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(71) Applicant (for all designated States except US): **CONOPTIX AB** [SE/SE]; Forskargatan 3, S-781 70 BORLÄNGE (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SKARP, Kent** [SE/SE]; Bjugg Görans väg 24, S-784 56 BORLÄNGE (SE). **FRANKLIN, Gustav** [SE/SE]; Vretstigen 2, S-791 43 FALUN (SE). **ADÅS, Christian** [SE/SE]; Sunnanö 3, S-781 94 BORLÄNGE (SE).

(74) Agents: **KÄRN, Ulf** et al.; GROTH & Co. KB, Box 6107, S-102 32 STOCKHOLM (SE).

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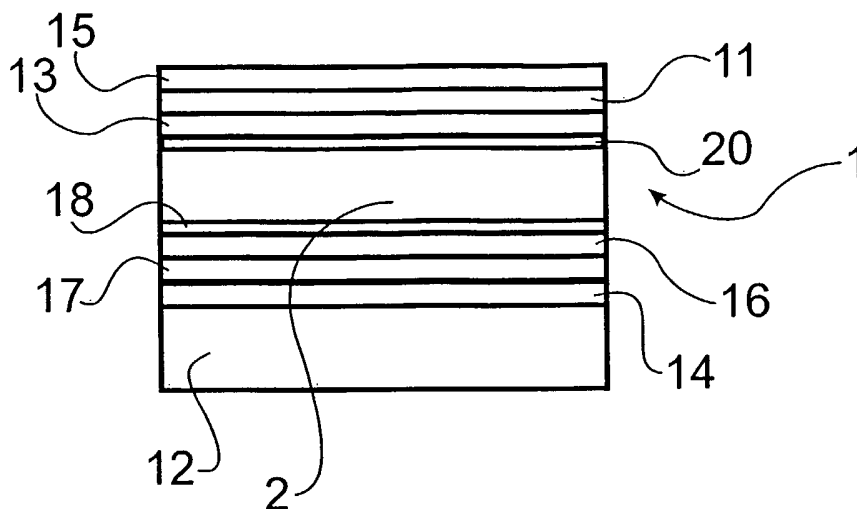
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(54) Title: REFLECTIVE DISPLAY



(57) Abstract: The present invention relates to an LCD (1) adapted to work in reflective mode, comprising a front and a back substrate (11, 12), a front and a back electrode (13, 14), and a front and a back polarizer (15, 16). The present invention specifically teaches that the back electrode is reflective (14), that the back polarizer (16) is made out of a thin film polarizer, and that a transparent layer (17) is positioned between the reflective back electrode (14) and the back polarizer (16).

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REFLECTIVE DISPLAY

Field of invention

The present invention relates to a liquid crystal display (LCD) adapted to
5 work in reflective mode, comprising a front and a back substrate, a front and a
back electrode, and a front and a back polarizer.

Description of the background art

Various kinds of LCD's are known to the art. Certain applications where
10 LCD's are used require a thin and sometimes flexible display, which enables
displays in new portable products such as smart cards, toys and mobile phones
etc that have an increasing demand for thinner and more flexible products.

It is known that different components on a smart card share a mutual
printed circuit board as a base that the card is built upon. It would be possible to
15 build an LCD directly on such a smart card, using the printed circuit board as a
substrate for the LCD.

These applications require thin LCD's with high reflectance and high con-
trast and it is a problem to manufacture LCD's according to these requirements.

20 Summary of the present invention

From the standpoint of the field of invention, as described above, the
present invention relates to an LCD with a reflective back electrode, thus mini-
mising the thickness of the combination of the electrode and the reflective layer.
The present invention also teaches that the back polarizer is made out of a thin
25 film polarizer, again in order to minimise the thickness of the LCD. With the pur-
pose of increasing the amount of light that is reflected from the reflector the pre-
sent invention teaches that a transparent layer is positioned between the reflective
back electrode and the back polarizer.

With the purpose of minimising the reflection of light in the transition be-
30 tween the transparent layer and the back thin film polarizer it is proposed that the
transparent layer has a refractive index that is close to the refractive index of the
back thin film polarizer.

With the purpose of providing the highest possible transmission of light
through the transparent layer it is proposed that the transparent layer has a trans-

mission of light that is at least more than 85%, and preferably more than 95%, in the visible light range.

