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(54) **Liquid crystal display apparatus**

Flüssigkristallanzeigegerät

Dispositif d'affichage à cristaux liquides

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- **PATENT ABSTRACTS OF JAPAN vol. 2000, no. 06, 22 September 2000 (2000-09-22) -& JP 2000 089226 A (NEC KANSAI LTD), 31 March 2000 (2000-03-31)**
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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a liquid crystal display apparatus which does not easily get out of order by an external impact.

2. Description of the Background Art

[0002] Generally, Liquid Crystal Display (LCD) is a displaying apparatus installed in a mobile terminal, monitor and the like and liquid crystal which is a material between liquid and solid condition is injected between two sheets of glass substrates formed as electrodes to display letters or images by adding an electric field.

[0003] As shown in Figure 1, such liquid crystal display apparatus is installed in folder-type mobile terminal 1 and the like to display adjust or use condition or letter or image information, etc.

[0004] Particularly, since a liquid crystal panel composing the liquid crystal display apparatus can not emit light by itself, a back light sheet is installed at the rear side and accordingly letter or image information displayed on the liquid crystal panel can be recognized more clearly by penetrating light emitted from the back light sheet.

[0005] The back light sheet mainly employs a direct method for directly illuminating the front surface of the liquid crystal panel using Electro luminescence (EL) or an edge method for illuminating the liquid crystal panel using light diffused by a light transmission board having light sources at one or two sides of the liquid crystal panel. Between the methods, the liquid crystal display apparatus having a back light sheet by the direct method is mainly used for miniature electric devices such as mobile terminals and the like.

[0006] JP 2000-89226 describes a liquid crystal display device with a backlight adhesively fixed. This document discloses all the features of the preamble of claim 1 in combination.

[0007] Figure 2 is an exploded perspective view showing a conventional liquid crystal display apparatus by the direct method.

[0008] With reference to Figure 2, the liquid crystal display apparatus 10 positioned in a mobile terminal is inserted-installed in a frame 17 fixed in a case of the terminal and as shown in Figure 1, it displays letter or image information through a viewing window.

[0009] Since such liquid crystal display apparatus 10 has a liquid crystal panel 11, a Flexible Printed circuit (FPC) 12 is connected to the liquid crystal panel 11 and a reflection board 13 for reflecting light incident from the liquid crystal panel 11 is adhered to the rear surface as a single body.

[0010] The back light sheet 15 formed as a flat board shape, for illuminating the liquid crystal panel 11 is positioned on the rear surface of the liquid crystal panel 11 where the reflection board 13 is attached. Here, the reflection board 13 penetrates the light emitted from the back light sheet 15 in the direction of the liquid crystal panel 11.

[0011] Here, the reflection board 13 and back light sheet 15 forming the rear surface of the liquid crystal panel 11 are mutually attached by a double-faced adhesive tape 20.

[0012] Therefore, the liquid crystal panel 11, reflection board 13 and back light sheet 15 form a liquid crystal panel assembly and the liquid crystal panel assembly is inserted-assembled in the frame 17.

[0013] Particularly, the double-faced adhesive tape 20 is formed in a square band shape not to interfere the light illuminated from the back light sheet 15 and maintain an adhesive force between the liquid crystal panel 11 and back light sheet 15 and is adhered to the circumferential portions 13P and 15P between the reflection board 13 and back light sheet 15 adhered to the liquid crystal panel 11 as a single body.

[0014] On the other hand, as shown in Figure 2, a polarizing plate 19 for forwardly penetrating the light penetrated through the liquid crystal panel 11 at the front side of the liquid crystal panel 11.

[0015] However, since in the conventional liquid crystal display apparatus, the double-faced adhesive tape 20 is adhered to the circumferential surface of the liquid crystal panel 11 and back light sheet 15, the liquid crystal panel 11 is easily transformed or broken by external impacts.

[0016] Namely, as shown in Figure 3, since all parts of the liquid crystal panel 11 are adhered and bound to the back light sheet 15 by the double-faced adhesive tape 20, when instantaneous impact is applied as in the case that the liquid crystal display apparatus falls and is collided with a bottom, the lower substrate 11B of the liquid crystal panel 11 is adhered to the back light sheet 15 as a single body by the reflection board 13 and fixed to the frame 17 as shown in figure 4. However, the upper substrate 11A performs relative movement minutely contrary to the lower substrate 11B by the falling impact and the upper substrate 11A and the lower substrate 11 B are instantaneously cracked apart in the "A" and "B" directions.

[0017] When the upper substrate 11A and the lower substrate 11 B are instantaneously cracked apart, vacuum foams

are formed from the liquid crystal 11C filled between the both substrates 11A and 11B to the space cracked apart and a bleeding phenomenon of an exploded dotted pattern regardless of the inputted display signal. In the excessive case, letter or image information can not be clearly displayed by the bleeding phenomenon.

[0018] Particularly, in case of using a mobile communication instrument such as a mobile terminal, the bleeding phenomenon is often occurred when the instrument falls. At this time, as shown in Figure 5, by the impact, the corner parts are damaged by the bleeding phenomenon and letter or image information is not displayed clearly.

[0019] Here, Figure 5A shows the initial stage of the bleeding phenomenon that spots are occurred on the liquid crystal panel 11 right after the mobile terminal 1 falls in case the liquid crystal display apparatus 10 is installed in the mobile terminal 1 and Figure 5B shows the bleeding expansion phenomenon that the spot (BL) is gradually expanded after 24 hours after the falling.

SUMMARY OF THE INVENTION

[0020] In summary, the present invention provides a liquid crystal display apparatus including an adhesion member as set out in Claim 1.

