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# United States Patent [19]

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**Koma**

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[54] **LIQUID CRYSTAL DISPLAY HAVING ORIENTATION CONTROL ELECTRODES FOR CONTROLLING LIQUID CRYSTAL ORIENTATION**

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[73] Assignee: **Sanyo Electric Co., Ltd.**, Osaka, Japan  
[21] Appl. No.: **263,871**  
[22] Filed: **Jun. 21, 1994**

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### [30] Foreign Application Priority Data

Jun. 24, 1993 [JP] Japan ..... 5-153671  
Jul. 8, 1993 [JP] Japan ..... 5-169087  
Nov. 25, 1993 [JP] Japan ..... 5-295731  
Apr. 28, 1994 [JP] Japan ..... 6-092283

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*Attorney, Agent, or Firm*—Loeb & Loeb LLP

[51] **Int. Cl.<sup>6</sup>** ..... **G02F 1/1343; G02F 1/135; G02F 1/1337**  
[52] **U.S. Cl.** ..... **349/143; 349/42; 349/116; 349/123**  
[58] **Field of Search** ..... 359/54, 59, 75, 359/87, 72

### [57] ABSTRACT

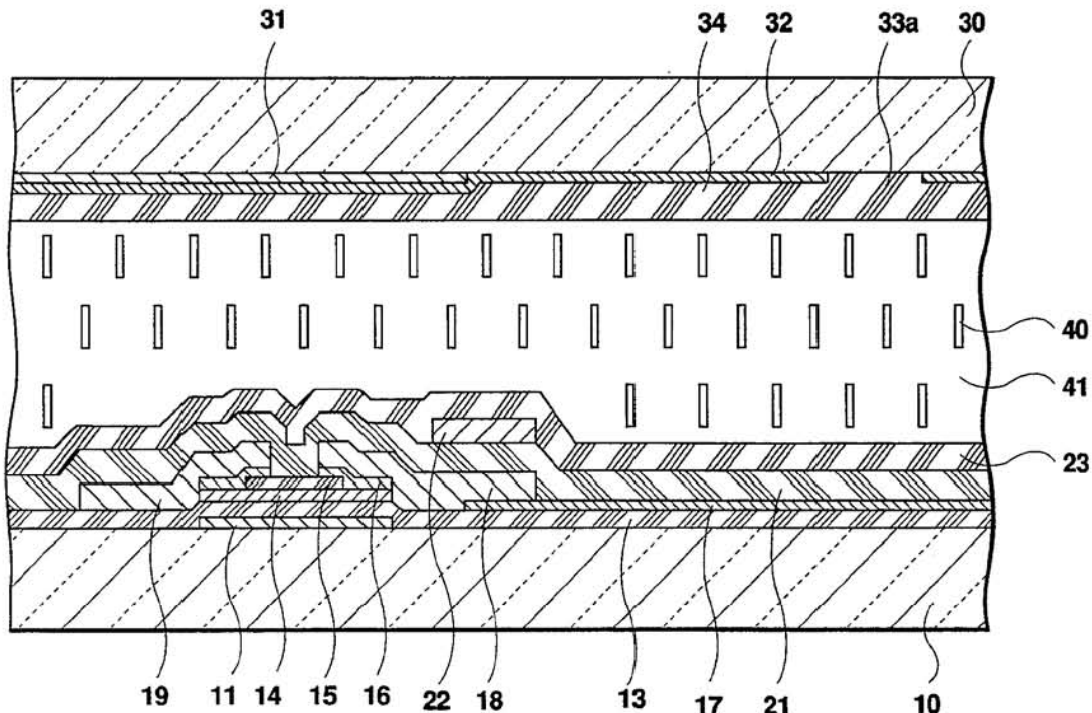
In a liquid crystal display of TFT active matrix type, the direction of orientation vectors of liquid crystal molecules are controlled for providing a wide viewing angle and preventing occurrence of disclination from making a rough display screen. With an orientation control electrode disposed on the periphery of a display electrode, an orientation control window, an electrode nonexistent portion, is formed in a common electrode and the potential difference between the orientation control electrode and the common electrode is set smaller than that between the display electrode and the common electrode. Alternatively, an orientation control window is likewise formed in the display electrode and the potential difference between the orientation control electrode, and the common electrode is set larger than that between the display electrode and the common electrode.

