

(19)



(11)

EP 1 310 820 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
23.07.2014 Bulletin 2014/30

(51) Int Cl.:
G02F 1/1333 ^(2006.01) **G02F 1/1335** ^(2006.01)
G02F 1/13357 ^(2006.01) **G02F 1/1341** ^(2006.01)

(21) Application number: **02024928.0**

(22) Date of filing: **06.11.2002**

(54) **Liquid crystal display**

Flüssigkristallanzeige

Affichage à cristaux liquides

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SK TR**

(30) Priority: **09.11.2001 KR 2001069845**

(43) Date of publication of application:
14.05.2003 Bulletin 2003/20

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EP-A- 1 223 726 JP-A- 2000 089 226
US-A- 5 844 166 US-A1- 2001 012 706
US-B1- 6 304 308

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a liquid crystal display assembly that is less susceptible to damage as a result of external impact.

Description of the Related Art

[0002] Generally, a liquid crystal display is a display apparatus installed on an electronic appliance such as a mobile terminal, a monitor, or the like, and includes a pair of glass layers having electrodes, respectively, and liquid crystals, which are at an intermediate state between solid and liquid, injected between the glass layers so as to display character or image information by applying an electric field to electrodes.

[0003] Such a liquid crystal display can be installed on a folder type mobile terminal 1, as shown in FIG. 1, so as to display the status of the terminal or characters and image information. A liquid crystal panel includes a liquid crystal display 10, that typically fails to be self-luminescent. Hence, a backlight is installed at a rear side of the liquid crystal panel so that light emitted from the backlight allows characters or image information displayed on the liquid crystal panel to be more clearly displayed.

[0004] Backlights are mainly divided into (1) a direct type system shedding light on a front face of the liquid crystal panel, using electro-luminescence (EL) and (2) an edge type system shedding light on the liquid crystal panel using the light diffused through a light-guiding plate from a light source installed at one side or both sides of the liquid crystal panel. A liquid crystal display having the former backlight system is widely applied to small-sized electronic appliances such as mobile terminals.

[0005] FIG. 2 illustrates an exploded perspective view of a liquid crystal display using a direct type backlight. A liquid crystal display 10 of a mobile terminal is installed in a frame 17 fixed inside a case (not shown) so as to display character or image information through a viewing window 5 (FIG. 1). The liquid crystal display 10 includes a liquid crystal panel 11 and a flexible print circuit (FPC) 12 connected to the liquid crystal panel 11 so that an output signal can be inputted thereto. A reflective plate 13 is attached in one body to a rear face of the liquid crystal panel 11 so as to reflect incident light.

[0006] A backlight 15 is placed at the rear face of the liquid crystal panel 11 to which the reflective plate 13 is attached so as to illuminate the flat liquid crystal panel 11. In this case, the reflective plate 13 transmits light emitted from the backlight 15 in the direction of the liquid crystal panel 11. The reflective plate 13 and the backlight 15 are attached to each other through a double-coated adhesive tape 20. Therefore, the liquid crystal panel 11, reflective plate 13, and backlight 15 are attached to each

other in one body so as to constitute a liquid crystal panel assembly. The liquid crystal panel assembly is disposed in the frame 17.

[0007] The double-coated adhesive tapes 20 are attached respectively to both parts 13p and 15p between the reflective plate 13 and backlight 15 attached to the liquid crystal panel 11 in one body so as to maintain adhesiveness between the liquid crystal panel 11 and backlight 15 as well as not to interfere light irradiated from the backlight 15.

[0008] The liquid crystal panel 11 has a liquid crystal injection part 14 sealed after the injection of liquid crystals between the two glass layers. The double-coated adhesive tapes 20 are attached to the edge portion of the liquid crystal injection part 14 and the opposite edge thereto, respectively. Portion 20a of one of the double-coated adhesive tapes 20, protrudes from the outer periphery of the backlight 15, as shown in FIG. 3, so as to be attached to an inner face 17a of the frame 17 (shown in FIG. 2). The front side of the liquid crystal panel 11, as shown in FIG. 2, is covered with a polarizing plate 19 positioned so as to transmit the light that passes through the liquid crystal panel 11.

[0009] Since the double-coated adhesive tapes 20 are attached to the edge of the liquid crystal injection part 14, a gap is generated in the area where the injection part is formed. Unfortunately, as the result of an impact on the liquid crystal panel 11 (see FIG. 5), bleeding can occur at the gapped area so as to generate spots S (see FIG. 5). Due to the construction of the liquid crystal assembly, crystal injection part 14 disposed between reflective plate 13 and a polarized lens cover 19 (at area 14) is not sealed as strongly as the other edges of the assembly. As such, an impact to the assembly can cause severe bleeding in that area.

[0010] Referring to FIG. 4, the upper layer 11a and lower layer 11b, can be widened by an impact in directions A and B, respectively. Vacuum bubbles may form in the widened area from liquid crystals 11c filling a space between the layers 11a and 11b so as to bring about bleeding spots image or character information may be incorrectly displayed due to such bleeding. Mobile communication appliances such as mobile terminal are dropped often. Bleeding may worsen as the result of successive impacts, as shown in FIG. 5, at the part where the liquid crystal injection part 14 is located.

