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(54) **Liquid crystal display device with a LED backlight and thermally conducting housing or frame portions**

Flüssigkristallanzeigevorrichtung mit LED-Rückbeleuchtung und wärmeleitenden Gehäuse- oder Rahmenteilern

Dispositif d'affichage à cristaux liquides avec rétro-éclairage à DEL et boîtier ou cadre ayant des parties thermoconductrices

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(73) Proprietor: **Samsung Electronics Co., Ltd.**
Suwon-si, Gyeonggi-do, 443-742 (KR)

(72) Inventors:
• **Cho, Jin-hyun**
Seoul (KR)

• **Kang, Joon**
Gwanak-gu
Seoul (KR)

(74) Representative: **Hylarides, Paul Jacques et al**
Arnold & Siedsma
Sweelinckplein 1
2517 GK The Hague (NL)

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US-A1- 2003 016 313 **US-A1- 2005 094 052**
US-A1- 2005 213 924

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Description**BACKGROUND OF THE INVENTION**

1. Field of the Invention

[0001] Apparatuses consistent with the present invention relate to a liquid crystal display (LCD) apparatus using a light emitting diode (LED) as a light source.

2. Description of the Related Art

[0002] A liquid crystal display (LCD) apparatus is a kind of flat panel display (FPD) apparatus, which converts various electric information generating from all sorts of devices into visual information by using a change of transmissivity in a liquid crystal according to a voltage applied thereto and displays it. Contrary to a cathode ray tube (CRT) display apparatus, the FDP apparatus needs a backlight because it does not have a self-luminosity. However, the FDP apparatus consumes little electric power and can be used in a portable type device because it is driven with a low driving voltage. Thus, the FDP apparatus is widely used in a watch, a TV, a monitor for computer, etc.

[0003] Such a LCD apparatus usually includes a liquid crystal panel, and a backlight module arranged adjacent to the liquid crystal panel.

[0004] The liquid crystal panel is provided with a pair of substrates arranged in a minutely spaced-apart relation to each other, a liquid crystal interposed in a space between the substrates, and a driving circuit to drive the liquid crystal.

[0005] According to a method of driving the liquid crystal, the liquid crystal panel is classified into an active matrix type to drive a pixel capacity by using switch elements, a passive matrix type to drive a pixel capacity without using switch elements, etc.

[0006] Particularly, the active matrix type liquid crystal panel can be further classified into a type using three terminal type switch elements such as thin film transistors (TFT), a type using two terminal type switch elements such as thin film diodes (TFD), etc.

[0007] The backlight module is provided with a light guide plate arranged adjacent to the liquid crystal panel, and a light source to irradiate light to the light guide plate. Light conveyed to the light guide plate from the light source is guided to the liquid crystal panel through a diffusing plate and/or a prism.

[0008] A fluorescent lamp, such a cold cathode fluorescent lamp (CCFL), an external electrode fluorescent lamp (EEFL), etc., is usually used as the light source of the backlight module. However, the fluorescent lamp is disadvantageous in that a lifespan is shortened due to a change of gas pressure in plasma, an inverter is required to realize a high driving voltage of several hundred volts necessary for plasma discharge, and a consumption efficiency of electric power is low.

[0009] Accordingly, recently a light emitting diode (LED) is in the spotlight as the light source for use in the backlight module. The LED is a light emitting element, which produces light by a light emitting phenomenon generating when a voltage is applied to a semiconductor. The LED is advantageous in that as compared with the conventional light source such as a fluorescent lamp, a size is relatively small, a lifespan is guaranteed for a relatively long time, an energy efficiency is relatively high since an electric energy is directly converted into a light energy, and a relatively low driving voltage is required.

[0010] However, when the LED is used as the light source for the backlight module in the LCD apparatus, it is disadvantageous in that due to heat of high temperature generating while the LED is operated, the liquid crystal panel is subject to a negative influence and a light emitting performance of the LED itself is deteriorated. Accordingly, recently, there have been developed and disclosed various types of heat emitting structures, which can effectively emit the heat from the LED.

[0011] FIG. 1 is a side section view exemplifying a related art LCD apparatus.

[0012] As shown in the drawing, the related art LCD apparatus includes a liquid crystal panel 1, a backlight module 2 to irradiate light to the liquid crystal panel 1, a controller 3 to drive the liquid crystal panel 1 and the backlight module 2, and a frame 4 to which the liquid crystal panel 1 and the backlight module 2 are mounted.

[0013] A driving circuit board (not shown) for liquid crystal is connected to the liquid crystal panel 1.