The transparent layer may be made out of a light or thermal curable material.

5 With the purpose of preventing short circuits between the front and back electrode it is proposed that the transparent layer is made out of an electrically insulating material.

The transparent layer can also act as a diffusion barrier for material that is degrading the LC-fluid, and it can act as a mechanical protection layer for the elec-
10 trode and reflector in the LCD.

An inventive LCD may be built on different kinds of back substrates. One embodiment teaches that the back substrate is a flexible back substrate.

An example of a flexible back substrate is a paper-based substrate. With the purpose of overcoming the problems of diffusion through a paper based sub-
15 strate the present invention teaches that the surface of such back substrate is preferably coated with a polymeric coating providing a required surface roughness.

It is also possible to form an inventive LCD on a glass back substrate.

Due to the possibility to form very thin LCD's through the present invention it is proposed that an inventive LCD is formed on a back substrate that is a part of
20 an integrated printed circuit board for a product, where other components belonging to the product and the LCD are interconnected through the circuit board. Such product may for instance be a smart card or any kind of disposal casing such as a carton or other wrapping material.

The back LC-alignment layer of an inventive LCD can be realised in vari-
25 ous ways. One possible embodiment teaches that the LCD comprises a separate back LC-alignment layer in combination with said back thin film polarizer.

This separate back LC-alignment layer may for instance be made out of a light curable or thermal curable polymer

Another possible embodiment teaches that the LCD comprises a back LC-
30 alignment layer that is made out of the back thin film polarizer.

In order to overcome the problem of contamination of the LC from a thin film polarizer used as a back LC-alignment layer, the present invention teaches that a thin polymeric protective layer is positioned between the back thin film polarizer and the liquid crystal.

The front substrate may be made out of a polymer foil or glass. If a polymer foil is used for front or back substrate then this foil may be made out of PET, PES, PEN, PC, polycyclic olefin, polyimide, poly arylate or other polymeric material.

5 The front polarizer may also be realised in different ways. It may for instance be made out of an external polarizer, which may be made out of a thin film polarizer or out of a conventional plastic foil polarizer.

The front polarizer may also be made out of an internal polarizer, which may be made out of a thin film polarizer.

10 In this case the LCD may comprise a separate front LC-alignment layer in combination with the internal front thin film polarizer, in which case the front LC-alignment layer may be made out of a light curable or thermal curable polymer. It is also possible to make the front LC-alignment layer out of the internal front thin film polarizer.

15 If the latter embodiment is used, then the present invention teaches that a thin polymeric protective layer is positioned between the internal front thin film polarizer and the liquid crystal of the LCD in order to overcome the problem of contamination of the LC from the thin film polarizer used as an LC-alignment layer.

20 **Advantages**

The advantages of the present invention are that it allows the manufacturing of displays with a thin design, with high brightness and good contrast even at high multiplexing levels. An inventive LCD can also be integrated into a product where the back substrate act as a printed circuit board with several
25 mounted electrical components which enables more efficient production of the product.

Brief description of drawings

An LCD according to the present invention will now be described in more
30 detail with reference to accompanying drawings, in which:

Figure 1 is a schematic and simplified cross sectional view of a first embodiment of an inventive LCD,

Figure 2 is a simplified view of a smart card with an inventive LCD,

Figure 3 is a simplified view of a carton with an inventive LCD,

Figure 4 is a schematic and simplified cross sectional view of a second embodiment of an inventive LCD, and

Figure 5 is a schematic and simplified cross sectional view of a third embodiment of an inventive LCD.

5

Detailed description of embodiments as presently preferred

Figure 1 is a schematic view of a liquid crystal display (LCD) 1 adapted to work in reflective mode, comprising a front and a back substrate 11, 12, a front and a back electrode 13, 14, and a front and a back polarizer 15, 16.

10 The present invention specifically teaches that the back electrode 14 is reflective, that the back polarizer 16 is made out of a thin film polarizer, and that a transparent layer 17 is positioned between the reflective back electrode 14 and the back polarizer 16.

The transparent layer 17 has certain purposes and properties in order to
15 achieve these purposes. One property is that the transparent layer 17 has a refractive index that is close to the refractive index of the back polarizer 16 in order to eliminate or minimise any reflection of light in the transition between the back polarizer 16 and the transparent layer 17.