[0011] Post-published EP 1 223 726 A2, which is relevant only under Article 54(3) EPC, describes a liquid crystal display apparatus comprising a liquid crystal display panel having upper and lower layers enclosing liquid crystal material therebetween. A reflector plate and a backlight are disposed beneath the liquid crystal display panel. The various members are stacked one on top of the other with a flexible printed circuit board interposed between the liquid crystal display panel and the reflector plate. The backlight is attached to the underside of the reflector plate by means of double-sided adhesive strips. The adhesive strips are present at all edges of the liquid

crystal display panel except in corner portions thereof.

[0012] US 6,304,308 B1 discloses a liquid crystal display device comprising a liquid crystal display panel having upper and lower transparent glass substrates with liquid crystal material disposed therebetween. In a seal section of the liquid crystal display panel, a strip spacer is disposed between the glass substrates to extend along the edges thereof. A seal material is coated at the outer edges of the strip spacer. The strip spacer is interrupted in an injection area where the liquid crystal material can be injected into the space between the glass substrates. Below the liquid crystal display panel a number of other plate and sheet members are disposed. These include a reflection sheet and a light guide plate, which forms part of a backlight of the liquid crystal display device. The document mentions both-sided adhesive tape without specifying a particular purpose and location thereof.

[0013] It is an object of the present invention to provide a liquid crystal display assembly that can endure external impact without bleeding.

[0014] To achieve this object, the present invention provides a liquid crystal assembly having all the features of claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention. Features, elements, and aspects of the invention that are referenced by the same numerals in different figures represent the same, equivalent, or similar features, elements, or aspects in accordance with one or more embodiments.

FIG. 1 illustrates a perspective view of a mobile terminal having a conventional liquid crystal display;
 FIG. 2 illustrates an exploded perspective view of a conventional liquid crystal display;
 FIG. 3 illustrates a perspective view of a conventional liquid crystal panel to which a backlight is attached;
 FIG. 4 illustrates a cross-sectional view of a conventional liquid crystal display panel deformed;
 FIG. 5 illustrates a perspective view of a conventional liquid crystal display showing bleeding resulted from an impact as spots S;
 FIG. 6 illustrates a mobile terminal having a liquid crystal display according to an embodiment of the invention;
 FIG. 7 illustrates an exploded perspective view of a disassembled liquid crystal display, according to an embodiment of the invention;
 FIG. 8 illustrates a liquid crystal panel to which a backlight is attached, according to an embodiment of the invention;
 FIG. 9 illustrates an exploded perspective view of a

disassembled liquid crystal display, according to another embodiment of the invention; and

FIG. 10 illustrates a liquid crystal panel to which a backlight is attached, according to another embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] Referring to FIG. 6, a mobile terminal 40 comprises a transmitting/receiving unit 43 installed at a side of a folder unit 41, an input operating unit 44 disposed on the upper face of a body 42, so as to be operated by a user. Terminal 40 also comprises a control unit 45 connected to the transmitting/receiving unit 43, a liquid crystal display driving unit 47 and a liquid crystal display 49 installed on the folder unit 41. The liquid crystal display 49 is viewable when the folder unit 41 is in an open position.

[0017] It should be noted that one or more embodiments of the invention are described herein as applicable to a mobile terminal unit, such as a cellular communication telephone. This application, however, is by way of example and should not be construed to limit the scope of the invention to these particular embodiments. As such, the invention in other embodiments may be applicable to other devices incorporating a flat display panel, such as a digital cameras, video camcorders, etc.

[0018] Referring to FIG. 7, a liquid crystal display 49, according to an embodiment of the invention, is installed on a frame 70 fixed inside the folder unit 41, for example, so as to display character or image information through a viewing window of the folder unit 41. The liquid crystal display 49 includes a liquid crystal panel 50, for example, having a rectangular plane shape. A flexible printed circuit (FPC) 55 is connected to the liquid crystal panel 50 so as to receive an output signal from the liquid crystal display driving unit 47 (FIG. 6). A reflective plate 60 is attached, in one embodiment, to a rear side of the liquid crystal panel 50 so as to reflect incident light projected on the liquid crystal panel 50 toward the front side of the display.

[0019] At the rear side of the liquid crystal panel 50 to which the reflective plate 60 is attached, a backlight 65 having a rectangular shape, for example, is attached so as to light the liquid crystal panel 50. The oppositely facing surfaces of reflective plate 60 and backlight 65 constituting the rear side of the liquid crystal panel 50 are attached to each other via double-coated adhesive tapes 80, as shown in FIG. 7.

[0020] The double-coated adhesive tapes 80 are attached to edges 60p and 65p between the reflective plate 60 and backlight 65 so as to attach the back light 65 to reflective plate 60, where liquid crystal injection part 51 is not present. An additional double-coated adhesive tape is installed at an edge 63P opposite to the edge where the injection part 51 of the liquid crystal panel 50 is located so that the double-coated adhesive tapes are

installed at all edges except the edge where the injection part 51 of the liquid crystal panel 50 is present.