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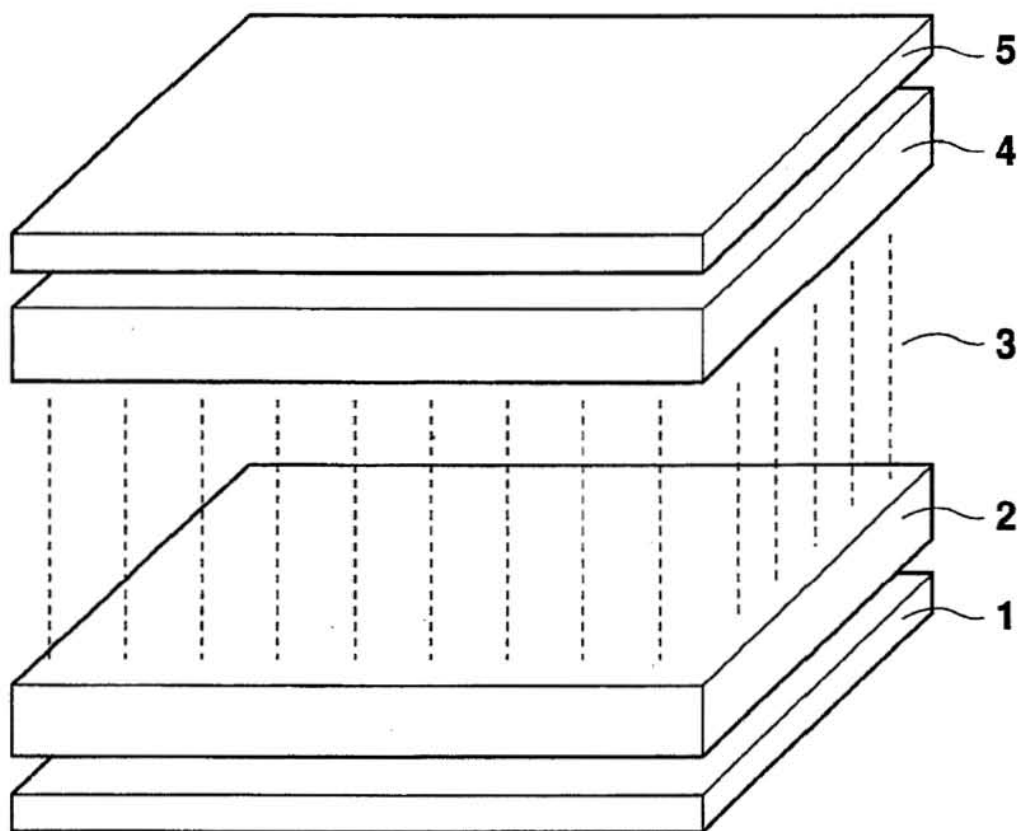
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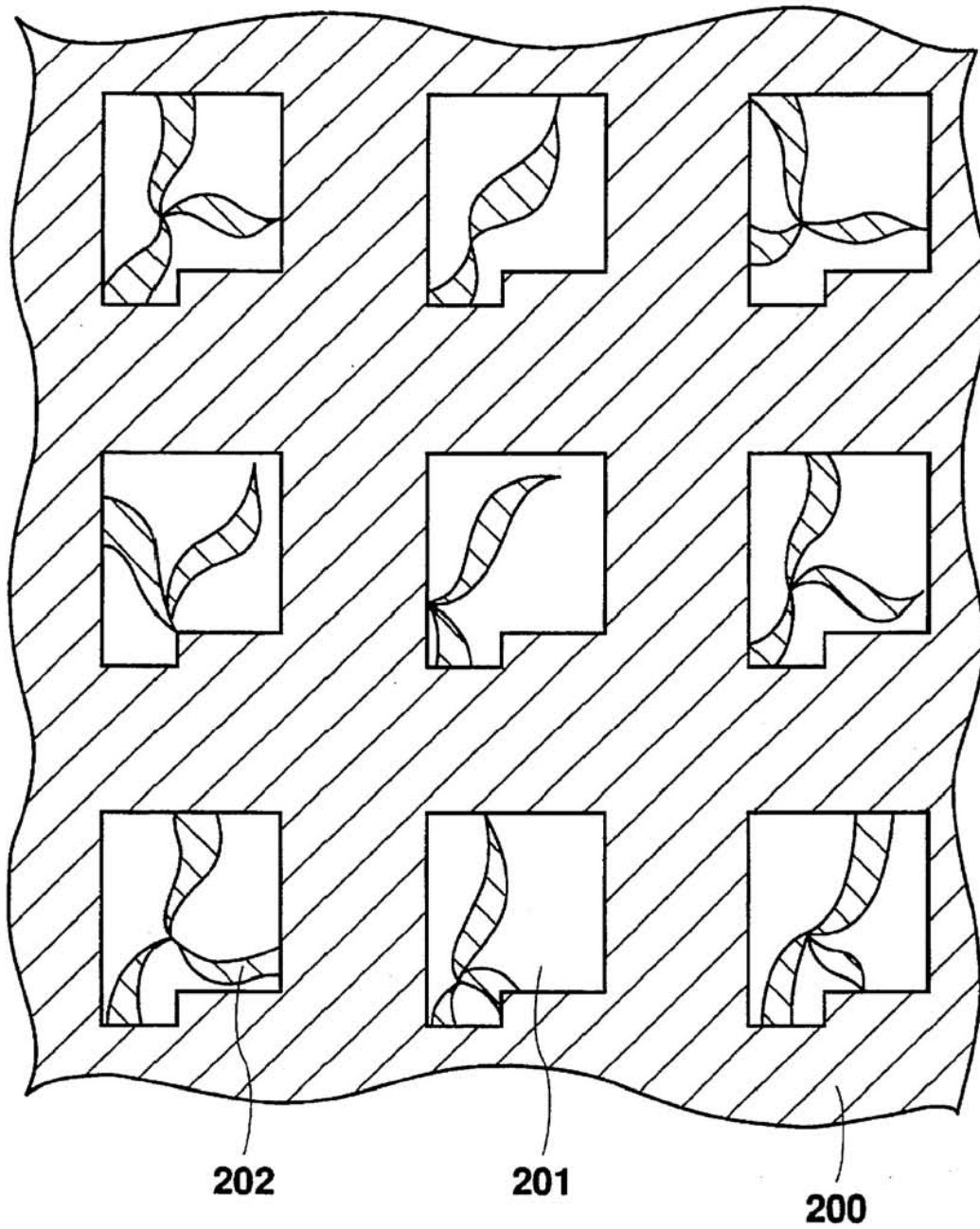
**22 Claims, 14 Drawing Sheets**