[0021] Embodiments of the present invention provide a liquid crystal display apparatus capable of improving durability of the liquid durability of the liquid crystal panel by minimizing spot generation even though impacts by a falling or temperature change or a certain wrenching load is applied, by installing double-faced adhesive tape only at the edge portions except corner parts of the liquid crystal panel and the back light sheet and composing the liquid crystal panel and the back light sheet to be mutually adhered.

[0022] The foregoing and other, features, aspects and advantages of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] 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.

[0024] In the drawings:

Figure 1 is a perspective view showing a conventional mobile terminal;
Figure 2 is an exploded perspective view showing the conventional liquid crystal display apparatus;
Figure 3 is a perspective view showing the condition that a conventional liquid crystal panel and back light sheet are adhered;
Figure 4 is a view showing the conventional liquid crystal panel changed by a falling impact;
Figure 5A and 5B are a view showing a bleeding of the conventional liquid crystal panel by the falling impact;
Figure 6 is a block diagram showing a mobile terminal in accordance with the present invention;
Figure 7 is an exploded perspective view showing, a liquid crystal display apparatus in accordance with a first example (outside the scope of the present invention).
Figure 8 is a perspective view showing the condition that a liquid crystal panel and back light sheet in accordance with the first example are adhered;
Figure 9 is an exploded perspective view showing the liquid crystal display apparatus in accordance with the present invention; and
Figure 10 is a perspective view showing the condition that the liquid crystal panel and back light sheet in accordance with the present invention are adhered.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Reference will now be made in detail to a first example outside the scope of the present invention which is included for understanding of the present invention, and to a preferred embodiment of the present invention. These are illustrated in the accompanying drawings.

[0026] Figure 6 is a block diagram showing a folder-type mobile terminal.

[0027] The mobile terminal 40 includes a transmission and reception unit 43 positioned at the side of a folder 41, an input adjusting unit 44 exposed to the upper surface of the main body 42 being adjusted by a user, a control unit 45 connected with the transmission and reception unit 43, for outputting a controlling driving signal according to an input signal of the input adjusting unit 44 at the same time when the signals are inputted and outputted, being connected to the transmission and reception unit 43, a liquid crystal display driving unit 47 operated by the output signal of the control unit 45 and a liquid crystal display apparatus 49 positioned inside the folder 41 so that it can be shown from the outside,

for displaying letter or image information by the operation of the liquid crystal display driving unit 47.

[0028] Figures 7 and 8 are views showing the liquid crystal display apparatus positioned in the mobile terminal and in accordance with a first example outside the scope of the present invention. Figure 7 is an exploded perspective view showing a liquid crystal display apparatus and Figure 8 is a perspective view showing the condition that a liquid crystal panel and back light sheet are adhered.

[0029] The liquid crystal display apparatus in accordance with a first example is installed in a frame 70 fixed in the folder of the mobile terminal shown in Figure 6 and can display letter or image information through a viewing window of the folder 41.

[0030] The liquid crystal display apparatus 49 has a liquid crystal panel 50 having a square flat shape and a FPC 55 is connected to the liquid crystal panel 50. A reflection board 60 for reflecting light incident from the side of the liquid crystal panel 50 in the front direction is adhered to the rear surface of the panel as a single body.

[0031] On the rear surface of the panel 50 where the reflection board 60 is attached, a back light sheet 65 formed in a square flat shape, for irradiating light to the liquid crystal panel 50 is positioned and the reflection board 60 and the back light sheet 65 forming the rear surface of the liquid crystal panel 50 are mutually adhered by the plurality of double-faced adhesive tapes 80.

[0032] Namely, the double-faced adhesive tape 80 is adhered to the four edges 60P and 65P except the four corners in the reflection board 60 and the back light sheet 65 and accordingly, the liquid crystal panel 50 and the back light sheet 65 can be mutually adhered to each other.

[0033] Here, it is desirable that the double-faced adhesive tapes 80 are installed at four all edges of the liquid crystal panel 50 and the back light sheet 65 and according to the design condition the tapes can be installed only at two parts opposing to each other.

[0034] The liquid crystal panel 50 and the back light sheet 65 adhered to the double-faced adhesive tape 80 are adhered to each other as a single body and form a liquid crystal panel assembly and the liquid crystal panel assembly is inserted-assembled in the frame 70.

[0035] On the other hand, reference numeral 75 in Figure 7 is a polarizing plate positioned at the front side of the above liquid crystal panel 50 for penetrating light penetrated through the liquid crystal panel 11.

[0036] Figures 9 and 10 are views showing the liquid crystal display apparatus in accordance with the present invention. Figure 9 is an exploded perspective view showing the liquid crystal display apparatus and Figure 10 is a perspective view showing the condition that the liquid crystal panel and back light sheet are adhered.

[0037] The liquid crystal display apparatus in accordance with the present invention has a reflection board 60' adhered to the rear surface of the liquid crystal panel 50' as a single body and on the rear surface of the liquid crystal panel 50', a back light sheet 65' is attached by a plurality of double-faced adhesive tapes 80' as in the above described example.

[0038] Particularly, the double-faced adhesive tapes 80' are adhered to only four edges except four corner parts of the reflection board 60' and the liquid crystal panel 50' and two of the four double-faced adhesive tapes are adhered to the inner surface 70A' of the frame 70' having parts 80A' and 80B' protruded further outwardly than the periphery of the liquid crystal panel 50' and back light sheet 65

[0039] Finally, the liquid crystal panel 50' and back light sheet 65' are adhered to each other as a single body by the double-faced adhesive tapes 80' and the liquid crystal panel assembly is inserted in the frame 70' and adhered and supported by the frame 70' by the two double-faced adhesive tapes 80'.