[0021] The double-coated adhesive tape 80 is shorter than the length of the side of the liquid crystal panel 50 on which it is installed. Thus, the liquid crystal panel 50 including the reflective plate 60 and the backlight 65 are attached to each other via the double-coated adhesive tapes 80 so as to constitute a liquid crystal panel assembly. A polarizing plate 75 may be installed at the front side of the liquid crystal panel 50 so as to polarize light that passes through the liquid crystal panel 11.

[0022] Referring to FIGS. 9 and 10, in accordance with one embodiment of the invention, a reflective plate 60' is attached to the rear side of a liquid crystal panel 50' and a backlight 65' is attached to the rear side of the reflective plate 60' through double-coated adhesive tapes 80'.

[0023] At least one of the double-coated adhesive tapes 80' includes a portion 80b' protruding externally from outer periphery of the liquid crystal panel 50' and backlight 65' so as to be attached to an inner surface 70a' of the frame 70'. The liquid crystal panel 50' and backlight 65 are attached to each other via the double-coated adhesive tapes 80', and the liquid crystal panel assembly is inserted and attached to the frame 70'.

[0024] The double-coated adhesive tapes 80' are attached to all the edges except to the edge where the liquid crystal injection part 51' of the liquid crystal panel 50' is disposed.

[0025] Accordingly, in a liquid crystal panel as described above, the injection part is less vulnerable to external forces that may be exerted due to falling, thermal impact, or other pressure applied. Thus, the present invention prevents the upper and lower panels from being widened where the liquid crystal injection part is located, thereby preventing any bleeding from occurring in the liquid crystal panel.

[0026] The forgoing embodiments are merely exemplary and are not to be construed as limiting the present invention. The present teachings can be readily applied to other types of apparatuses. The description of the present invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art.

Claims

1. A liquid crystal display assembly comprising:

- a liquid crystal display panel (50) comprising an upper and a lower panel;
- a liquid crystal injection member (51) installed at a first edge of the liquid crystal display panel for injecting liquid crystals between said upper and lower panels through an injection area, wherein the injection area is sealed in between

the upper and lower panels to contain the injected liquid crystals;

- a reflective plate (60) positioned under the lower panel; and

- a backlight (65) positioned under the reflective plate; wherein the reflective plate is able to transmit light emitted from the backlight in the direction of the liquid crystal panel;

wherein the reflective plate (60) is attached to the backlight (65) by one or more fastening means attaching a lower surface of the reflective plate to an upper surface of the backlight at edges of the reflective plate and backlight;

wherein the fastening means comprises double-sided adhesive strips (80) installed at all edges of the reflective plate and backlight except the edge where the injection area is present;

wherein each adhesive strip is shorter than the length of the edge at which it is installed; and wherein the adhesive strips of mutually adjacent edges are spaced from each other, such that corner portions between the edges are free of adhesive strips.

2. The liquid crystal display assembly of claim 1, wherein at least one of the adhesive strips (80') includes a portion (80b') protruding externally from in between oppositely facing surfaces of the reflective plate (60) and the backlight (65) for attaching the LCD assembly to a support member (70).
3. The liquid crystal display assembly of claim 2, wherein the support member (70) is a frame installable in a mobile terminal.

Patentansprüche

1. Flüssigkristallanzeigeanordnung mit:

- einem Flüssigkristallanzeigebildschirm (50) mit einer oberen und einer unteren Platte;
- einem Flüssigkristallanzeige-Einspritzelement (51), das an einer ersten Kante des Flüssigkristallanzeigebildschirms angebracht ist, um durch einen Einspritzbereich Flüssigkristalle zwischen die obere und die untere Platte einzuspritzen, wobei der Einspritzbereich abgedichtet zwischen der unteren und der oberen Platte vorgesehen ist, um die eingespritzten Flüssigkristalle aufzunehmen;
- einer reflektierenden Platte (60), die unter der unteren Platte angeordnet ist; und
- einer unter der reflektierenden Platte angebrachten Rückbeleuchtungseinrichtung (65);