[0014] The backlight module 2 includes a LED light source 5. The LED light source 5 is provided with a plurality of LEDs 5a, and a circuit board 5b on which the plurality of LEDs 5a are mounted.

[0015] At a rear side of the LED light source 5 is arranged a heat radiating member 7 having a plurality of heat radiating pins 7a. The heat radiating member 7 emits heat generating from the LED light source 5 to the outside.

[0016] The controller 3 includes a power supply, an inverter, a main control board, all sorts of electric elements and sensors, etc., which are not shown in the drawing, and controls a whole operation of the LCD apparatus. The frame 4 is provided with a front frame part 4a to which the liquid crystal panel 1 is mounted, and a rear frame 4b arranged behind the front frame part 4a.

[0017] Between the frame 4 and the backlight module 2 are arranged a first shield 8 to surround the backlight module 2 and the liquid crystal panel 1, and a second shield 9 to surround the controller 3.

[0018] The first and the second shields 8 and 9 are made of an electric-conductive material so as to shield all sorts of electromagnetic waves generating from the backlight module 2 and the controller 3.

[0019] However, such a related art LCD apparatus is disadvantageous in that the heat radiating member 7 used for emitting the heat of high temperature generating from the LED light source 5 occupies a large installation

space, thereby increasing a size of the LCD apparatus.

[0020] Further, the related art LCD apparatus is disadvantageous in that there is no heat radiating structure to emit all sorts of heat of high temperature generating from the controller 3, thereby deteriorating a display quality of the LCD apparatus.

[0021] Also, the related art LCD apparatus is disadvantageous in that there is installed a shield structure such as the first and the second shields 8 and 9 to intercept the electromagnetic waves generating from the backlight module 2 and the liquid crystal panel 1, thereby increasing the number of assembling parts and processes and enlarging a volume of the LCD apparatus.

[0022] JP 2005 338 178 discloses:

a liquid crystal display apparatus comprising a frame to which a liquid crystal panel assembly including a liquid crystal panel and a backlight module is mounted,

wherein the frame comprises a front frame part which exposes a screen of the liquid crystal panel to the outside, and a rear frame part arranged behind the front frame part, the rear frame part being adjacent to the backlight module being formed of a thermal-conductive material (metal), and being in thermal contact with the rear side of the liquid crystal panel assembly to emit heat generated by the light source of the backlight module.

US 2005/0094052 A1 discloses a liquid crystal panel assembly comprising:

- a liquid crystal panel;
- a backlight module having at least one light source which irradiates light to the liquid crystal panel and a light guide plate which guides light from the at least one light source; and
- a housing which surrounds (see Fig. 2) the liquid crystal panel and the backlight module, wherein at least a portion of the housing adjacent to the at least one light source is formed of a thermal-conductive material (metal),

wherein the at least one light source is a light emitting diode light source, - comprising a circuit board and a plurality of LEDs, wherein the portion of the housing is arranged to be in contact with the circuit board so as to transmit heat of the at least one LED light source to the housing

[0023] US 2005/21 3924 A1 discloses a liquid crystal panel assembly comprising:

a liquid crystal panel;
a backlight module having a light source which irradiates light to the liquid crystal panel and a light guide plate which guides light from the light sources; and
a housing which surrounds the liquid crystal panel and the backlight module, wherein the entire housing

including the portion of the housing adjacent to the light sources is formed of a thermal-conductive material,

5 wherein
the light source comprises a circuit board and a plurality of LEDs, wherein the housing is arranged so as to transmit heat of the LEDs to the housing, the housing comprises a front part and a rear part, the latter surrounding
10 the LED light source, and a reflecting plate.

SUMMARY OF THE INVENTION

[0024] Exemplary embodiments of the present invention address at least the above problems and/or disadvantages. Accordingly, an aspect of the present invention is to provide a liquid crystal display (LCD) apparatus according to claim 1 realising a compact size.

[0025] The present invention provides a LCD apparatus, which has a greatly enhanced display quality.

[0026] The present invention provides a LCD apparatus which can realize a high-energy efficiency.

[0027] The present invention provides a LCD apparatus, which can more effectively emit heat of high temperature generating from a light emitting diode (LED) light source of a backlight module.

[0028] The at least one LED light source of the backlight module may comprise a pair of LED light sources arranged symmetrically to each other at both sides of the light guide plate.

