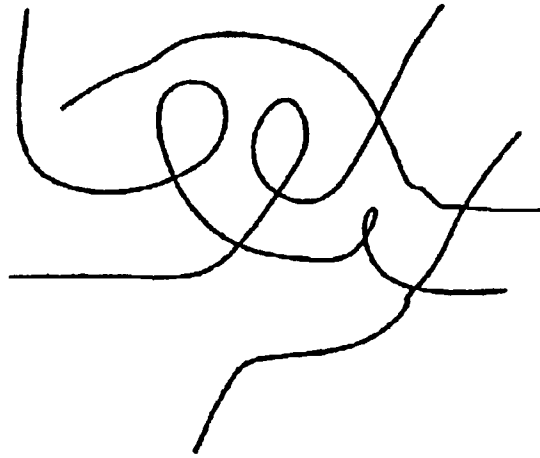


FIG. 1B



*FIG. 2*



*FIG. 3*

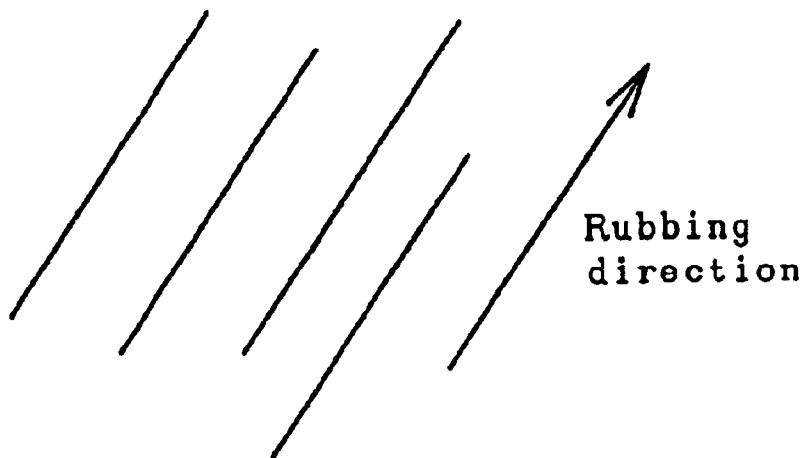


FIG. 4A

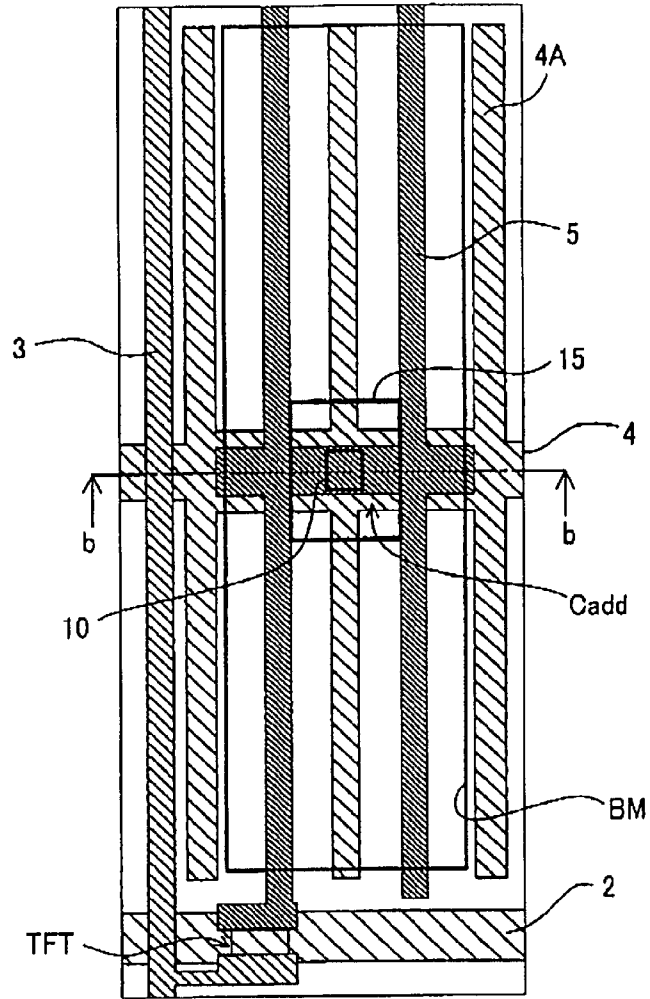


