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(54) **LIQUID CRYSTAL DISPLAY PANEL AND LIQUID CRYSTAL DISPLAY**

FLÜSSIGKRISTALLANZEIGETAFEL UND FLÜSSIGKRISTALLANZEIGEVORRICHTUNG

PANNEAU D'AFFICHAGE À CRISTAUX LIQUIDES ET DISPOSITIF D'AFFICHAGE À CRISTAUX LIQUIDES

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(73) Proprietor: **BOE Technology Group Co., Ltd.**
Beijing 100015 (CN)

(72) Inventor: **SUZUKI, Teruaki**
Beijing 100176 (CN)

(74) Representative: **Brötz, Helmut et al**
Rieder & Partner mbB
Patentanwälte - Rechtsanwalt
Corneliusstrasse 45
42329 Wuppertal (DE)

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a liquid crystal display panel and a liquid crystal display.

BACKGROUND

[0002] As shown in FIG. 1, a vertical alignment (VA) liquid crystal display panel comprises: an array substrate 01 and a color-filter substrate 02, disposed opposite to each other to form a cell, as well as a liquid crystal layer 13 between the two substrates; the liquid crystal molecules in the liquid crystal layer 13 is arranged vertically.

[0003] With reference to the VA liquid crystal display panel shown in FIG. 1, on the array substrate 01, there are formed with a first common electrode 111 and a pixel electrode 112, and both the electrodes 111, 112 are arranged at an interval; on the color-filter substrate 02, there is formed with a second common electrode 121. When power is supplied, oblique electric fields are formed among the three electrodes, the liquid crystal molecules under the effect of the two electric fields deviate from their vertical positions to be in a tilted manner, so that the liquid crystal display panel is enabled to let light pass; however, a part of the liquid crystal molecules in the upper-layer (the liquid crystal layer near the color-filter substrate)-because the distance from the pixel electrode is large and thus the electric force is reduced-deviate from their vertical positions by smaller angles, and this will lead to a lower light-transmittance of the liquid crystal display panel.

[0004] In order to improve the light-transmittance of such liquid crystal display panel, as shown in FIG. 2, in the prior art, if the thickness of the liquid crystal display panel is unchanged, a transparent dielectric layer 122 is formed on the color-filter substrate to cover the second common electrode 121. The dielectric layer 122 can increase the proportion of the horizontal electric field with respect to the vertical electric field, so that the tilt degrees of the liquid crystal molecules are increased, thereby improving the light-transmittance of the panel to a certain extent. The present disclosure provides another scheme of a liquid crystal display panel.

[0005] In the prior art, US2009/0109356A1 discloses a liquid crystal display device. It includes a TFT substrate and a display pixel arranged in a matrix form on the substrate, a counter substrate opposed to the TFT substrate and being stuck therewith and a liquid crystal enclosed between the TFT substrate and the counter substrate, the pixel electrode and the first common electrode are arranged so that an electric field along a principal plane of the TFT substrate can be applied to the liquid crystal, a second common electrode for inputting a common electric potential is formed on the counter substrate, the second common electrode is opposed to the first common electrode, and a conduction part for electrically connecting the second common electrode and the first common electrode mutually and transmitting the common electric potential to the first common electrode is formed near each display pixel or near a predetermined display pixel.

SUMMARY

[0006] According to claim 1, there is provided a vertical alignment liquid crystal display panel, comprising: a first substrate and a second substrate, disposed opposite to each other to form a cell, as well as a liquid crystal layer between the two substrates, wherein on the first substrate, there is formed with a first common electrode and a pixel electrode, arranged at an interval; on the second substrate, there is formed with a set of layers, the set of layers comprising: a second common electrode, and a dielectric layer covering one side of the second common electrode facing the first substrate, and the structure of the set of layers is different at a position directly opposite to the first common electrode from that at a position directly opposite to the pixel electrode,

characterized in that

the dielectric layer in the set of layers comprises: a first dielectric unit and a second dielectric unit, arranged at an interval and closely linked; wherein the first dielectric unit is located at a position directly opposite to the first common electrode, and the second dielectric unit is located at a position directly opposite to the pixel electrode; and the dielectric constant of the first dielectric unit is greater than that of the second dielectric unit.

[0007] Preferably, a width of the first dielectric unit is consistent with a width of the second dielectric unit.

[0008] In some other examples, the structure of the set of layers being different at a position directly opposite to the first common electrode from that at a position directly opposite to the pixel electrode comprises the case in which:

[0009] on the second common electrode in the set of layers, there is formed with a slit, and the slit is located at a position directly opposite to the pixel electrode.

[0010] Preferably, a width of the slit is consistent with a width of the pixel electrode.