It is also proposed that the transparent layer 17 has a transmission of light
20 that is more than 85%, or preferably more than 95%, in the visible light range.

The transparent layer 17 may be made out of a light or thermal curable material and it is preferably made by an electrically insulating material.

A transparent layer 17 with the above described properties will increase the light reflected from the reflector, and thus the overall performance of the LCD.
25 It can also prevent short circuits between the front and back electrode 13, 14, it can act as a diffusion barrier for material that is degrading the LC-fluid, and it can act as a mechanical protection layer for the electrode/reflector 14 in the LCD.

The present invention teaches that the back substrate 12 may be a flexible back substrate. Thus, the back substrate may be paper based, in which case the
30 surface of said back substrate is coated with a polymeric coating providing a required surface roughness. The back substrate 12 may also be made out of a polymer foil.

The present invention may also be implemented on a back substrate 12 made out of glass.

Since the present invention makes it possible to manufacture thin LCD's, an inventive LCD is suitable to form on a back substrate that is a part of an integrated printed circuit board for a product where other components belonging to the product and the LCD are interconnected through the circuit board.

5 Figure 2 shows that such a product is a smart card A with an LCD 1 and thereto belonging driver electronics and other electrical circuits 1a such as a computer unit, formed on a mutual substrate where in this case the card A itself forms the substrate.

Figure 3 shows that the product B is a carton with an LCD 1 and thereto
10 belonging driver electronics and other electrical circuits 1a, formed on a mutual substrate where in this case the carton B itself, or part of the carton, forms the substrate. It is obvious that the product may be any of wrapping or any other kind of disposal casing.

An inventive LCD can be formed in different ways. Figure 1 shows that the
15 LCD comprises a separate back LC-alignment layer 18 in combination with the back thin film polarizer 16. The figure also shows a separate front LC alignment layer 20. The LC-alignment layers 18, 20 may for instance be made out of a light curable or thermal curable polymer or a photo alignment material.

Figure 4 shows that the LCD comprises a back LC-alignment layer 18'
20 made out of the back thin film polarizer 16. A thin polymeric protective layer 19 is positioned between the back thin film polarizer 16 and the liquid crystal 2 belonging to the LCD 1.

The front substrate 11 may, just as the back substrate, be made out of a polymer foil, such as a polymer foil made out of PET, PES, PEN, PC, polycyclic
25 olefin, polyimide, poly arylate or other polymeric material.

The front substrate 11 may also be made out of glass.

Figure 1 shows a front polarizer 15 made out of an external polarizer, which may be made out of a thin film polarizer or a conventional plastic foil polarizer.

30 Figure 4 shows that the front polarizer 15' is made out of an internal polarizer, which may be made out of a thin film polarizer.

The figure shows that the LCD comprises a separate front LC-alignment layer 20 in combination with the internal front thin film polarizer 15'. This front LC-

alignment layer 20 may for instance be made out of a light curable or thermal curable polymer or a photo alignment material.

Figure 5 shows an alternative embodiment where the LCD comprises a front LC-alignment 20' layer made out of the internal front thin film polarizer 15'.
5 The figure also shows that a thin polymeric protective layer 21 is positioned between the internal front thin film polarizer 15' and the liquid crystal 2 belonging to the LCD.

It is obvious that the above described different embodiments of a back polarizer 16 and a front polarizer 15, 15', with respective LC alignment layer 18,
10 18', 20, 20' and protective layer 19, 21, may be combined in any way.

It will be understood that the invention is not restricted to the aforedescribed and illustrated exemplifying embodiment thereof and that modifications can be made within the scope of the inventive concept as illustrated in the accompanying Claims.

CLAIMS

1. A liquid crystal display adapted to work in reflective mode, comprising a front and a back substrate, a front and a back electrode, and a front and a back polarizer, **characterised** in, that said back electrode is reflective, that said back
5 polarizer is made out of a thin film polarizer, and that a transparent layer is positioned between said reflective back electrode and said back polarizer.
2. An LCD according to Claim 1, **characterised** in, that said transparent
10 layer has a refractive index that is close to the refractive index of said back polarizer.
3. An LCD according to Claim 2, **characterised** in, that said transparent
layer has a transmission of light that is more than 85% in the visible light range.
15
4. An LCD according to Claim 3, **characterised** in, that said transparent
layer is made by a light or thermal curable material.
5. An LCD according to Claim 4, **characterised** in, that said transparent
20 layer is made out of an electrically insulating material.
6. An LCD according to Claim 4 or 5, **characterised** in, that said transparent
layer is made out of material that will act as a diffusion barrier for material that is
degrading the LC-fluid and as a mechanical protection layer for the electrode and
25 reflector in the LCD.
7. An LCD according to any preceding Claim, **characterised** in, that said
back substrate is a flexible back substrate.
- 30 8. An LCD according to Claim 7, **characterised** in, that said back substrate
is paper based, and that the surface of said back substrate is coated with a poly-
meric coating providing a required surface roughness.

