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CMI CORP. v. PATENT OF YOSHIHARU HIRAKATA and  
SHUNPEI YAMAZAKI

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US005995189A

# United States Patent [19] Zhang

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[54] LIQUID-CRYSTAL DISPLAY DEVICE

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[73] Assignee: Semiconductor Energy Laboratory Co., Ltd., Kanagawa-ken, Japan

[21] Appl. No.: 08/768,066

[22] Filed: Dec. 16, 1996

[30] Foreign Application Priority Data

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[51] Int. Cl.<sup>6</sup> ..... G02F 1/1339; G02F 1/1345; G02F 1/1333

[52] U.S. Cl. .... 349/153; 349/151; 349/122; 345/206

[58] Field of Search ..... 349/153, 151, 349/122, 152; 345/206

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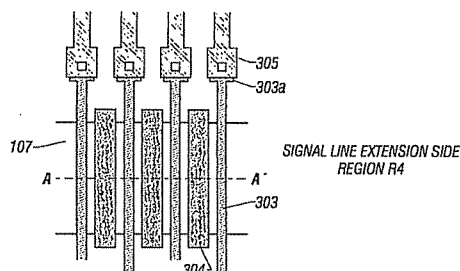
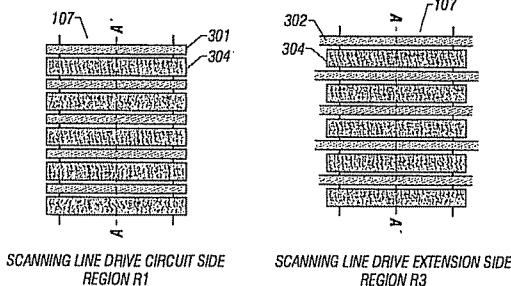
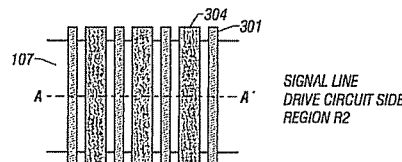
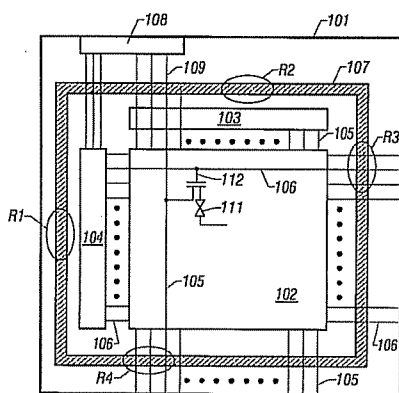
Primary Examiner—Tiep H. Nguyen

Attorney, Agent, or Firm—Fish &amp; Richardson

[57] ABSTRACT

The present invention related to unifying steps of sealing material so that the yield and the reliability of a liquid-crystal display device become high. A starting film of scanning lines is patterned so that prismatic dummy wirings 301 for the first layer which are not electrically connected are formed in regions R1 and R2, and wirings 302 extending from the pixel section are formed in a region R3, and wirings 303 having connection end portions 303a are formed in a region R4. After an interlayer insulation film is formed on those surface, the starting film of the signal lines is patterned so that the dummy wirings 304 for the second layer are formed to embed the gaps between the wirings 301 to 303, and also the wirings 305 and the wirings 303 which extend from the pixel portion are connected to each other. As a result, the cross-sectional structure along the line A-A' of the sealing material formation region 107 can be unified.

