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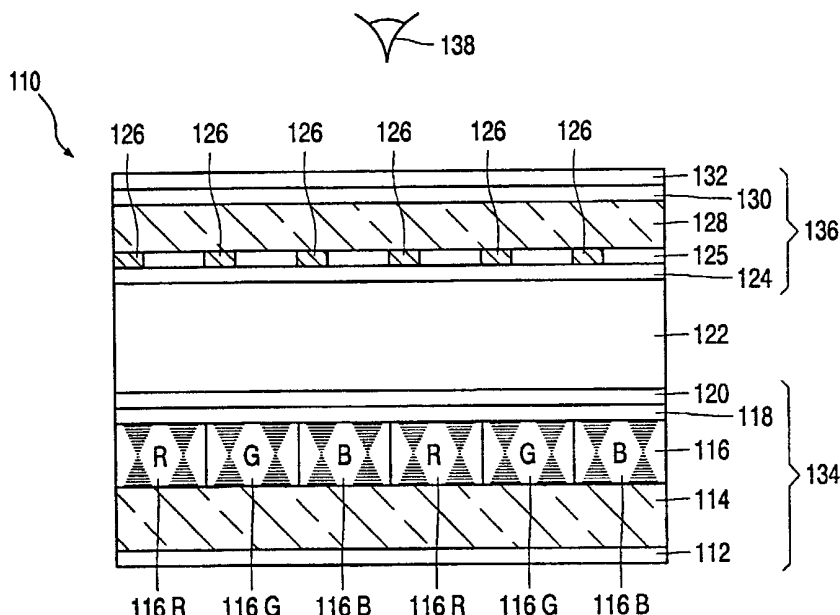
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G02B 5/30, C09K 19/58
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- (71) Applicant: **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL). (88) Date of publication of the international search report: 21 March 2002
- (72) Inventors: **VAN DE WITTE, Peter**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **PITT, Michael, G.**; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LIQUID CRYSTAL DISPLAY DEVICE AND METHOD OF MANUFACTURING SUCH



(57) Abstract: In a method of manufacturing a liquid crystal device (110) including a layer (116) having a fixed cholesteric order, the patterned layer is manufactured by providing a layer comprising polymerizable cholesterically ordered material and a compound convertible by means of radiation from a non-converted to converted state. The pitch of the cholesterically ordered material is influenced by the compound in its converted state to a different extent than in its converted state. The polymerizable layer is then irradiated pattern-wise thus creating regions of different pitch. The irradiated layer is then polymerized and/or cross-linked to fix the cholesteric order thus obtained.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 01/05566

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G02F1/1335 G02B5/30 C09K19/58

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G02F G02B C09K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 668 614 A (CHIEN LIANG-CHY ET AL) 16 September 1997 (1997-09-16) cited in the application	1,2,6-8, 10,11, 15-17
Y	column 2, line 26 - line 29 column 3, line 1 - line 39 column 4, line 1 - line 29 column 4, line 57 - column 5, line 38 column 27, line 30 - line 59 column 31, line 9 - column 37, line 67 --- -/--	3-5,14



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

12 October 2001

Date of mailing of the international search report

14.12.01

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 01/05566

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CHEN S H ET AL: "COMMUNICATIONS" ADVANCED MATERIALS, VCH VERLAGSGESELLSCHAFT, WEINHEIM, DE, vol. 11, no. 14, 1 October 1999 (1999-10-01), pages 1183-1186, XP000864822 ISSN: 0935-9648	3-5
A	the whole document	1,2,7,8, 11,15
Y	EP 0 982 605 A (MERCK PATENT GMBH) 1 March 2000 (2000-03-01)	3-5,14
A	paragraph [0001] - paragraph [0012] paragraph [0027] - paragraph [0034] paragraph [0044] - paragraph [0053] paragraph [0064] - paragraph [0069] paragraph [0077] - paragraph [0078] paragraph [0093] - paragraph [0115] paragraph [0165] - paragraph [0180]	1,2, 7-13, 15-17
A	US 5 793 456 A (LUB JOHAN ET AL) 11 August 1998 (1998-08-11) cited in the application column 3, line 9 - line 33 column 4, line 24 - column 5, line 14 column 6, line 6 - line 41 column 8, line 62 - column 11, line 64; figures 1-5,7	1-5,8, 10,11,15
A	WITTE VAN DE P ET AL: "MODIFICATION OF THE PITCH OF CHIRAL NEMATIC LIQUID CRYSTALS BY MEANS OF PHOTOISOMERIZATION OF CHIRAL DOPANTS" LIQUID CRYSTALS, TAYLOR AND FRANCIS LTD, LONDON, GB, vol. 24, no. 6, 1 June 1998 (1998-06-01), pages 819-827, XP000773004 ISSN: 0267-8292 chapters 1, 3.3, 3.4, 3.6, 3.7, 4	1-17
X,P	WO 00 34808 A (LUB JOHAN ;KONINKL PHILIPS ELECTRONICS NV (NL); WITTE PETER VAN DE) 15 June 2000 (2000-06-15) * see the whole document, in particular the claims in connection with page 16, lines 7-8 *	1-17

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 01/05566

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-17

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-17

Claims 1-14 relate to a method of manufacturing a liquid crystal display device in which a layer of polymerized cholesteric material and a convertible compound which determines the helical pitch of the cholesteric material is patterned by irradiating it such as to convert that compound and hence, modify the helical pitch; claims 15-17 define a liquid crystal display device obtainable by such methods.

2. Claims: 18,19

Claims 18 and 19 specify an active matrix liquid crystal display device in which an electrically insulating, reflective color selection layer is arranged between the switching elements and the pixel electrodes, without mentioning any helical structure at all.

II INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 01/05566

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5668614	A	16-09-1997	NONE	
EP 0982605	A	01-03-2000	EP 0982605 A1	01-03-2000
			JP 2000095883 A	04-04-2000
			TW 394852 B	21-06-2000
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			CN 1095164 A ,B	16-11-1994
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			EP 0606940 A2	20-07-1994
			HK 1013333 A1	20-04-2000
			JP 3224467 B2	29-10-2001
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			WO 0034808 A1	15-06-2000
			EP 1053493 A1	22-11-2000
			TW 424161 B	01-03-2001