[0040] The operation of the liquid crystal display apparatus having the above composition in accordance with the present invention will be described as follows.

[0041] When heat impact, wrenching load and falling impact are applied to the folder-type mobile terminals having the liquid crystal display apparatuses in accordance with the present and conventional arts, as shown in Figure 5, inferiority, that is, the bleeding phenomenon was occurred.

kind of experiment	conventional art	present art (an embodiment)	present art (other embodiment)
heat impact	61	0	0
wrenching load	60	0	0
falling impact	62	0	0

[0042] Numeral values according to each experiment in the above table are results that 100 folder-type mobile terminals are tested and among factors according to each experiment of each terminal, the heat impact experiment was repeated 6 times varying temperature from -30 to 80°C, the wrenching experiment was conducted by repeating a wrenching load of 3.7kg 30,000 times and the falling impact experiment was conducted by fallings of 6 surfaces of a terminal respectively one time under the condition that the folder was closed and by fallings of 6 surfaces of a terminal respectively one time

under the condition that the folder was opened.

[0043] As shown in the above table, the liquid crystal display apparatus in accordance with the present invention binds edge parts of the liquid crystal panel 50 and the back light sheet 65 under the condition that they are mutually adhered by attaching the double-faced adhesive tapes 80 only to edge parts except the corner parts of the flat surface of the liquid crystal panel 50 but the corner parts of the liquid crystal panel 50 is not bound to the back light sheet 65 or frame 70.

[0044] Therefore, since when heat impact, wrenching load and falling impact are applied to the mobile terminal having the liquid crystal display apparatus in accordance with the present invention, the corner parts where the bleeding phenomenon is easily occurred in the liquid crystal panel 50 is not bound, the phenomenon that the upper and lower substrates are cracked apart is minimized as shown in Figure 4 and the bleeding phenomenon in the spot shape can be prevented, thus to reduce inferiority of the liquid crystal display apparatus.

[0045] In the liquid crystal display apparatus in accordance with the present invention with the above composition and operation, the double-faced adhesive tape is installed only edge parts except the corner parts of the liquid crystal panel and the liquid crystal panel and the back light sheet can be attached to each other. Accordingly, spot generation is minimized even if impacts by varying temperature and falling or a certain wrenching load is applied and durability of the liquid crystal panel can be increased.

[0046] Also, in the liquid crystal display apparatus in accordance with the present invention with the above composition and operation, since the liquid crystal display apparatus is installed, damage of the liquid crystal panel by external impacts can be minimized and the efficiency of the display unit conducted by the liquid crystal panel is not decreased, thus to improve reliability of the terminal.

[0047] As the present invention may be embodied in several forms without departing from the essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims.

Claims

1. A liquid crystal display apparatus (49), including:

a liquid crystal panel (50') having a polygonal flat shape;
a backlight sheet (65');
a supporting means (70'); and
a plurality of adhesion members (80');

wherein the plurality of adhesion members (80') are installed along each edge of a flat portion of each of the liquid crystal panel (50') and the backlight sheet (65'), such that the liquid crystal panel is adhered to the backlight sheet (65') through the medium of the plurality of adhesion members (80') ; and
wherein the liquid crystal panel (50') and backlight sheet (65') are fixed in position at the supporting means, **characterised in that** the plurality of adhesion members (80') do not extend to corner parts of the flat portion of the liquid crystal panel, and **in that** at least one part of the plurality of adhesion members (80') protrudes beyond the periphery of the liquid crystal panel (50') and the backlight sheet (65') and is adhered to the supporting means (70').

2. The apparatus of claim 1, wherein the plurality of adhesion members (80') are double-faced adhesive tapes.

3. The apparatus of claim 1, wherein the liquid crystal panel (50') has a square flat shape.

4. The apparatus of claim 1, wherein the liquid crystal panel (50') includes a reflecting plate (60') positioned at one side.

5. The apparatus of claim 5, wherein the plurality of adhesion members (80') adhere the reflecting plate (60') and the back light sheet (65').

6. The apparatus of claim 1, wherein said at least one part of the plurality of adhesion members (80') comprises two parts.

Patentansprüche

1. Flüssigkristallanzeigegerät (49), mit:

einer Flüssigkristallanzeige (50'), die eine polygonale flache Form aufweist;
einer Hintergrundbeleuchtungsplatte (65');
einem Abstützmittel (70'); und
einer Mehrzahl von Klebeelementen (80');
wobei die Mehrzahl von Klebeelementen (80') entlang einer jeden Kante eines flachen Abschnitts sowohl der Flüssigkristallanzeige (50') als auch der Hintergrundbeleuchtungsplatte (65') angebracht ist, so dass die Flüssigkristallanzeige mit der Hintergrundbeleuchtungsplatte (65') durch das Mittel der Mehrzahl von Klebeelementen (80') verklebt ist; und
wobei die Flüssigkristallanzeige (50') und die Hintergrundbeleuchtungsplatte (65') an den Abstützmitteln in Position gehalten werden, **dadurch gekennzeichnet, dass** die Mehrzahl von Klebeelementen (80') sich nicht zu Eckteilen des flachen Abschnitts der Flüssigkristallanzeige erstreckt, und dass wenigstens ein Teil der Mehrzahl von Klebeelementen (80') über den Umfang der Flüssigkristallanzeige (50') und der Hintergrundbeleuchtungsplatte (65') vorspringt und mit den Abstützmitteln (70') verklebt ist.

2. Gerät nach Anspruch 1, wobei die Mehrzahl von Klebeelementen (80') doppelseitige Klebebänder sind.

3. Gerät nach Anspruch 1, wobei die Flüssigkristallanzeige (50') eine rechtwinklige flache Form aufweist.

4. Gerät nach Anspruch 1, wobei die Flüssigkristallanzeige (50') eine reflektierende Platte (60') einschließt, die an einer Seite positioniert ist.