SHARP EXHIBIT 1014



**Fig. 1 PRIOR ART**



**Fig. 2 PRIOR ART**

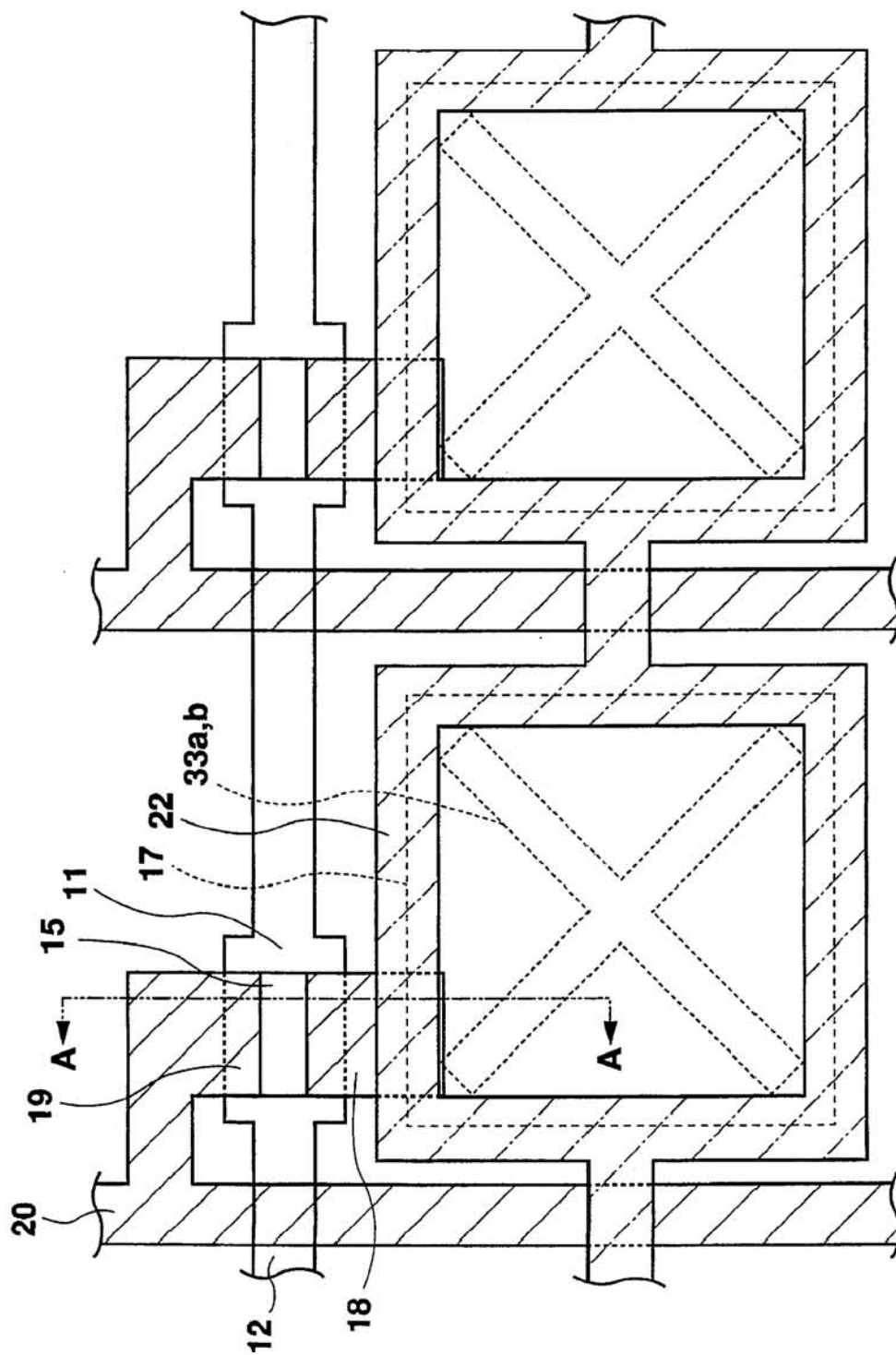


