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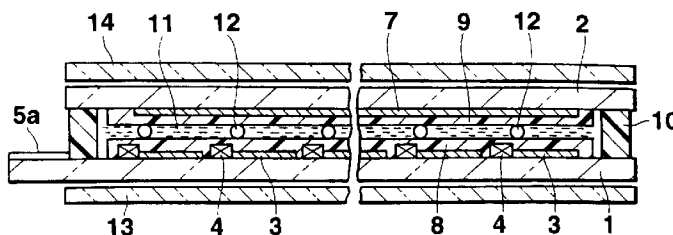
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(54) **Liquid crystal display apparatus using liquid crystal having ferroelectric phase and method of driving liquid crystal display device using liquid crystal having ferroelectric phase**

(57) In a TFT liquid crystal display device using a DHF liquid crystal (11), the DHF liquid crystal (11) is alignable to a first alignment state in which liquid crystal molecules are substantially aligned to a first direction, to a second alignment state in which the liquid crystal molecules are substantially aligned to a second direction and to an arbitrary intermediate alignment state between the first and second alignment states, in accordance with a voltage applied between the pixel electrodes (3) and the opposing electrode (7). One of a pair of polarization plates (13, 14) has an optical axis

set in substantially an intermediate direction between the first and second directions. The optical axis of the other polarization plate is set perpendicular to the optical axis of the former polarization plate. A plurality of pulses having voltages corresponding to a display gradation and whose polarities change frame by frame are applied to the DHF liquid crystal (11) for each pixel in the selection period of that pixel. A single pulse is applied to a pixel in a single frame.



**FIG.1**

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# EUROPEAN SEARCH REPORT

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| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |   |   |
|--|--|---|---|
| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim                                       | CLASSIFICATION OF THE APPLICATION (Int.Cl.6)                |
| X  | EP-A-0 552 045 (SHARP KK) 21 July 1993<br><br>* abstract; page 2; page 3, lines 25-29;<br>page 8, lines 10-40; figures 1,3,4,6,7 *<br>---  | 1-13,<br>17-30  | G09G3/36  |
| A  | WO-A-93 10477 (UNIV COLORADO FOUNDATION)<br>27 May 1993<br>* page 8, last paragraph *<br>---   | 7,9,24,<br>26   |   |
| A  | OPTICAL ENGINEERING,<br>vol. 26, no. 5, May 1987, BELLINGHAM US,<br>pages 373-384, XP002005660<br>J. PATEL ET AL.: "properties and<br>applications of ferroelectric liquid<br>crystals"<br>* section 10 *<br>----- | 12,29   |   |
| The present search report has been drawn up for all claims   |  |   | <b>TECHNICAL FIELDS<br/>SEARCHED (Int.Cl.6)</b><br><br>G09G |
| Place of search<br><b>THE HAGUE</b>  |  | Date of completion of the search<br><b>14 June 1996</b> | Examiner<br><b>Verhoof, P</b>                               |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |  |   |   |

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