wobei die reflektierende Platte (60) an der Rückbe-

- leuchtungseinrichtung (65) befestigt ist, mittels einem oder mehreren Befestigungsmitteln, die eine untere Oberfläche der reflektierenden Platte an einer oberen Oberfläche der Rückbeleuchtungseinrichtung an Kanten der reflektierenden Platte und der Rückbeleuchtungseinrichtung befestigen; wobei die Befestigungsmittel doppelseitige Klebestreifen (80) umfassen, die an allen Kanten der reflektierenden Platte und der Rückbeleuchtungseinrichtung angebracht sind, mit Ausnahme der Kante, an der sich der Einspritzbereich befindet; wobei jeder Klebestreifen kürzer ist als die Länge der Kante, an der er angebracht ist; und wobei die Klebestreifen einander benachbarter Kanten so voneinander beabstandet sind, dass Eckbereiche zwischen den Kanten keine Klebestreifen aufweisen.
2. Flüssigkristallanzeigeanordnung nach Anspruch 1, wobei wenigstens einer der Klebestreifen (80') einen Bereich (80b') aufweist, der sich von einer zwischen gegenüberliegenden Oberflächen der reflektierenden Platte (60) und der Rückbeleuchtungseinrichtung (65) gelegenen Position nach außen erstreckt, um die Flüssigkristallanzeigeanordnung an einem Halteteil (70) zu befestigen.
3. Flüssigkristallanzeigeanordnung nach Anspruch 2, wobei das Halteteil (70) ein in einem mobilen Endgerät anbringbarer Rahmen ist.
- chée au rétroéclairage (65) par un ou plusieurs moyens de fixation attachant une surface inférieure de la plaque réfléchissante à une surface supérieure du rétroéclairage au niveau des bords de la plaque réfléchissante et du rétroéclairage ; dans lequel le moyen de fixation comprend des bandes adhésives (80) double face installées au niveau de tous les bords de la plaque réfléchissante et du rétroéclairage excepté le bord où se situe la zone d'injection ; dans lequel chaque bande adhésive est plus courte que la longueur du bord au niveau duquel elle est installée ; et dans lequel les bandes adhésives des bords mutuellement adjacents sont espacées les unes des autres, d'une manière telle que les parties de coin entre les bords ne comportent pas de bande adhésive.
2. Assemblage d'affichage à cristaux liquides selon la revendication 1, dans lequel au moins l'une des bandes adhésives (80') comprend une partie (80b') faisant saillie vers l'extérieur en partant d'entre les surfaces opposées en regard de la plaque réfléchissante (60) et du rétroéclairage (65) pour attacher l'assemblage LCD à un élément de support (70).
3. Assemblage d'affichage à cristaux liquides selon la revendication 2, dans lequel l'élément de support (70) est un cadre pouvant être installé dans un terminal mobile.

Revendications

1. Assemblage d'affichage à cristaux liquides comprenant :
- un panneau (50) d'affichage à cristaux liquides comprenant un panneau supérieur et un panneau inférieur ;
 - un élément (51) d'injection de cristaux liquides installé au niveau d'un bord avant du panneau d'affichage à cristaux liquides destiné à injecter des cristaux liquides entre les panneaux supérieur et inférieur par l'intermédiaire d'une zone d'injection, dans lequel la zone d'injection est fermée de manière étanche entre les panneaux supérieur et inférieur pour contenir les cristaux liquides injectés ;
 - une plaque réfléchissante (60) positionnée sous le panneau inférieur ; et
 - un rétroéclairage (65) positionné sous la plaque réfléchissante ; dans lequel la plaque réfléchissante est capable de transmettre une lumière émise depuis le rétroéclairage dans la direction du panneau à cristaux liquides ;