23 Claims, 12 Drawing Sheets



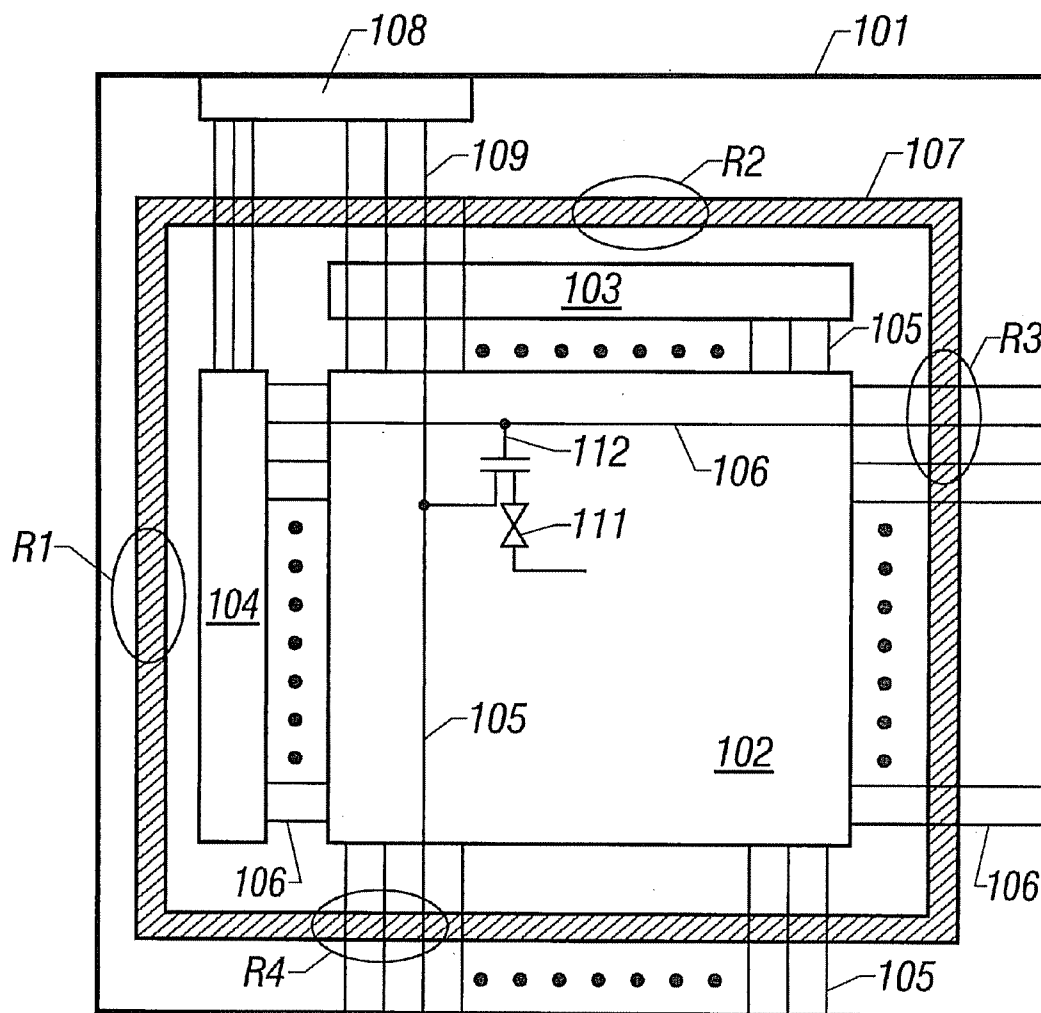


FIG. 1

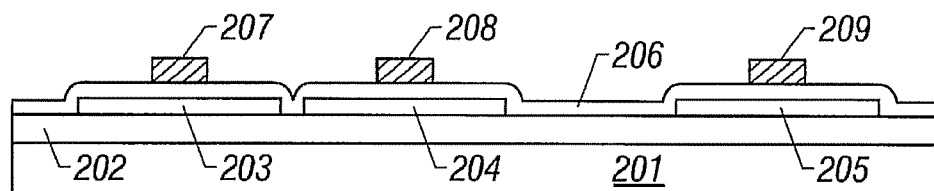


FIG. 2A

DRIVER CIRCUIT TFT → ← PIXEL TFT

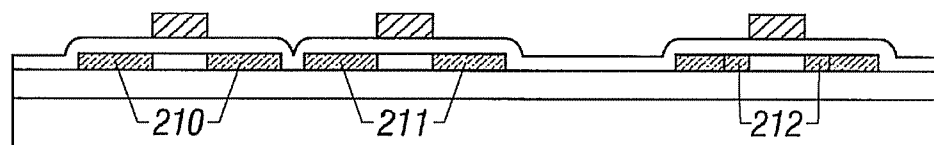


FIG. 2B

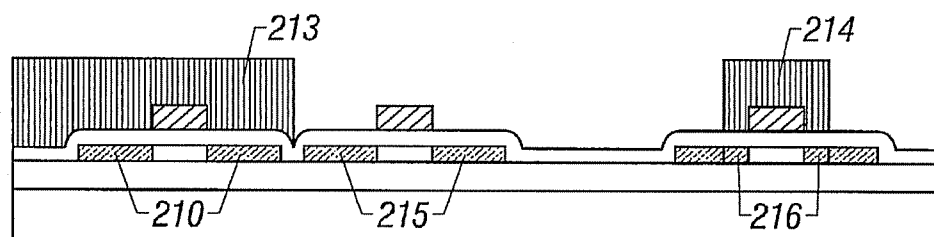