FIG. 4B

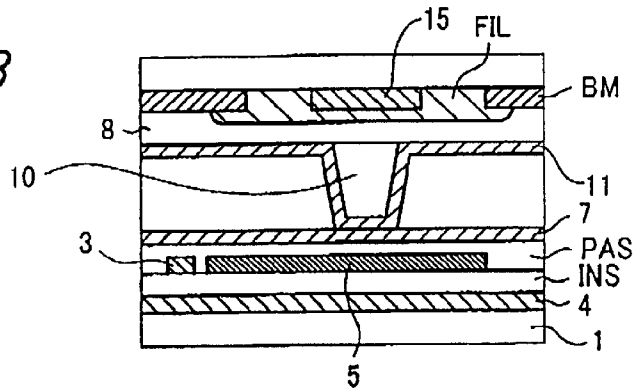
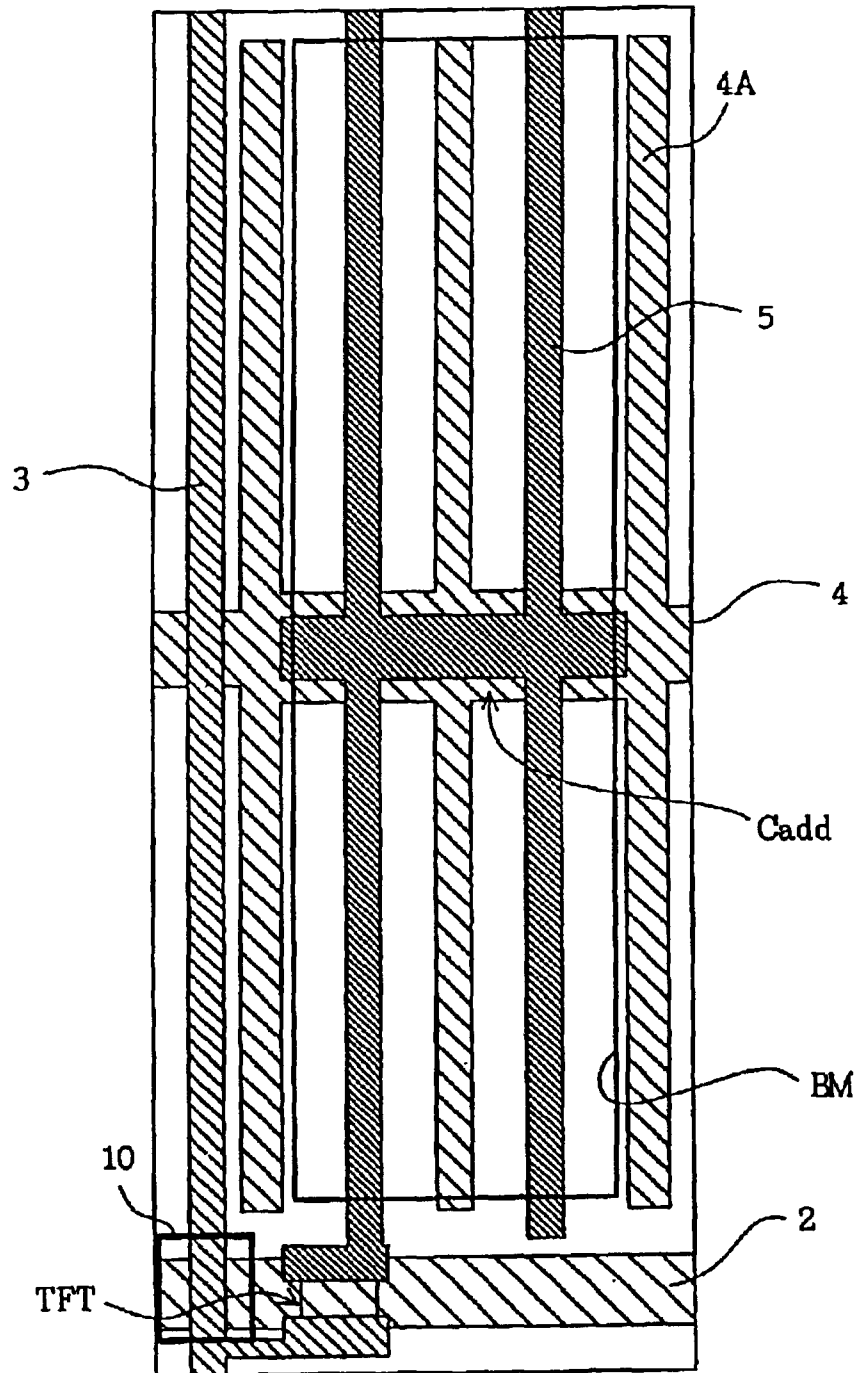


FIG. 5



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