dans lequel la plaque réfléchissante (60) est atta-

FIG. 1
CONVENTIONAL ART

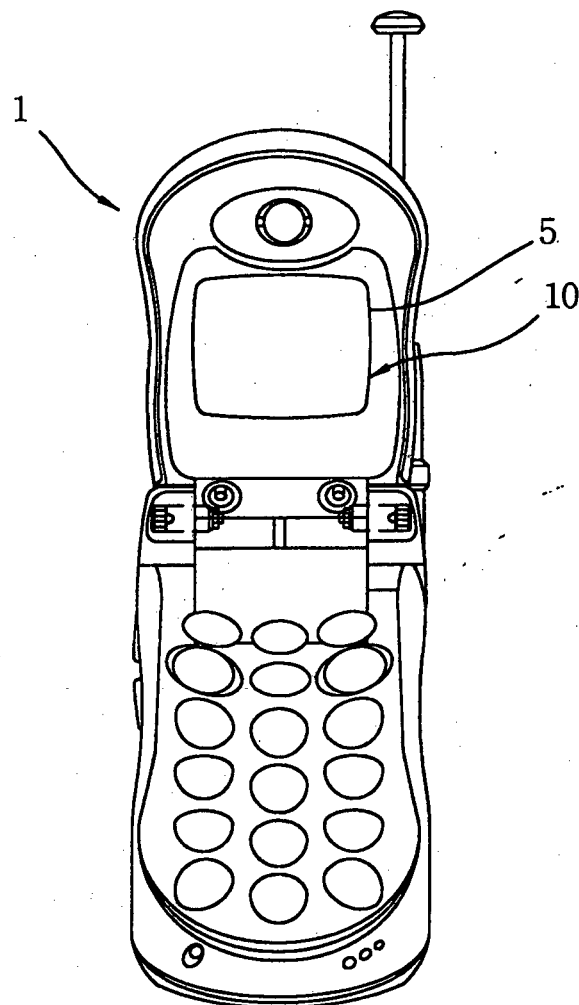


FIG. 2
CONVENTIONAL ART

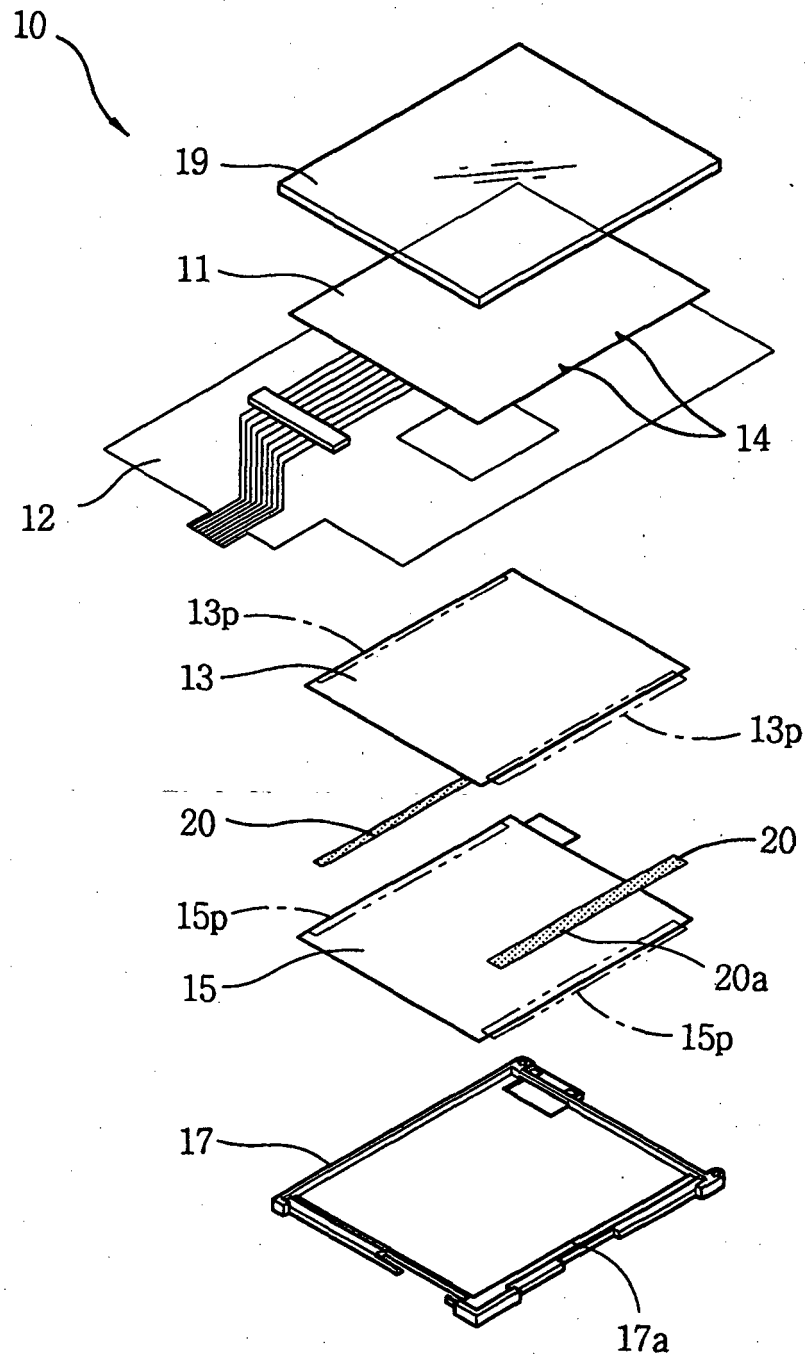


FIG. 3
CONVENTIONAL ART

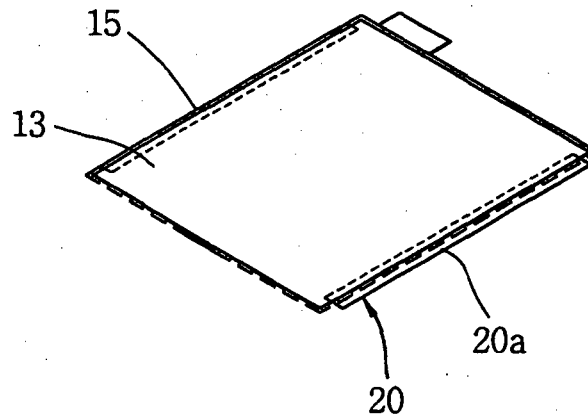


FIG. 4
CONVENTIONAL ART

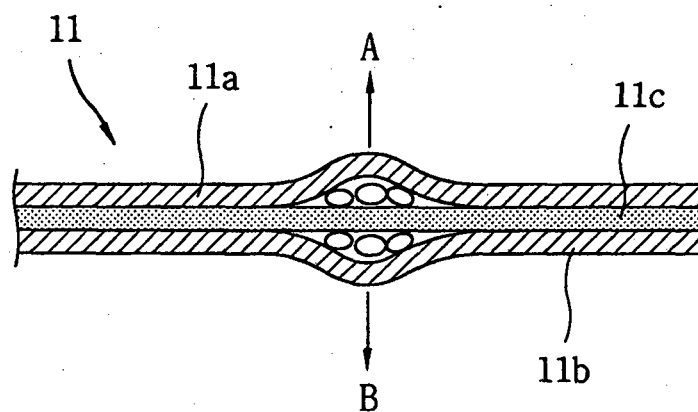


FIG. 5
CONVENTIONAL ART