[0029] Other aspects and features of the invention will become apparent to those skilled in the art from the following detailed description, which, taken in conjunction with the annexed drawings, discloses exemplary embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] These and/or other aspects of certain exemplary embodiments of the present invention will become apparent and more readily appreciated from the following description of the exemplary embodiments, taken in conjunction with the accompanying drawings of which:

45 FIG. 1 is a side section view exemplifying a related art LCD apparatus;

FIG. 2 is an exploded perspective view exemplifying a liquid crystal panel assembly ;

FIG. 3 is a cross section view exemplifying a LCD apparatus in accordance with an exemplary embodiment of the present invention; and

FIG. 4 is a magnified cross section view of a portion IV of FIG. 3.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS OF THE PRESENT INVENTION

[0031] Reference will now be made in detail to the ex-

emplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The exemplary embodiments are described below in order to explain the present invention by referring to the figures.

[0032] FIG. 2 exemplifies a liquid crystal panel assembly, and FIGS. 3 and 4 exemplify a liquid crystal display (LCD) apparatus in accordance with an exemplary embodiment of the present invention to which the liquid crystal panel assembly is applied.

[0033] As illustrated in the drawings, the liquid crystal panel assembly 100 includes a liquid crystal panel 10, a backlight module 20 to irradiate light to the liquid crystal panel 10, and a housing 30.

[0034] The liquid crystal panel 10 may be one of various types of liquid crystal panels, which has a pair of substrates arranged in a minutely spaced-apart relation to each other, a liquid crystal interposed in a space between the pair of substrates, etc.

[0035] The backlight module 20 is provided with at least one light emitting diode (LED) light source 21, a light guide plate 22 to guide light from the LED light source 21, a diffusing plate 23 to diffuse light from the light guide plate 22 to the liquid crystal panel 10, and a reflecting plate 24 arranged at a rear side of the light guide plate 22.

[0036] The LED light source 21 includes a circuit board 21a, and a plurality of LEDs 21b mounted on the circuit board 21a. The respective LEDs 21b irradiate light in a lateral direction of the light guide plate 22, the light guide plate 22 leads light from the respective LEDs 21b to the diffusing plate 23, and the diffusing plate 23 diffuses light conveyed from the light guide plate 22 to the liquid crystal panel 10. The reflecting plate 24, which is arranged at an opposite surface to a light emitting surface of the light guide plate 22, reflects and guides light led onto the opposite surface of the light guide plate 22 toward the diffusing plate 23.

[0037] According to an exemplary embodiment of the present invention, the LED light source 21 is configured, such that as illustrated in FIGS. 2 and 3, a pair of LED light sources are arranged at both ends, e.g., upper and lower ends, of the light guide plate 22, respectively, thereby uniformly conveying light all over the light guide plate 22.

[0038] However, the present invention does not limit the number and the arrangement of the LED light source 21. For instance, instead of arranging the pair of LED light sources 21 at both ends of the light guide plate 22 as illustrated in FIGS. 2 and 3, a single LED light source (not shown) can be arranged at the middle of the backlight module 20.

[0039] Also, a condensing sheet 25 is interposed between the diffusing plate 23 and the liquid crystal panel 10. The condensing sheet 25 functions to condense light diffused by the diffusing plate 23 into an image area of the liquid crystal panel 10, like, e.g., a prism sheet, a high brightness film, etc.

[0040] If a prism sheet is used as the condensing sheet 25, it does not transmit an S wave, thereby reducing a light efficiency even though a P wave is transmitted. Thus, a high brightness film such as a dual brightness-enhanced film (DBEF) may be used as the condensing sheet 25.

[0041] Such a high brightness film, as an improved reflective polarizer to reduce a loss of light as generated in the prism sheet, converts a direction of an S wave component into the same direction as that of a P wave component to reduce a loss of the S wave, thereby increasing a brightness.

[0042] The housing 30 is arranged to surround the liquid crystal panel 10 and the backlight module 20, either contacting with or being adjacent to but without contacting with the LED light source 21 of the backlight module 20 at a portion thereof. The housing 30 includes a front housing part 31 formed to expose an effective display area of a screen of the liquid crystal panel 10 to the outside, and a rear housing part 32 arranged behind the front housing part 31.

[0043] The front housing part 31 has an opening 31a to expose the effective display area of the screen of the liquid crystal panel 10 to the outside.

[0044] The rear housing part 32 is mounted at a rear side of the backlight module 20, so that it is arranged to be in contact with the LED light source 21 of the backlight module 20 (see FIG. 4).

[0045] The rear housing part 32 is formed of a thermal-conductive material such as Al, Zr-electroplated steel, Cu, graphite, thermal-conductive plastic, etc. so as to facilitate an emission of heat of high temperature generating from the LED light source 21 therethrough.

[0046] The rear housing part 32 may be configured in a shape to surround the LED light source 21 to more facilitate the emission of the heat of high temperature generating from the LED light source 21.

