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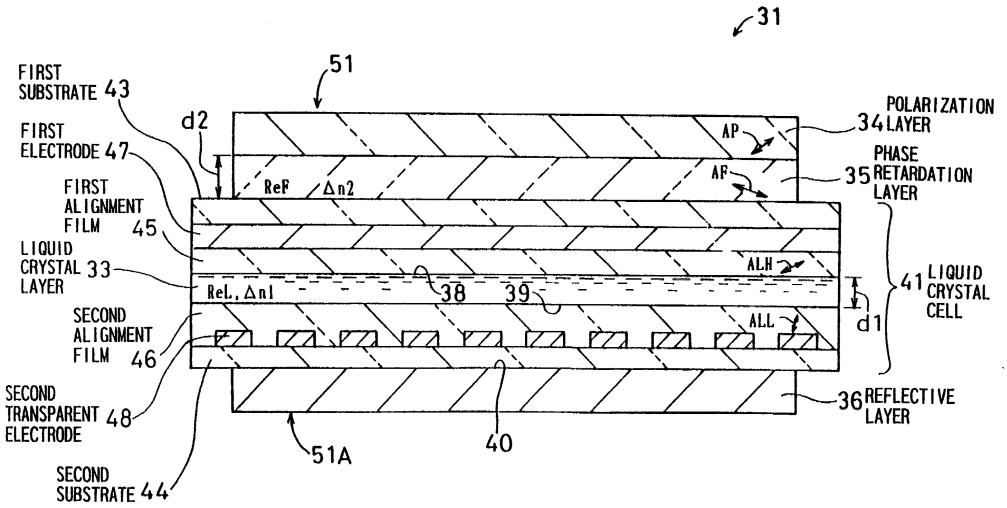
(54) Liquid crystal display device

(57) An object of the invention is to prevent color shifting which occurs in a liquid crystal display device in a white display state as well as in a black display state. The liquid crystal display device (31) includes a single polarization layer (34), a single phase retardation layer (35), a reflective layer (36), and a liquid crystal layer (33), and produces a display by utilizing light reflected from the reflective layer (36). Based on the wavelength λ of incident light, the retardation value ReF of the phase retardation layer (35) is set approximately equal to (1/4 + K/2) λ, and the retardation value ReL of the liquid crystal layer (33) is set approximately equal to (1/2 + L/2) λ (K = 0, 1, 2, ...: L = 0, 1, 2, ...). The angle $\Delta\phi$ that the absorption axis (AP) of the polarization layer makes with the retardation axis (AF) of the phase retardation layer is set as $0° < \Delta\phi < 45°$ or $45° < \Delta\phi < 90°$. This prevents the color shifting in the white display state as well as in the black display state in the liquid crystal display device (31), and improves the contrast.

FIG. 1



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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 6198

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.7)
X Y	US 5 619 356 A (ICHIRO FUKUDA ET AL) 8 April 1997 (1997-04-08) * the whole document *	1-12 13	G02F1/13363 G02F1/139
Y	US 5 920 367 A (SEIKE TAKESHI ET AL) 6 July 1999 (1999-07-06) * column 3, line 16 - column 3, line 28 *	13	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

G02F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	26 September 2002	Lerbinger, K

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 30 6198

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26-09-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5619356 A	08-04-1997	JP 7084252 A	31-03-1995
		CN 1117594 A ,B	28-02-1996
		KR 149744 B1	15-10-1998
US 5920367 A	06-07-1999	JP 10197865 A	31-07-1998

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

专利名称(译)	液晶显示装置		
公开(公告)号	EP1072930A3	公开(公告)日	2002-11-27
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IPC分类号	G09F9/35 G02F1/133 G02F1/1335 G02F1/13363 G02F1/139 G09F9/00		
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优先权	1999206732 1999-07-21 JP		
其他公开文献	EP1072930B1 EP1072930A2		
外部链接	Espacenet		

摘要(译)

本发明的目的是防止在液晶显示装置中发生白色显示状态以及黑色显示状态的色移。液晶显示装置（31）包括单个偏振层（34），单个相位延迟层（35），反射层（36）和液晶层（33），并利用反射光产生显示从反射层（36）。基于入射光的波长λ，相位延迟层（35）的延迟值ReF被设定为近似等于（1/4 + K / 2）λ，并且液晶层（33）的延迟值ReL被设定为大约等于（1/4 + K / 2）λ。设定近似等于（1/2 + L / 2）λ（K = 0,1,2，... : L = 0,1,2，...）。偏振层的吸收轴（AP）与相位延迟层的延迟轴（AF）的角度Δφ设定为0°<Δφ<45°或45°<Δφ<90°。这防止了液晶显示装置（31）中的白色显示状态以及黑色显示状态下的色移，并且改善了对比度。

FIG. 1