5. Gerät nach Anspruch 5, wobei die Mehrzahl von Klebeelementen (80') die reflektierende Platte (60') und die Hintergrundbeleuchtungsplatte (65') miteinander verklebt.

6. Gerät nach Anspruch 1, wobei der wenigstens eine Teil der Mehrzahl von Klebeelementen (80') zwei Teile aufweist.

Revendications

1. Dispositif d'affichage à cristaux liquides (49), comprenant :

un panneau à cristaux liquides (50') d'une forme polygonale plate ;
une feuille de rétro-éclairage (65') ;
un moyen de support (70') ; et
une pluralité d'éléments d'adhérence (80') ;
dans lequel la pluralité d'éléments d'adhérence (80') sont installés le long de chaque bord d'une portion plate de chacun du panneau à cristaux liquides (50') et de la feuille de rétro-éclairage (65') de telle sorte que le panneau à cristaux liquides adhère à la feuille de rétro-éclairage (65') par le moyen de la pluralité d'éléments d'adhérence (80') ; et
dans lequel le panneau à cristaux liquides (50') et la feuille de rétro-éclairage (65') sont fixés en position au moyen de support,

caractérisé en ce que la pluralité d'éléments d'adhérence (80') ne s'étendent pas aux parties de coin de la portion plate du panneau à cristaux liquides, et **en ce qu'**au moins une partie de la pluralité d'éléments d'adhérence (80') fait saillie au-delà de la périphérie du panneau à cristaux liquides (50') et de la feuille de rétro-éclairage (65') et adhère au moyen de support (70').

2. Dispositif selon la revendication 1, dans lequel la pluralité d'éléments d'adhérence (80') sont des bandes adhésives double-face.

3. Dispositif selon la revendication 1, dans lequel le panneau à cristaux liquides (50') a une forme plate carrée.

4. Dispositif selon la revendication 1, dans lequel le panneau à cristaux liquides (50') comprend une plaque de réflexion (60') positionnée à un côté.

5. Dispositif selon la revendication 5, dans lequel la pluralité d'éléments d'adhérence (80') adhèrent à la plaque de réflexion (50') et à la feuille de rétro-éclairage (65').

6. Dispositif selon la revendication 1, dans lequel ladite au moins une partie de la pluralité d'éléments d'adhérence (80') comprend deux parties.