[0011] According to claim 5, there is provided a vertical alignment liquid crystal display panel, which includes: a first substrate and a second substrate, disposed opposite to each other to form a cell, as well as a liquid crystal layer between the two substrates;

wherein, on the first substrate, there is formed with a first common electrode and a pixel electrode, arranged at an interval; on the second substrate, there is formed with a set of layers, the set of layers comprising: a second common electrode, and a dielectric layer covering one side of the second common electrode facing the first substrate, the structure of the set of layers being different at a position directly opposite to the first common electrode from that at a position directly opposite to the pixel electrode , characterized in that: with respect to the second substrate,

[0012] the second common electrode in the set of layers is in a concave-convex shape, wherein a distance between a concave-shaped portion of the second common electrode and the first substrate is smaller than a distance between a convex-shaped portion of the second common electrode and the first substrate; and the concave-shaped portion of the second common electrode is located at a position directly opposite to the first common electrode, and the convex-shaped portion of the second common electrode is located at a position directly opposite to the pixel electrode.

[0013] Preferably, a width of the concave-shaped portion of the second common electrode is consistent with a width of the first common electrode.

[0014] Furthermore, the convex-shaped portion of the second common electrode may be formed with a slit, and the slit is located at a position directly opposite to the pixel electrode. Preferably, a width of the slit is consistent with a width of the pixel electrode.

[0015] According to some other embodiments of the present disclosure, there is provided a liquid crystal display comprising: a liquid crystal display panel as previously described, and a backlight source providing backlight for the liquid crystal display panel.

[0016] In the liquid crystal display panel and the liquid crystal display provided by the embodiments of the present disclosure, the structure of the set of layers is different at a position directly opposite to the first common electrode from that at a position directly opposite to the pixel electrode, so that the liquid crystal molecules in the liquid crystal layer-alter being supplied with power-deviate from their vertical positions under the effect of electric fields, enabling the liquid crystal display panel to be light-transmissive, and thereby realizing the display function of the liquid crystal display panel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] In order to clearly illustrate the technical solutions in the embodiments of the present disclosure or in the prior art, the drawings needed in describing the embodiments or the prior art will be briefly described in the following; it is obvious that the drawings described as follows are merely some embodiments of the present disclosure. Based on these accompany drawings, those ordinary skilled in the art can obtain other drawings, without any inventive work.

FIG. 1 is a schematic view of a liquid crystal display panel in the prior art;

FIG. 2 is a schematic view of another liquid crystal display panel in the prior art;

FIG. 3 is a schematic view of a liquid crystal display panel provided in the first embodiment;

FIG 4 is a schematic view of a liquid crystal display panel provided in the second embodiment;

FIG. 5 is a schematic view of another liquid crystal display panel provided in the second embodiment;

FIG. 6 is a schematic view of a liquid crystal display panel provided in the third embodiment;

FIG. 7 is a schematic view of a liquid crystal display panel provided in the third embodiment in the first implementation;

FIG. 8 is a schematic view of a liquid crystal display panel provided in the third embodiment in the second implementation; and

FIG. 9 is a schematic view of another liquid crystal display panel provided in the third embodiment in the second implementation.

Reference numerals

[0018]

01 - Array substrate, 02 - Color-filter substrate;
11 - First substrate, 12 - Second substrate, 13 - Liquid crystal layer;
111 - First common electrode, 112 - Pixel electrode, 121 - Second common electrode, 122 - Dielectric layer;
31 - Slits on the second common electrode, 42 - Concave-shaped portion of second common electrode, 41 - Convex-shaped portion of second common electrode, 43 - Slits on the convex-shaped portion of second common electrode, 61 - First dielectric unit, 62 - Second dielectric unit.

DETAILED DESCRIPTION

[0019] Below, the technical solutions in the embodiments of the present disclosure will be described in a clearly and fully understandable way, in connection with the accompanying drawings in the embodiments of the present disclosure. It is obvious that, the described embodiments are only a part but not all of the embodiments of the present disclosure. Based on the embodiments in the present disclosure, those ordinary skilled in the art can obtain all other embodiment(s), without any inventive work, which should belong to the protection scope as claimed.

[0020] The liquid crystal display panels in all embodiments of the present disclosure may be VA-IPF liquid crystal display panels. Among them, before a VA liquid crystal display panel being supplied with power, the liquid crystal molecules are arranged vertically. IPF (In-Plane Field) refers to the case in which a liquid crystal display panel mainly utilizes a horizontal electric field to drive liquid crystal molecules to deflect in a vertical plane so as to achieve the light-transmission of the panel and thus the display function of the panel. The present disclosure refers to a liquid crystal display panel with these two features of both VA and IPF as a VA-IPF liquid crystal display panel.