[0047] Referring to FIG. 4, the front and the rear housing parts 31 and 32 are interconnected by a frame-shaped connecting bracket 33. A driving circuit board 15 for liquid crystal is disposed between the connecting bracket 33 and the front housing part 31, and connected to the liquid crystal panel 10 through a flexible board 14 to drive and control a pixel capacity of the liquid crystal panel 10.

[0048] Similarly to the rear housing part 32, the connecting bracket 33 is formed of a thermal-conductive material.

[0049] The LCD apparatus 200 in accordance with an exemplary embodiment of the present invention includes a liquid crystal panel assembly 100 as described above, and a frame 40 to which the liquid crystal panel assembly 100 is mounted.

[0050] The frame 40 is provided with a front frame part 41 to which the liquid crystal panel 10 is mounted to expose an effective display area of the screen thereof to the outside, and a rear frame part 42 mounted at a rear side of the liquid crystal panel assembly 100.

[0051] The front frame part 41 has an opening 41a corresponding to the opening 31a of the front housing part 31 so as to expose the effective display area of the screen of the liquid crystal panel 10 to the outside.

[0052] The rear frame part 42 is configured, such that it is either in contact or adjacent to, but not contacting with the LED light source 21 of the liquid crystal panel assembly 100.

[0053] The rear frame part 42 is formed of a thermal and electric-conductive material such as Al, Zr-electroplated steel, Cu, etc.

[0054] The rear frame part 42 at an inner side thereof may have a contact part 42a to be in contact with and support the rear housing part 32 of the liquid crystal panel assembly 100. According to the invention, the rear frame part 42 and the rear housing part 32 are in contact with each other, so that the heat of high temperature generating from the LED light source 21 can be more effectively emitted to the outside through the rear frame part 42 and the rear housing part 32.

[0055] Between the rear frame part 42 and the rear housing part 32 is interposed a controller 50. The controller 50 includes a power supply to control a supply of electric power, an inverter, a main control board to control all sorts of controlling and driving signals for the LCD apparatus 200, all sorts of electric elements and sensors, etc., which are not shown in the drawings, and controls a whole operation of the LCD apparatus 200.

[0056] As previously noted, being formed of the thermal and electric-conductive material such as Al, Zr-electroplated steel, Cu, etc., and arranged behind the controller 50, the rear frame part 42 also has an electromagnetic wave shield function which effectively intercepts electromagnetic waves generated by the controller 50 during the operation.

[0057] According to the present invention, the rear housing part 32 and the rear frame part 42 are formed of the thermal-conductive material. Accordingly, the heat of high temperature generating from the LED light source 21 can be more effectively emitted to the outside, thereby reducing a heating temperature of the LED light source 21. Thus, the display quality of the liquid crystal panel assembly and the LCD apparatus as well as the brightness of the LED light source 21 can be enhanced.

[0058] Further, according to the exemplary embodiment of the present invention, as the heat generating from the LED light source 21 is effectively emitted to the outside as described above, the liquid crystal panel assembly and the LCD apparatus can minimize the consumption of electric power, thereby maximizing the energy efficiency.

[0059] Also, according to the exemplary embodiment of the present invention, the LCD apparatus is configured, such that a structure of emitting the heat from the LED light source 21 is simplified as described above. Accordingly, the LCD apparatus can be embodied to have a more-compact size.

[0060] Also, according to the present invention, the

rear frame part 42 is formed of the thermal and electric-conductive material so as to intercept the electromagnetic waves generating from the controller 50. Accordingly, the LCD apparatus does not need a separate electromagnetic wave shield structure.

[0061] Although a few exemplary embodiments of the present invention have been generally shown and described, it will be appreciated by those skilled in the art that changes may be made in these exemplary embodiments without departing from the principles of the invention, the scope of which is defined in the appended claims.

15 Claims

1. A liquid crystal display apparatus (200) comprising:

a liquid crystal panel assembly (100) including

- a liquid crystal panel (10);
- a backlight module (20) having at least one LED light source (21) arranged to irradiate light to the liquid crystal panel (10), a light guide plate (22) arranged to guide light from the at least one LED light source (21), a diffusing plate (23) arranged to diffuse light from the light guide plate (22) to the liquid crystal panel (10), and a reflecting plate (24) arranged to reflect light from the light guide plate (22) to the diffusing plate (23), the at least one LED light source (21) including a circuit board (21a) and a plurality of LEDs (21b) mounted on the circuit board (21a), the plurality of LEDs (21b) arranged to irradiate light in a lateral direction of the light guide plate (22); and
- a housing (30) which surrounds the liquid crystal panel (10) and the backlight module (20), the housing (30) having a front part (31) which exposes a screen of the liquid crystal panel (10) to the outside and a rear part (32) formed of a thermal-conductive material and arranged at a rear side of the backlight module (20),