FIG. 1

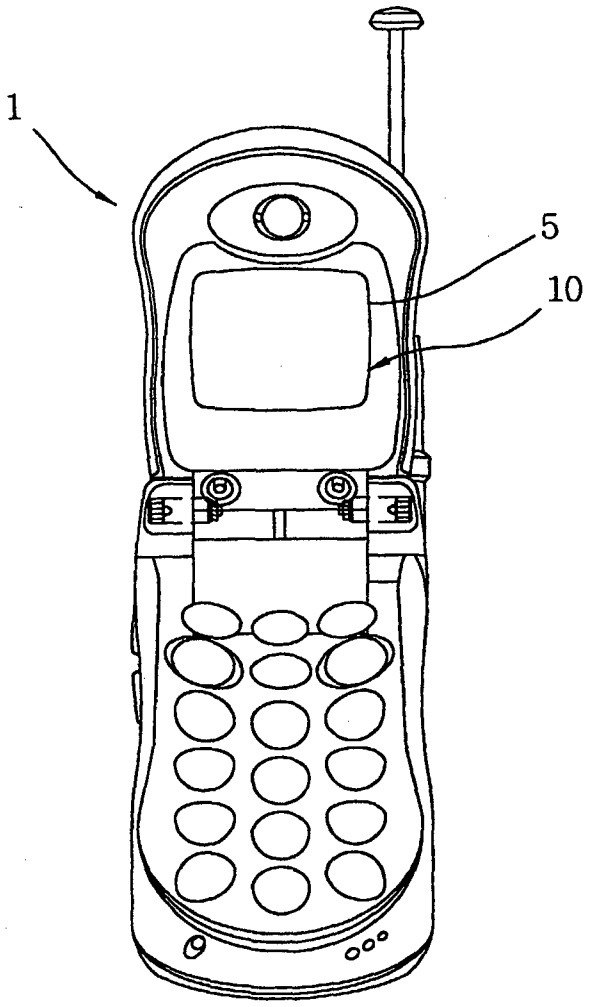


FIG. 2

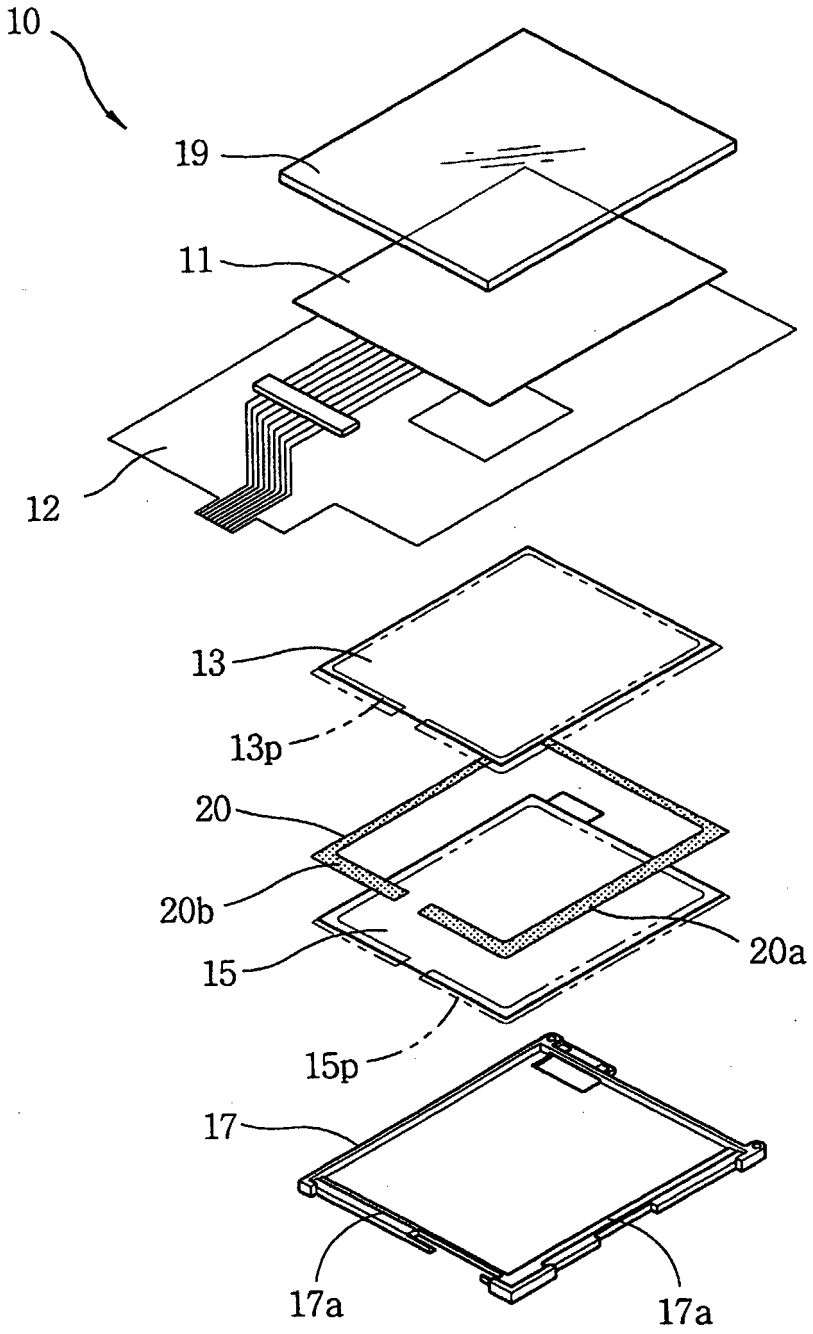


FIG. 3

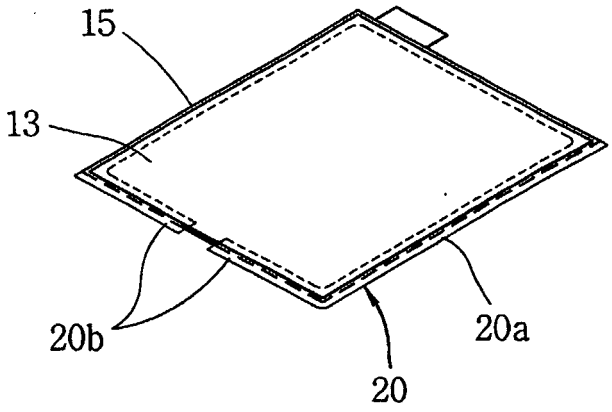


FIG. 4

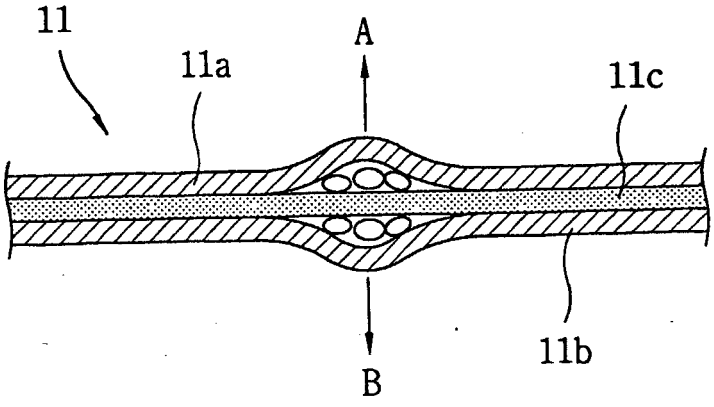


FIG. 5A

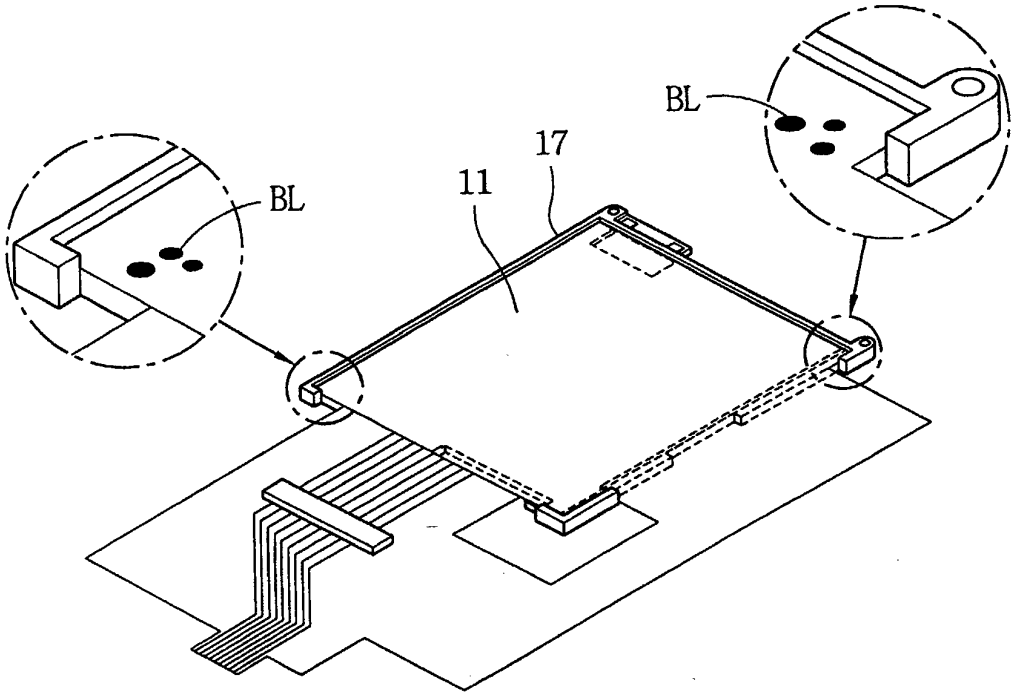


FIG. 5B