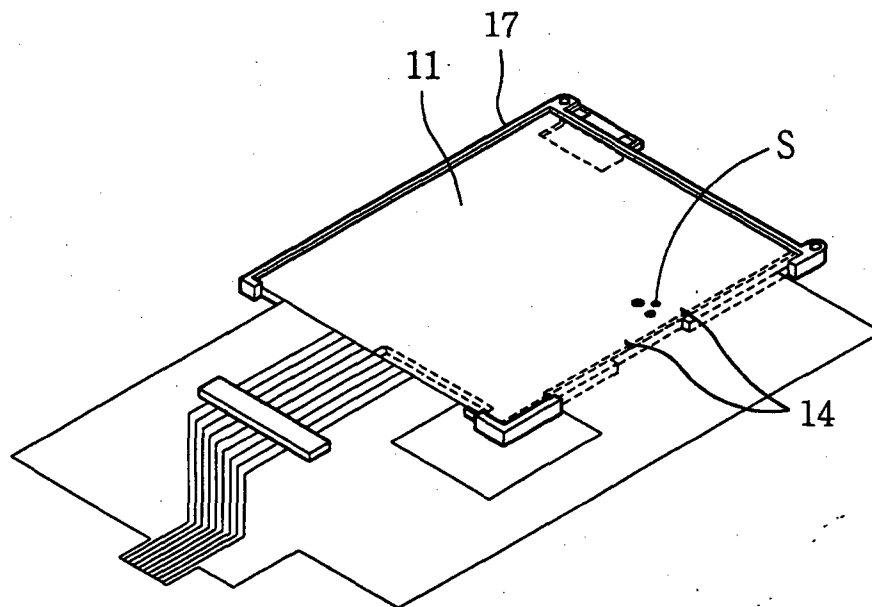


FIG. 6

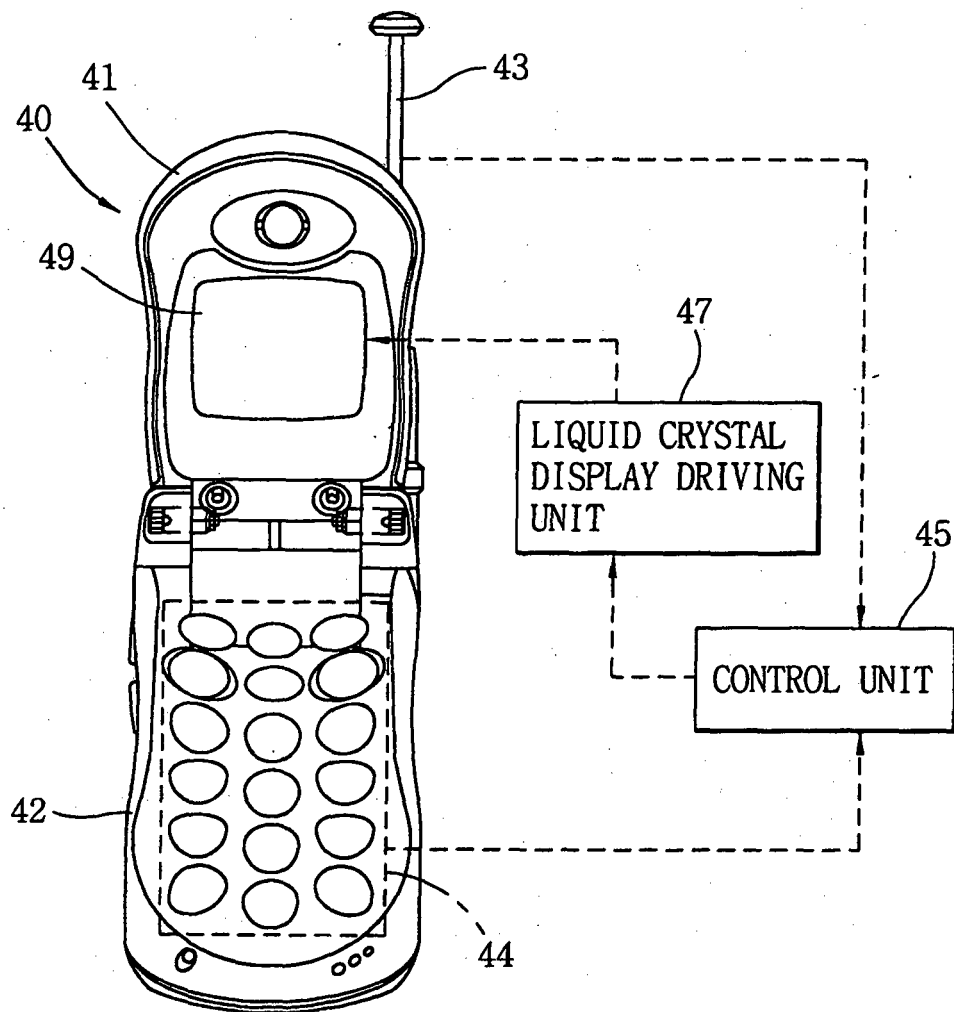


FIG. 7

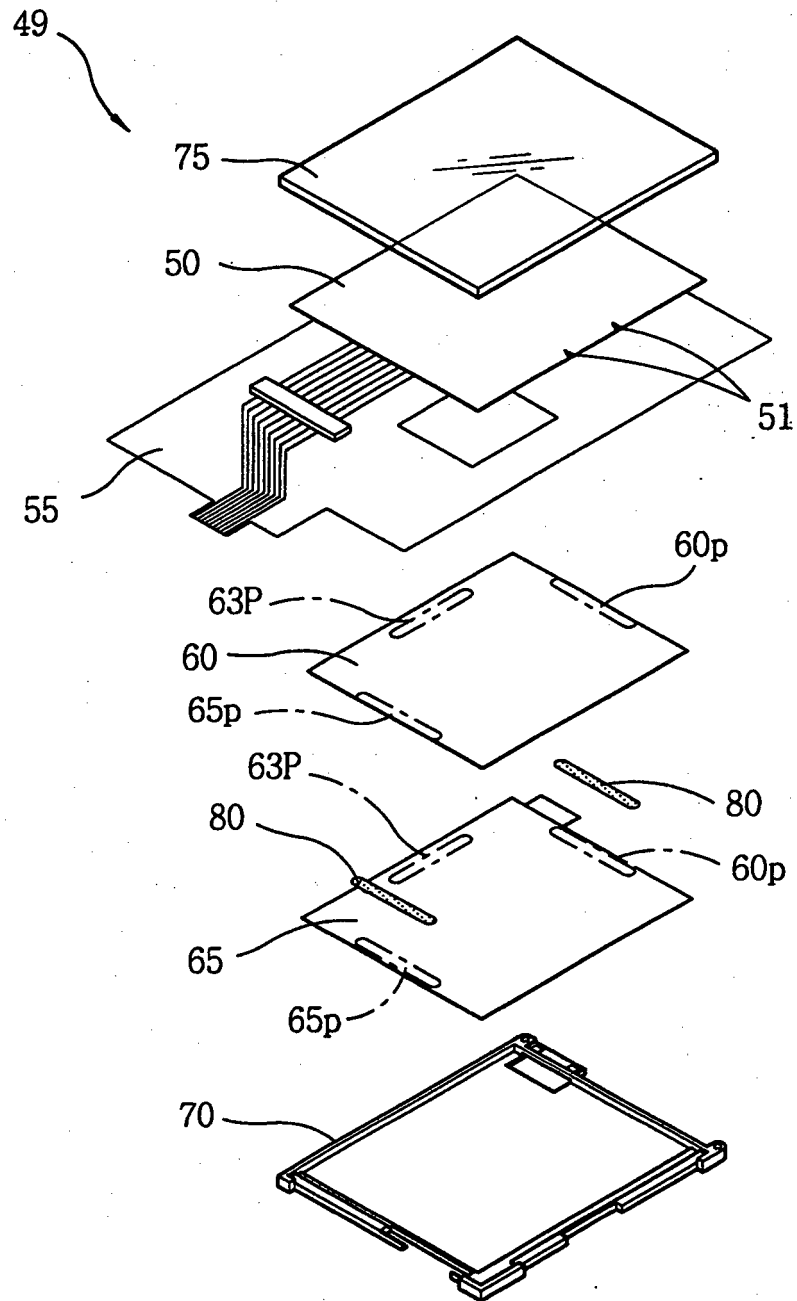


FIG. 8

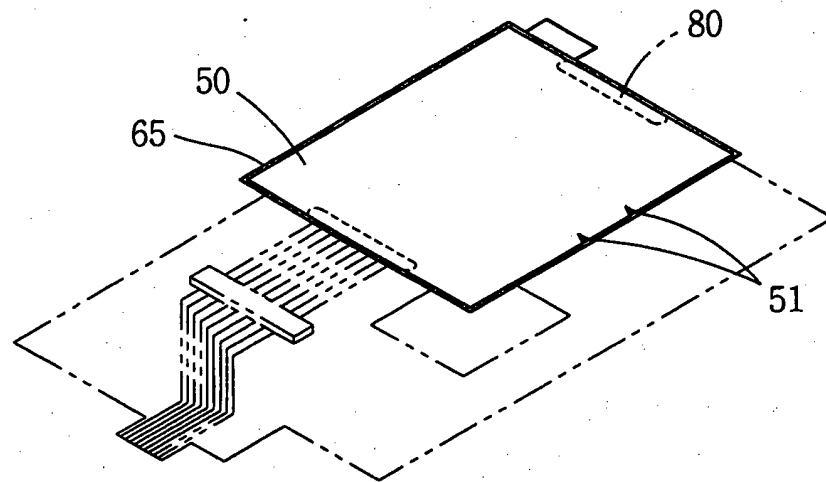


FIG. 10

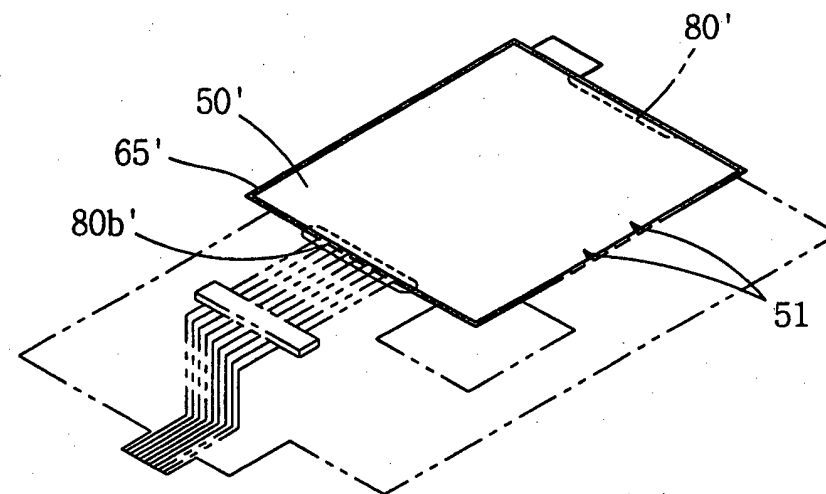
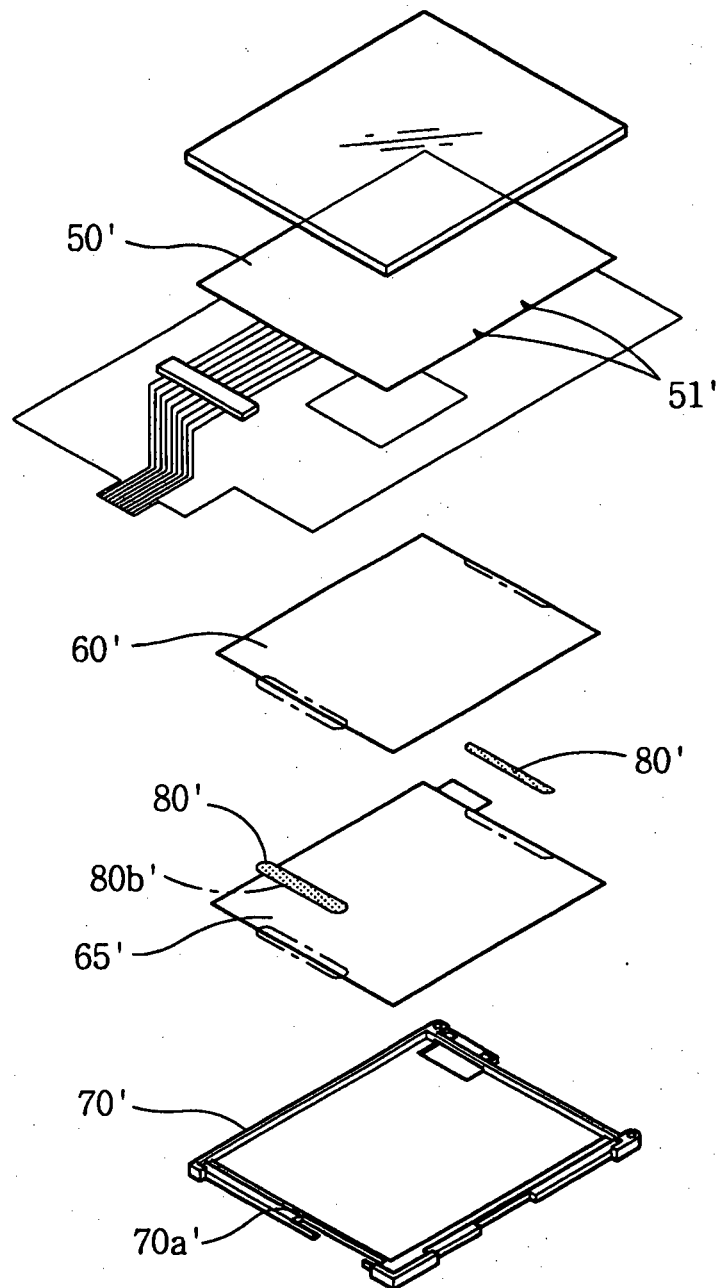


FIG. 9



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1223726 A2 [0011]
- US 6304308 B1 [0012]