FIG. 2C

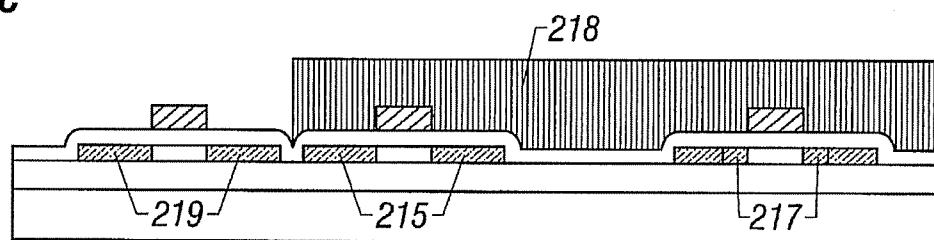


FIG. 2D

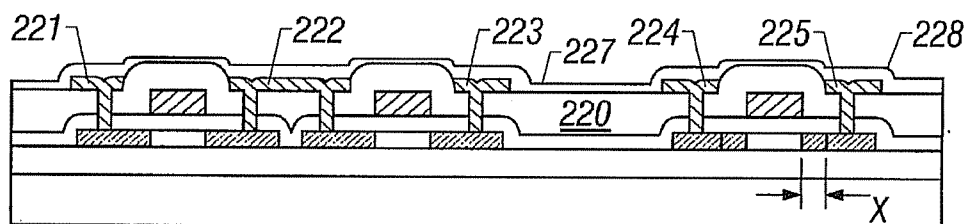


FIG. 2E

DRIVER CIRCUIT TFT → ← PIXEL TFT

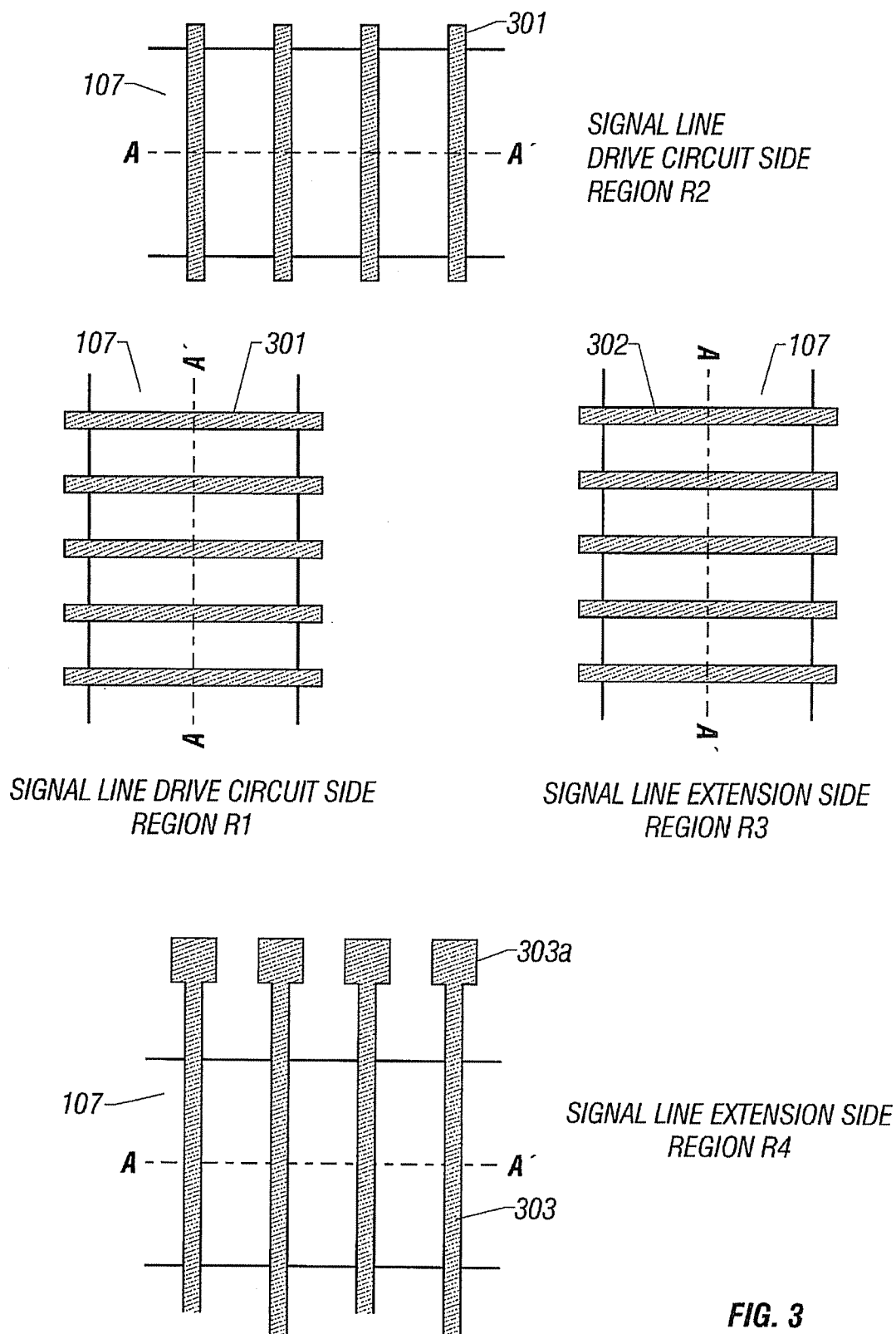


FIG. 3

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