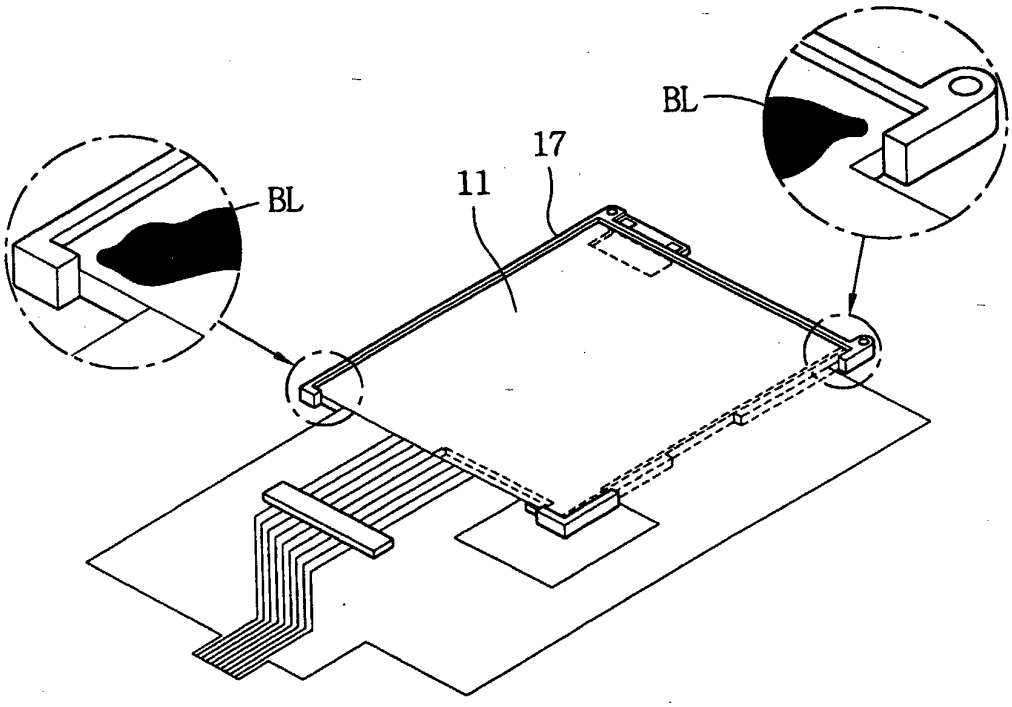


FIG. 6

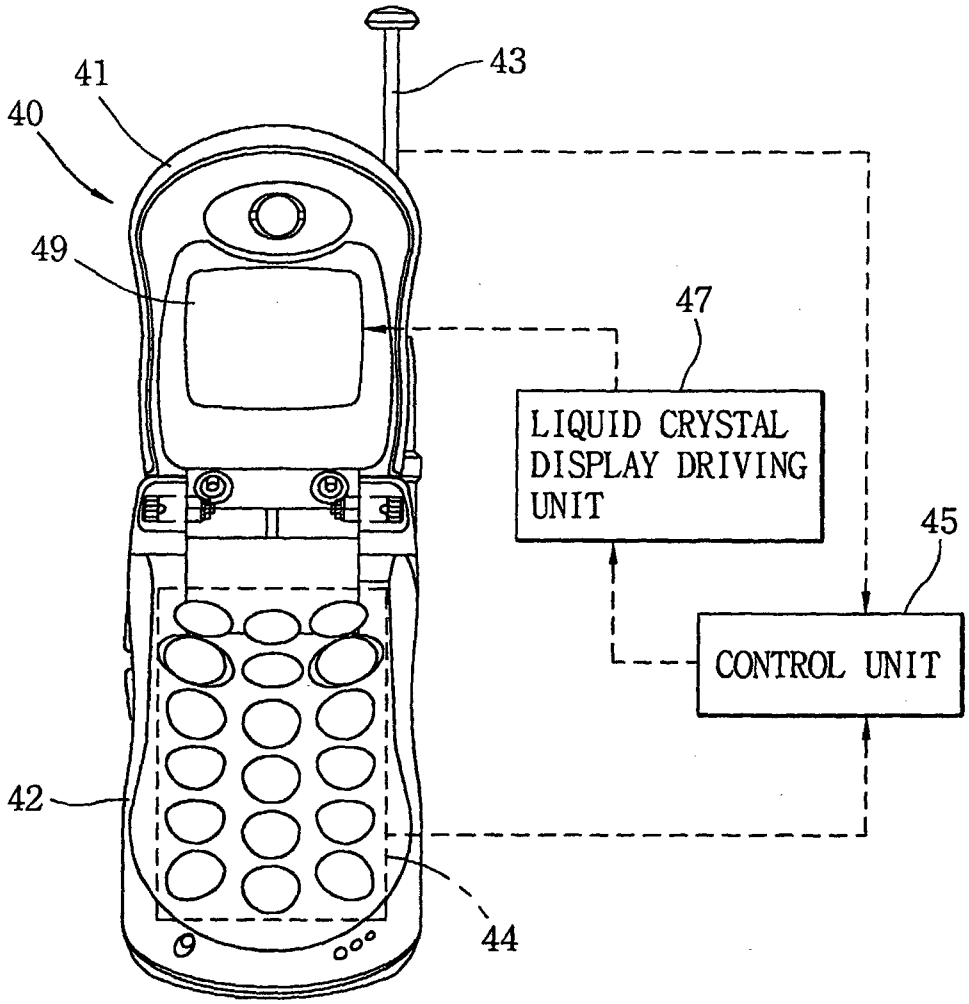

41
43
40
49
47
LIQUID CRYSTAL DISPLAY DRIVING UNIT
45
CONTROL UNIT
42
44

FIG. 7

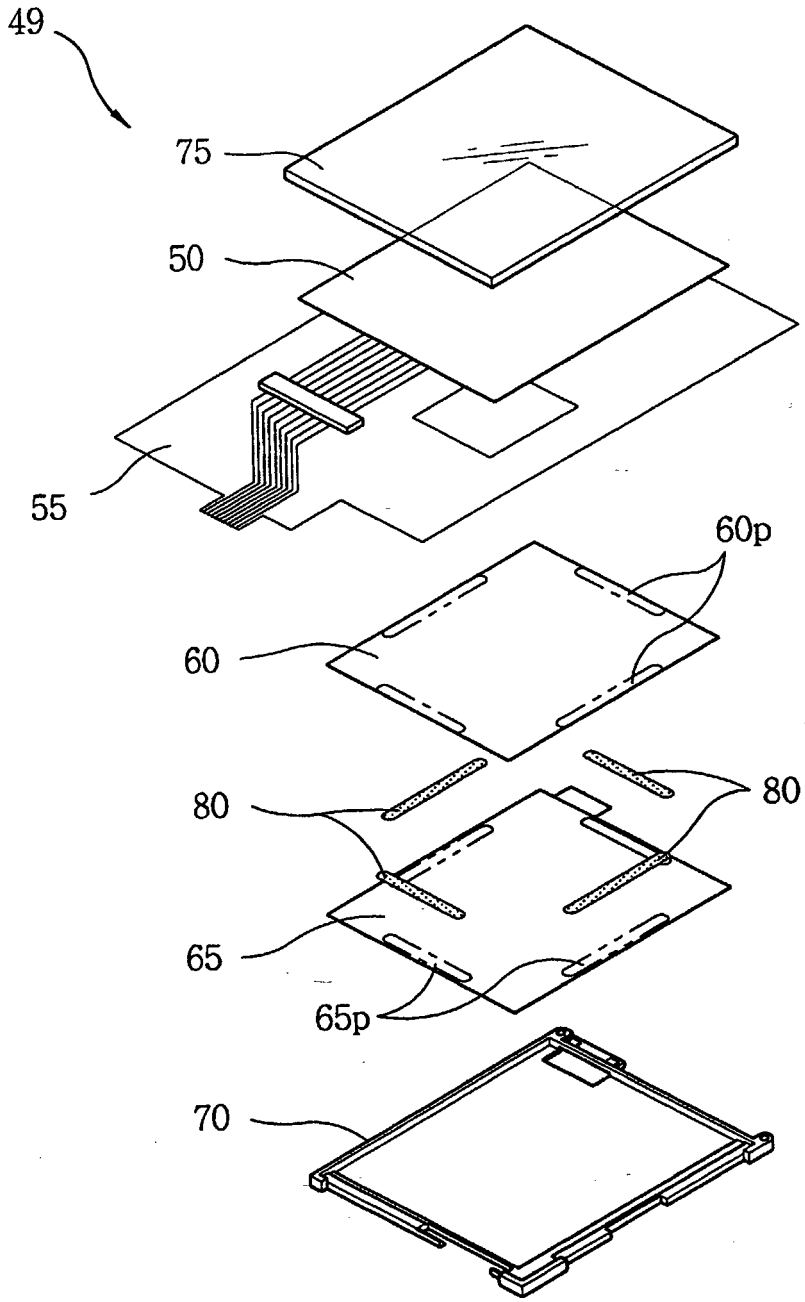


FIG. 8

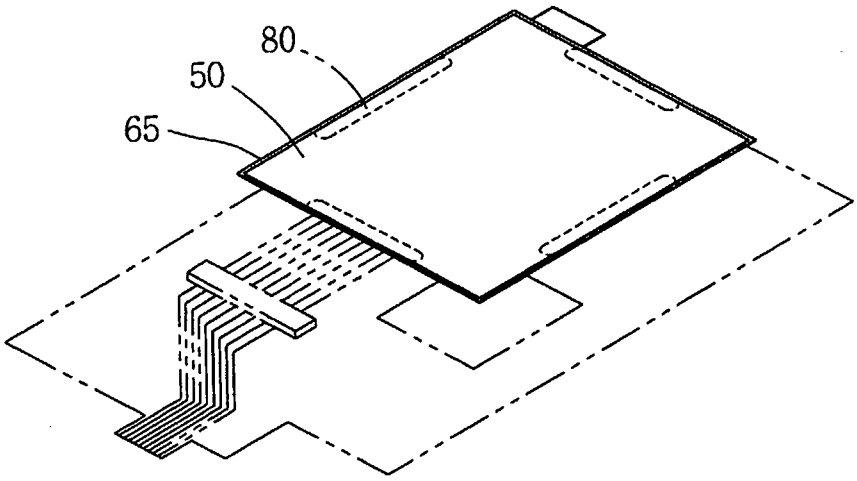


FIG. 9

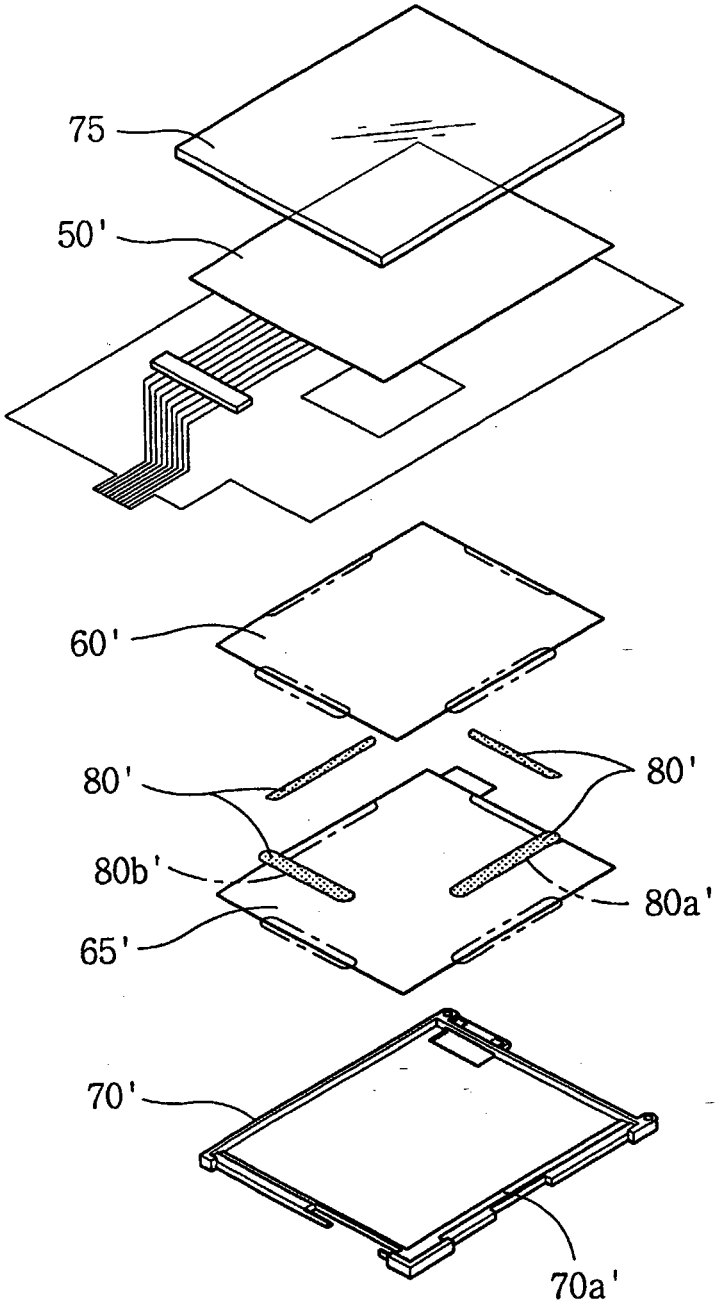