专利名称(译)	液晶显示器		
公开(公告)号	EP1310820B1	公开(公告)日	2014-07-23
申请号	EP2002024928	申请日	2002-11-06
申请(专利权)人(译)	LG电子株式会社.		
当前申请(专利权)人(译)	LG电子株式会社.		
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IPC分类号	G02F1/1333 G02F1/1335 G02F1/13357 G02F1/1341 G02F1/13 G09F9/00 H04B1/38		
CPC分类号	G02F1/133308 G02F1/133555 G02F1/133615 G02F1/1341 G02F2202/28		
优先权	1020010069845 2001-11-09 KR		
其他公开文献	EP1310820A1		
外部链接	Espacenet		

摘要(译)

提供了一种具有多个构件的液晶显示 (LCD) 组件 (49) , 其中每个构件的外周边与其它构件的相应外周边对应, 包括LCD面板 (50) 和液晶注入 (51) , 安装在所述LCD组件的第一边缘, 用于注入液晶。 LCD 面板包括上面板和下面板, 并且液晶通过注入区域注入在上面板和下面板之间。注入区域被密封在上面板和下面板之间以容纳注入的液晶。 LCD 组件还包括用于反射入射光的反射板 (60) , 其通过接合板和背光源的一个或多个边缘的一个或多个双面粘合带 (80) 固定到背光源 (65) , 而不是所述边缘对应于注射区域的第一边缘。

FIG. 1
CONVENTIONAL ART