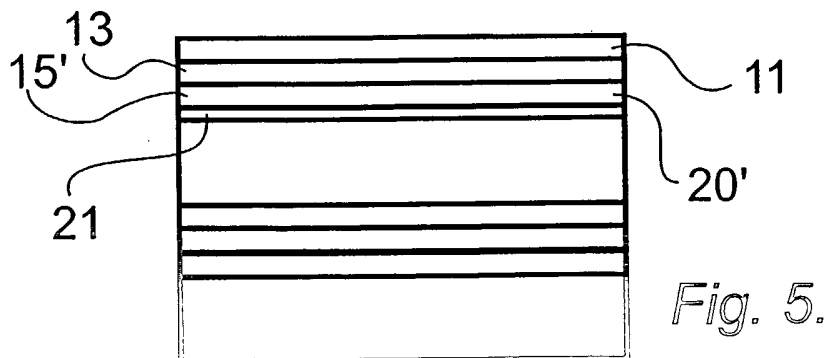
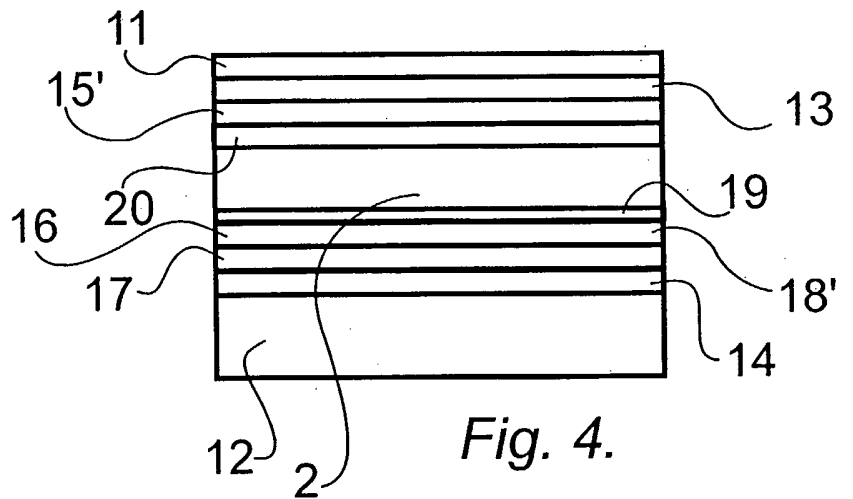
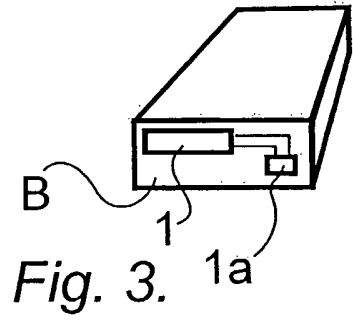
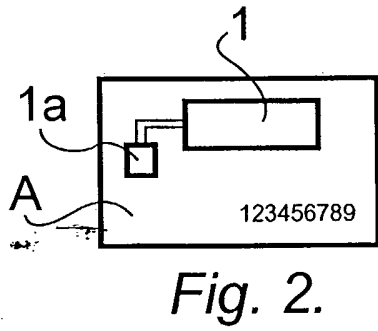
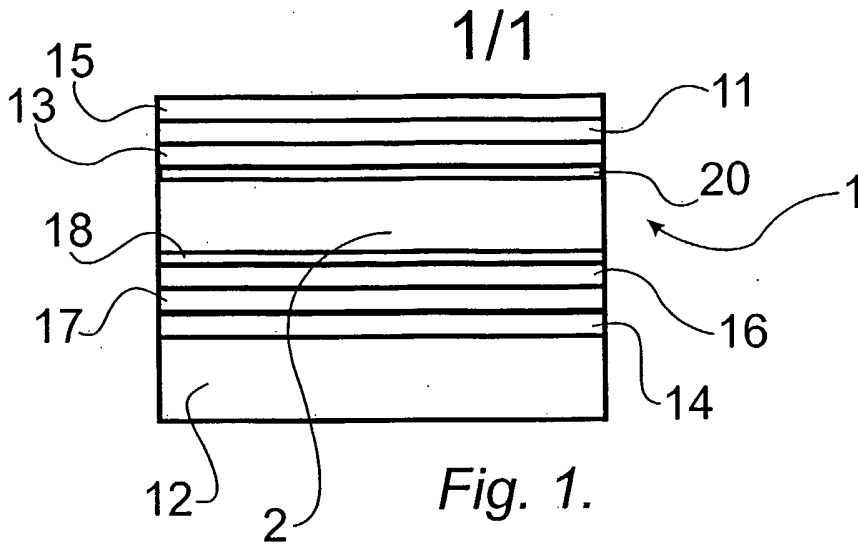
9. An LCD according to Claim 7, **characterised** in, that said back substrate is made out of a polymer foil.
10. An LCD according to any one of Claims 1 to 6, **characterised** in, that said
5 back substrate is a glass substrate.
11. An LCD according to any preceding Claim, **characterised** in, that said back substrate is a part of an integrated printed circuit board for a product, and that other components belonging to said product and said LCD are interconnected
10 through said circuit board.
12. An LCD according to Claim 11, **characterised** in, that said product is a smart card.
- 15 13. An LCD according to Claim 11, **characterised** in, that said product is a carton, wrapping or any other kind of disposal casing.
14. An LCD according to any preceding Claim, **characterised** in, that said LCD comprises a separate back LC-alignment layer in combination with said back
20 thin film polarizer.
15. An LCD according to Claim 13, **characterised** in, that said back LC-alignment layer is made out of a light curable or thermal curable polymer.
- 25 16. An LCD according to Claim 15, **characterised** in, that said back LC-alignment layer is made out of a photo alignment material.
17. An LCD according to any one of Claims 1 to 13, **characterised** in, that said LCD comprises a back LC-alignment layer, and that said back LC-alignment
30 layer is made out of said back thin film polarizer.
18. An LCD according to Claim 17, **characterised** in, that a thin polymeric protective layer is positioned between said back thin film polarizer and the liquid crystal belonging to said LCD.