Fig. 3

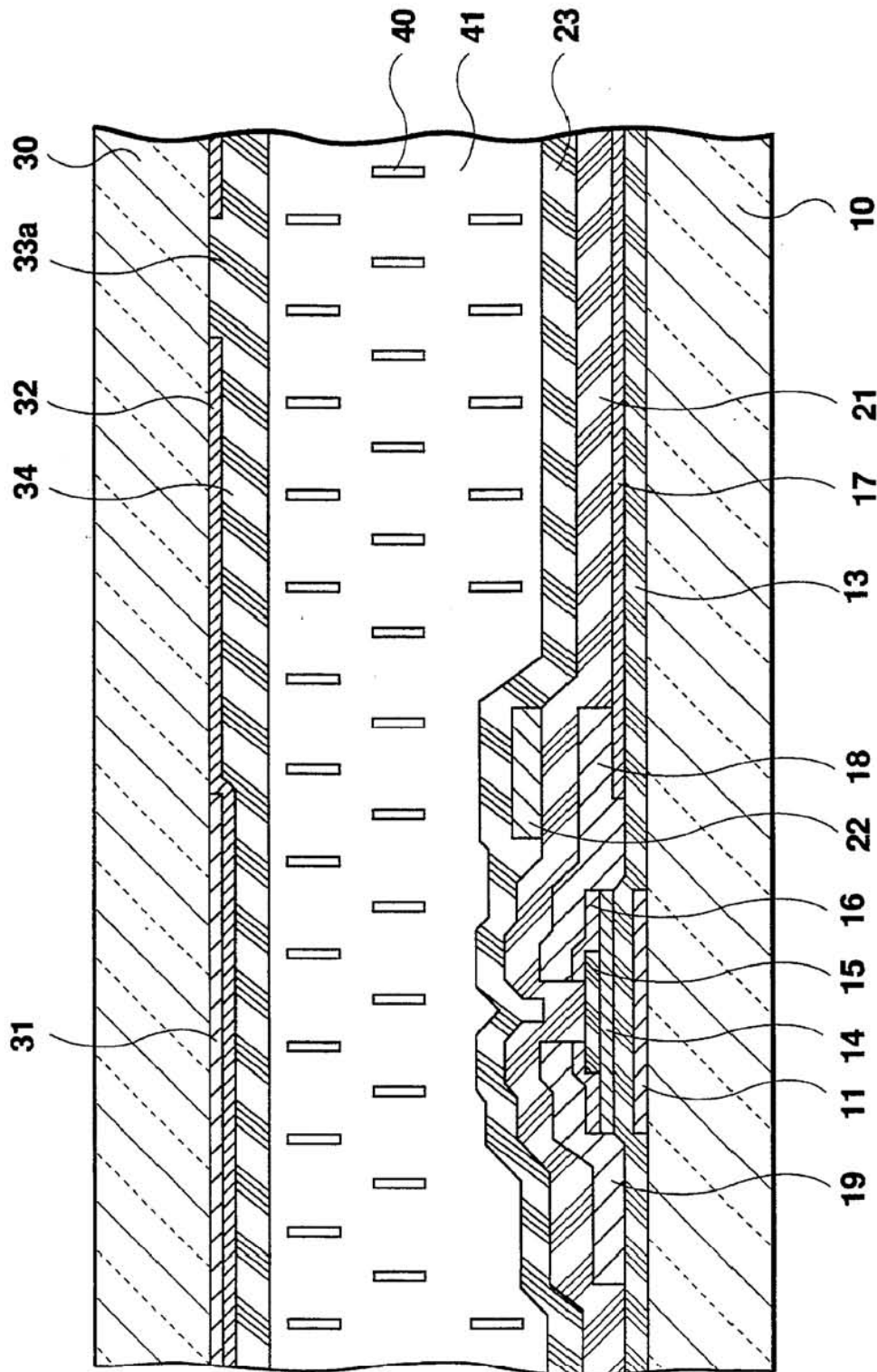


Fig. 4

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