a frame having a front part (41) which is provided with an opening (41a) for exposure of the screen of the liquid crystal panel assembly (100), and a rear part (42) formed of a thermal-and electric-conductive material and mounted at a rear side of the liquid crystal panel assembly (100); and a controller (50) interposed between the rear part (42) of the frame and the rear part (32) of the housing (30), the controller including a power supply, an inverter and a main control board and being arranged to control the operation of the liquid crystal display apparatus,

wherein the rear part (32) of the housing (30) is arranged to be in contact with the at least one LED light source (21), and the rear part (42) of the frame is arranged to be in contact with the rear part (32) of the housing (30), and wherein the rear part (42) of the frame has an electromagnetic wave shield function of effectively intercepting electromagnetic waves generated by the controller (50) during operation.

2. The liquid crystal panel assembly as claimed in claim 1, wherein the at least one LED light source of the backlight module comprises a pair of LED light sources arranged symmetrically to each other at both sides of the light guide plate.

Patentansprüche

1. Flüssigkristallanzeigevorrichtung (200), umfassend:

eine Flüssigkristalltafelanordnung (100) einschließlich

- einer Flüssigkristalltafel (10);
- eines Hintergrundbeleuchtungsmoduls (20) mit zumindest einer LED-Lichtquelle (21), die dazu eingerichtet ist, Licht zur Flüssigkristalltafel (10) zu strahlen, einer Lichtleiterplatte (22), die dazu eingerichtet ist, Licht aus der zumindest einen LED-Lichtquelle (21) zu leiten, einer Diffusionsplatte (23), die dazu eingerichtet ist, Licht aus der Lichtleiterplatte (22) zur Flüssigkristalltafel (10) zu diffundieren, und einer Reflexionsplatte (24), die dazu eingerichtet ist, Licht aus der Lichtleiterplatte (22) zur Diffusionsplatte (23) zu reflektieren, wobei die zumindest eine LED-Lichtquelle (21) eine Platine (21a) und mehrere auf der Platine (21a) angebrachte LEDs (21b) beinhaltet, wobei die mehreren LEDs (21b) dazu eingerichtet sind, Licht in eine seitliche Richtung der Lichtleiterplatte (22) zu strahlen; und
- eines Gehäuses (30), das die Flüssigkristalltafel (10) und das Hintergrundbeleuchtungsmodul (20) umgibt, wobei das Gehäuse (30) einen vorderen Teil (31) aufweist, der einen Schirm der Flüssigkristalltafel (10) zur Außenseite hin freilegt, und einen rückwärtigen Teil (32), der aus einem wärmeleitenden Material ausgebildet und an einer Rückseite des Hintergrundbeleuchtungsmoduls (20) eingerichtet ist, einen Rahmen mit einem vorderen Teil (41), der mit einer Öffnung (41a) zur Freilegung des Schirms der Flüssigkristalltafelanordnung

(100) versehen ist, und einem rückwärtigen Teil (42), der aus einem wärme- und elektrisch leitenden Material ausgebildet und an einer Rückseite der Flüssigkristalltafelanordnung (100) angebracht ist; und

einen Controller (50), der zwischen dem rückwärtigen Teil (42) des Rahmens und dem rückwärtigen Teil (32) des Gehäuses (30) angeordnet ist, wobei der Controller eine Energieversorgungseinrichtung, einen Inverter und eine Hauptplatine beinhaltet und dazu eingerichtet ist, den Betrieb der Flüssigkristallanzeigevorrichtung zu steuern, wobei der rückwärtige Teil (32) des Gehäuses (30) dazu eingerichtet ist, in Kontakt mit der zumindest einen LED-Lichtquelle (21) zu sein, und der rückwärtige Teil (42) des Rahmens dazu eingerichtet ist, in Kontakt mit dem rückwärtigen Teil (32) des Gehäuses (30) zu sein, und wobei der rückwärtige Teil (42) des Rahmens eine Abschirmfunktion für elektromagnetische Wellen zum effektiven Abfangen elektromagnetischer Wellen besitzt, die vom Controller (50) während des Betriebs erzeugt werden.

2. Flüssigkristalltafelanordnung nach Anspruch 1, wobei die zumindest eine LED-Lichtquelle des Hintergrundbeleuchtungsmoduls ein Paar LED-Lichtquellen umfasst, die symmetrisch zueinander an beiden Seiten der Lichtleiterplatte eingerichtet sind.