19. An LCD according to any preceding Claim, **characterised** in, that said front substrate is made out of a polymer foil.
- 5 20. An LCD according to Claim 9 or 19, **characterised** in, that said polymer foil is made out of PET, PES, PEN, PC, polycyclic olefin, polyimide, poly arylate or other polymeric material.
21. An LCD according to any one of Claims 1 to 18, **characterised** in, that
10 said front substrate is made out of glass.
22. An LCD according to any preceding Claim, **characterised** in, that said front polarizer is made out of an external polarizer.
- 15 23. An LCD according to Claim 22, **characterised** in, that said external polarizer is made out of a thin film polarizer.
24. An LCD according to Claim 22, **characterised** in, that said external polarizer is made out of a conventional plastic foil polarizer.
20
25. An LCD according to any one of Claims 1 to 21, **characterised** in, that said front polarizer is made out of an internal polarizer.
26. An LCD according to Claim 25, **characterised** in, that said front polarizer
25 is made out of a thin film polarizer.
27. An LCD according to Claim 26, **characterised** in, that said LCD comprises a separate front LC-alignment layer in combination with said internal front thin film polarizer.
30
28. An LCD according to Claim 27, **characterised** in, that said front LC-alignment layer is made out of a light curable or thermal curable polymer.

29. An LCD according to Claim 27, **characterised** in, that said front LC-alignment layer is made out of a photo alignment material.

30. An LCD according to Claim 26, **characterised** in, that said LCD comprises
5 a front LC-alignment layer, and that said front LC-alignment layer is made out of
said internal front thin film polarizer.

31. An LCD according to Claim 30, **characterised** in, that a thin polymeric
protective layer is positioned between said internal front thin film polarizer and the
10 liquid crystal belonging to said LCD.