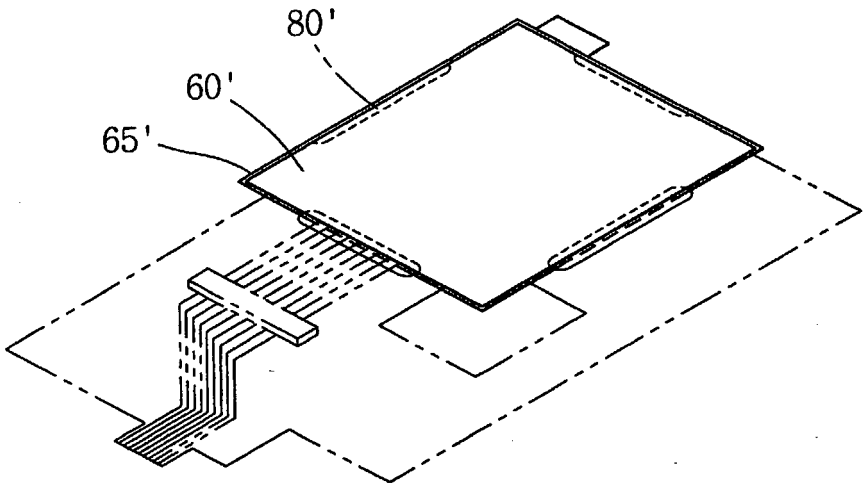


FIG. 10



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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外部链接	Espacenet		

摘要(译)

液晶显示装置和移动终端显示字母或图像信息。液晶显示装置包括具有多边形扁平形状的液晶面板和安装在液晶面板的平坦部分处除角部之外的边缘中的至少一部分的粘合构件，并且根据本发明的移动终端包括：位于壳体一侧的发送和接收单元，暴露于由用户调节的壳体外部的输入调节单元，用于根据输入调节单元的输入信号输出驱动信号的控制单元输入和输出信号的时间，连接到发送和接收单元，由控制单元的输出信号操作的液晶显示驱动单元，位于壳体中的液晶面板，从而可以从外部，用于通过液晶显示驱动单元显示字母或图像信息，以及安装在至少一部分am的粘附构件除了液晶面板的平坦部分处的角部之外的边缘。因此，根据本发明的液晶显示装置和根据本发明的移动终端可以提高具有液晶面板的移动终端的耐用性和可靠性，即使由于下降或温度变化的影响，也可以使点生成最小化。施加一定的扭力负荷。

FIG. 1