Revendications

1. Dispositif d'affichage à cristaux liquides (200) comprenant :

une unité à panneau à cristaux liquides (100) comportant

- un panneau à cristaux liquides (10) ;
- un module de rétroéclairage (20) présentant au moins une source lumineuse à DEL (21) agencée pour rayonner de la lumière sur le panneau à cristaux liquides (10), une plaque de guidage lumineux (22) agencée pour guider la lumière provenant de l'au moins une source lumineuse à DEL (21), une plaque de diffusion (23) agencée pour diffuser la lumière provenant de la plaque de guidage lumineux (22) vers le panneau à cristaux liquides (10), et une plaque réfléchissante (24) agencée pour réfléchir la lumière provenant de la plaque de guidage lumineux (22) vers la plaque de diffusion (23), l'au moins une source lumineuse à DEL (21) comportant une carte de circuit

imprimé (21a) et une pluralité de DEL (21b) montées sur la carte de circuit imprimé (21a), la pluralité de DEL (21b) étant agencée pour rayonner de la lumière dans une direction latérale de la plaque de guidage lumineux (22) ; et

- un boîtier (30) qui entoure le panneau à cristaux liquides (10) et le module de rétroéclairage (20), le boîtier (30) possédant une partie avant (31), qui expose à l'environnement extérieur un écran du panneau à cristaux liquides (10), et une partie arrière (32) constituée dans une matière thermoconductrice et agencée sur un côté arrière du module de rétroéclairage (20),

un cadre possédant une partie avant (41) qui est pourvue d'une ouverture (41a) permettant d'exposer l'écran de l'unité à panneau à cristaux liquides (100), et

une partie arrière (42) constituée dans une matière thermoconductrice et montée sur un côté arrière de l'unité à panneau à cristaux liquides (100) ; et

un dispositif de commande (50) interposé entre la partie arrière (42) du cadre et la partie arrière (32) du boîtier (30), le dispositif de commande comportant une alimentation, un convertisseur et un tableau de commande principal et étant agencé pour commander le fonctionnement du dispositif d'affichage à cristaux liquides, la partie arrière (32) du boîtier (30) étant agencée pour être en contact avec l'au moins une source lumineuse à DEL (21), et la partie arrière (42) du cadre étant agencée pour être en contact avec la partie arrière (32) du boîtier (30), et la partie arrière (42) du cadre possédant une fonction de protection contre les ondes électromagnétiques permettant d'intercepter efficacement les ondes électromagnétiques générées par le dispositif de commande (50) lors du fonctionnement.

2. Unité à panneau à cristaux liquides selon la revendication 1, dans laquelle l'au moins une source lumineuse à DEL du module de rétroéclairage comprend une paire de sources lumineuses à DEL agencées symétriquement l'une par rapport à l'autre de part et d'autre de la plaque de guidage lumineux.