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER		
IPC7: G09F 9/35 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)		
IPC7: G09F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-INTERNAL,WPI DATA PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5179457 A (HIRATAKA ET AL), 12 January 1993 (12.01.1993), column 4, line 40 - line 47; column 5, line 4 - line 12, figures 1A-1F --	1-31
X	WO 0049453 A1 (CENTRAL RESEARCH LABORATORIES LTD), 24 August 2000 (24.08.2000), page 6, line 20 - line 26; page 7, line 22 - line 29, figures 4D,4E	1
Y	--	2-31
Y	US 5701165 A (M.KUBO ET AL), 23 December 1997 (23.12.1997), column 9, line 35 - line 45 --	2-6
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family 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 application or patent 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		Date of mailing of the international search report
9 June 2005		14-06-2005
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 555 02 86		Authorized officer Sture Elnäs /MN Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2005/000377

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>DATABASE WPI Week 199713 Derwent Publications., London, GB; Class A85, AN 1997-141975 & JP9022003 A(JAPC)NIPPON SHOKUBAI CO LTD), 21 JANUARY 1997 (1997-01-21)</p> <p>--</p>	7-9, 19, 20
A	<p>US 20040001174 A1 (S.DOI ET AL), 1 January 2004 (01.01.2004), part[0007],[0173]</p> <p>--</p>	1-31
A	<p>EP 1256834 A2 (NITTO DENKO CORPORATION), 13 November 2002 (13.11.2002), part [0027-0031], part[0066], [0069]</p> <p>--</p>	1-31
A	<p>EP 1111437 A1 (CITIZEN WATCH., LTD.), 27 June 2001 (27.06.2001), part [0044]</p> <p>--</p>	1-31
A	<p>GB 2160692 A (CANON KABUSHIKI KAISHA), 24 December 1985 (24.12.1985), page 4, line 50 - line 63</p> <p>-- -----</p>	1-31

INTERNATIONAL SEARCH REPORT
Information on patent family members

30/04/2005

International application No.
PCT/SE 2005/000377

US	5179457	A	12/01/1993	DE	4029838 A,C	28/03/1991
				JP	2651026 B	10/09/1997
				JP	3105318 A	02/05/1991

WO	0049453	A1	24/08/2000	AT	225065 T	15/10/2002
				AT	227439 T	15/11/2002
				AU	764323 B	14/08/2003
				AU	6222899 A	08/05/2000
				CA	2388012 A	27/04/2000
				DE	19983666 T	08/11/2001
				DE	60000722 D,T	18/09/2003
				DE	69903190 D,T	30/04/2003
				EP	1131802 A,B	12/09/2001
				EP	1155351 A,B	21/11/2001
				GB	0011803 D	00/00/0000
				GB	2346213 A,B	02/08/2000
				GB	9903459 D	00/00/0000
				GB	9914908 D	00/00/0000
				JP	2002537581 A	05/11/2002
				US	6844818 B	18/01/2005
				US	20020024446 A	28/02/2002

US	5701165	A	23/12/1997	DE	19520626 A,C	11/01/1996
				JP	3083719 B	04/09/2000
				JP	3415100 B	09/06/2003
				JP	8076081 A	22/03/1996
				JP	2000356764 A	26/12/2000
				JP	2003262855 A	19/09/2003
				KR	185455 B	01/05/1999
				TW	539144 Y	00/00/0000
				TW	575195 Y	00/00/0000

US	20040001174	A1	01/01/2004	CN	1462902 A	24/12/2003
				JP	2004004164 A	08/01/2004
				US	6882394 B	19/04/2005
				JP	2004126021 A	22/04/2004

EP	1256834	A2	13/11/2002	CN	1384392 A	11/12/2002
				JP	2002333618 A	22/11/2002
				US	6693690 B	17/02/2004
				US	20020180910 A	05/12/2002

EP	1111437	A1	27/06/2001	DE	60005775 D	00/00/0000
				JP	3526453 B	17/05/2004
				US	6693692 B	17/02/2004
				WO	0075718 A	14/12/2000

GB	2160692	A	24/12/1985	DE	3515978 A,C	07/11/1985
				GB	8511375 D	00/00/0000
				JP	60233619 A	20/11/1985
				JP	61005902 U	14/01/1986
				JP	60233620 A	20/11/1985
				JP	61005923 U	14/01/1986
				JP	60233621 A	20/11/1985
				JP	61003799 U	10/01/1986