FIG. 1

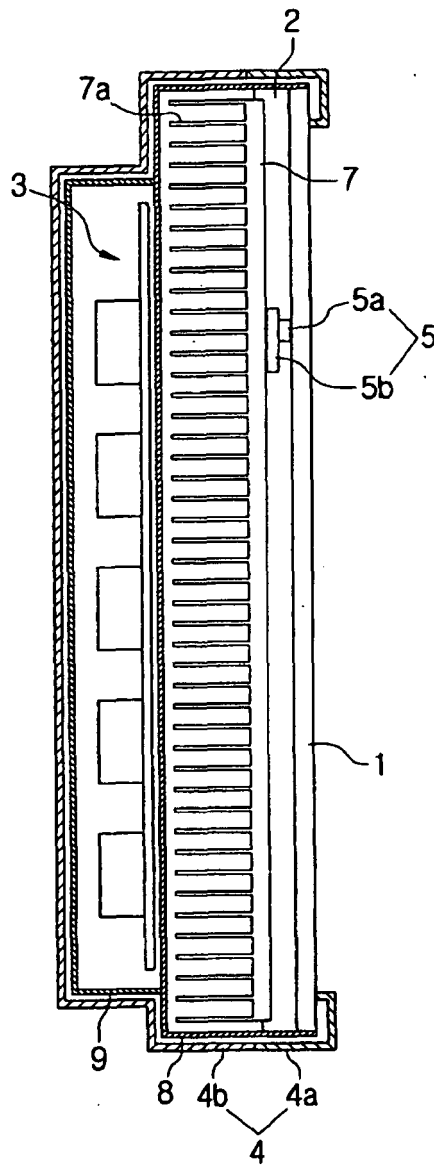


FIG. 2

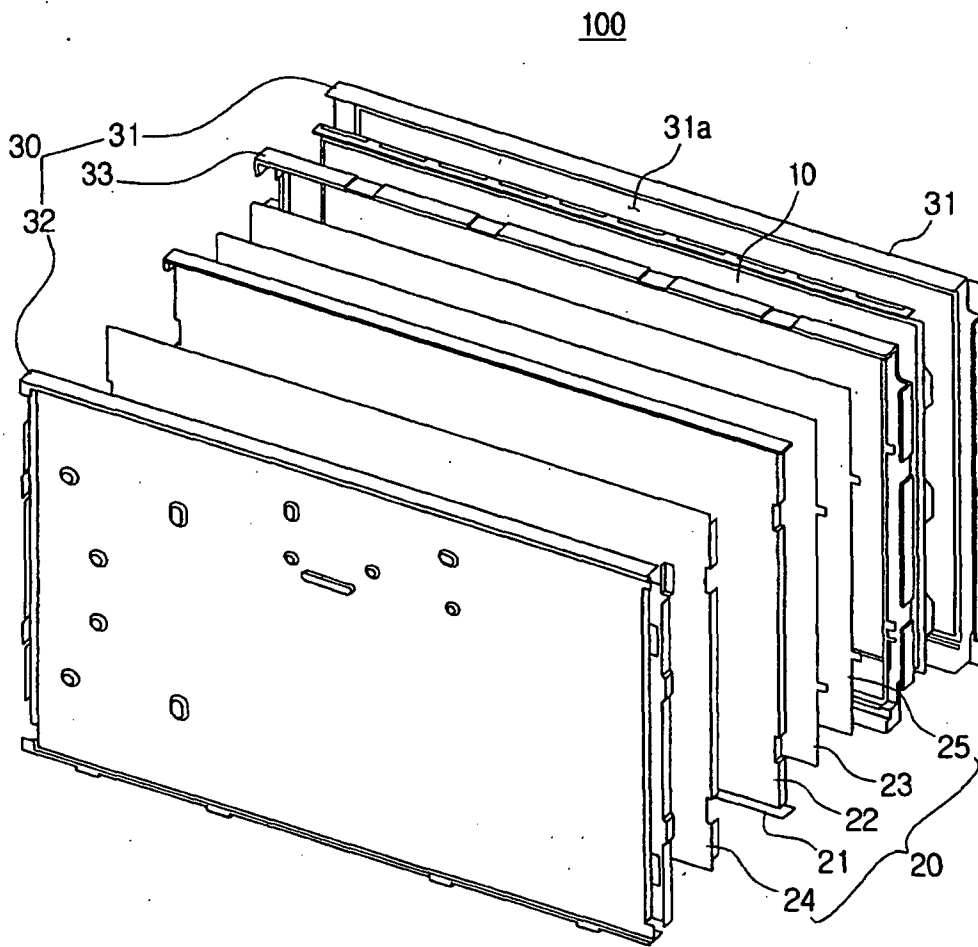


FIG. 3

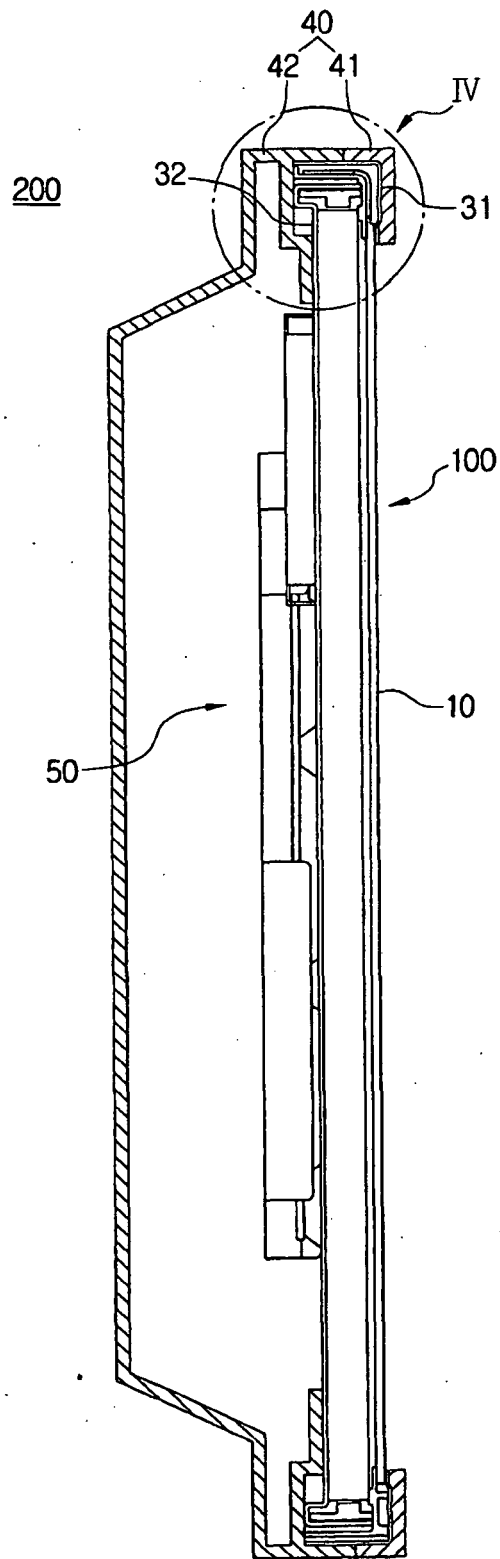
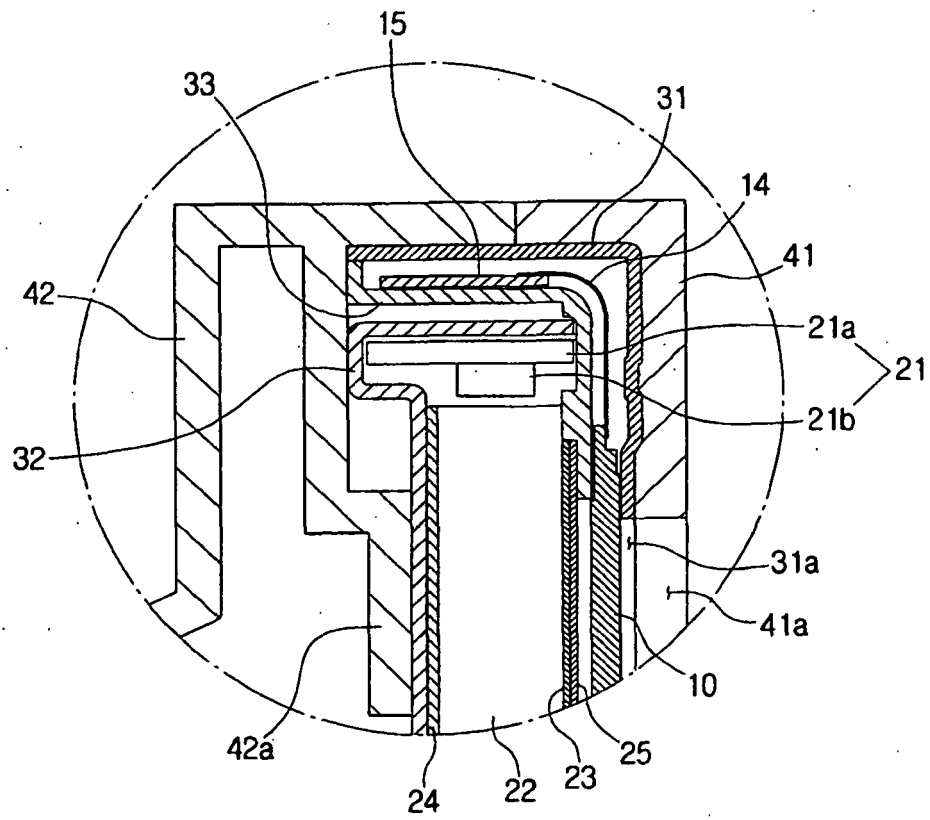


FIG. 4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 20050094052 A1 [0022]
- US 2005213924 A1 [0023]

专利名称(译)	液晶显示装置具有LED背光和导热壳体或框架部分		
公开(公告)号	EP1835330B1	公开(公告)日	2014-06-25
申请号	EP2006077004	申请日	2006-11-10
[标]申请(专利权)人(译)	三星电子株式会社		
申请(专利权)人(译)	SAMSUNG ELECTRONICS CO. , LTD.		
当前申请(专利权)人(译)	SAMSUNG ELECTRONICS CO. , LTD.		
[标]发明人	CHO JIN HYUN KANG JOON		
发明人	CHO, JIN-HYUN KANG, JOON		
IPC分类号	G02F1/1333 G02F1/13357 F21V8/00		
CPC分类号	G02F1/133615 G02B6/0073 G02B6/0085 G02F1/133308 G02F2001/133314 G02F2001/133317 G02F2001/133334 G02F2001/133628		
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摘要(译)

一种液晶面板组件，包括液晶面板（10），具有至少一个发光二极管（LED）光源（21b）的背光模块，用于将光照射到液晶面板，以及壳体（31,32）。围绕液晶面板和背光模块。与至少一个LED光源（21b）相邻的壳体的至少一部分（32）由导热材料形成。

FIG. 1