First Embodiment:

[0021] As shown in FIG. 3, this embodiment provides a liquid crystal display panel, which comprises: a first substrate 11 and a second substrate 12, disposed opposite to each other to form a cell, as well as a liquid crystal layer 13 between the two substrates. On the first substrate, there is formed with a first common electrode 111 and a pixel electrode 112, arranged at an interval. On the second substrate, there is formed with a set of layers, the set of layers comprising: a second common electrode 121 and a dielectric layer 122 covering the side of the second common electrode 121 facing the first substrate 11. The structure of the set of layers is different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112.

[0022] Typically, the first substrate is an array substrate, and the second substrate is a color-filter substrate.

[0023] Among them, in the case of the liquid crystal display panel being supplied with power, the voltage applied to the first common electrode 111 is consistent with the voltage applied to the second common electrode 121; and the pixel electrode 112 is typically connected with a drain of a thin film transistor in the pixel structure on the first substrate.

[0024] Typically, the first common electrode 111, the second common electrode 121 and the pixel electrode 112 are all made of the material of indium-tin oxide (ITO).

[0025] Preferably, the structure of the set of layers being different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112, comprises the following cases.

[0026] The dielectric layer 122 in the set of layers comprises: a first dielectric unit 61 and a second dielectric unit 62, arranged at an interval and closely linked to each other; the first dielectric unit 61 is located at a position directly opposite to the first common electrode 111, and the second dielectric unit 62 is located at a position directly opposite to the pixel electrode 112; and the dielectric constant of the first dielectric unit 61 is greater than that of the second dielectric unit 62.

[0027] In this embodiment, the first dielectric unit 61 with a larger dielectric constant is located at a position directly opposite to the first common electrode 111, and the second dielectric unit 62 with a smaller dielectric constant is located at a position directly opposite to the pixel electrode 112. According to theoretical knowledge of physics, it can be known that: a dielectric will change the intensity of an electric field; thus, when a dielectric with a high dielectric constant is placed in an electric field, the electric field intensity will have a certain amount of decrease comparatively; the higher the dielectric constant of the dielectric is, more notable the effect on the electric filed becomes. Therefore, electric field intensity at the location of the first dielectric unit 61 with a larger dielectric constant is less than that at the location of the second dielectric unit 62 with a smaller dielectric constant. Since the electric field intensity between the second common electrode 121 and the first common electrode 111 as well as between the second common electrode 121 and the pixel electrode 112 is constant, in the liquid crystal layer the electric field intensity corresponding to the location of the first dielectric unit 61 is greater than that of the second dielectric unit 62. Since an electric force is directly proportional to an electric field intensity, the electric force formed between the pixel electrode 112 and a portion of the second common electrode 121 corresponding to the first dielectric unit 61 is greater than the electric force formed between the pixel electrode 112 and a portion of the second common electrode 121 corresponding to the second dielectric unit 62. Thus an oblique electric field is formed in the liquid crystal layer, so that the liquid crystal molecules in the liquid crystal layer when power is supplied deviate from their vertical positions by a larger tilt angle with respect to the prior art, which further improves the light-transmittance of the liquid crystal display panel.

[0028] Further preferably, the width of the first dielectric unit 61 is consistent with the width of the second dielectric unit 62. In the present disclosure, "width" refers to a minimum profile dimension of a structural feature in a direction parallel to a substrate plane.

Second Embodiment:

[0029] As shown in FIG. 4, this embodiment provides a liquid crystal display panel, which comprises: a first substrate 11 and a second substrate 12, disposed opposite to each other to form a cell, as well as a liquid crystal layer 13 between the two substrates. On the first substrate, there is formed with a first common electrode 111 and a pixel electrode 112, arranged at an interval. On the second substrate, there is formed with a set of layers, the set of layers comprising: a second common electrode 121, and a dielectric layer 122 covering the side of the second common electrode 121 facing the first substrate 11. The structure of the set of layers is different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112.

[0030] Typically, the first substrate is an array substrate, and the second substrate is a color-filter substrate.

[0031] Among them, in the case of the liquid crystal display panel being supplied with power, the voltage applied to the first common electrode 111 is consistent with the voltage applied to the second common electrode 121; and moreover, each pixel electrode 112 is typically connected with a drain of a thin film transistor in the pixel structure on the first substrate.

[0032] The electric fields comprise: a horizontal electric field, formed between the first common electrode 111 and the second common electrode 121 as well as between the first common electrode 111 and the pixel electrode 112; and a vertical electric field, formed between the pixel electrode 112 and the second common elec-

trode 121.

[0033] Typically, the first common electrode 111, the second common electrode 121 and the pixel electrode 112 are all made of the material of indium-tin oxide (ITO).

[0034] It should be noted that, in the drawings of all embodiments of the present disclosure, only the layer structures related to the technology of this disclosure are shown, whereas the layer structures unrelated to the technology of this disclosure are not shown; however, those skilled in the art can have a clear and unambiguous understanding of the technical solutions provided by the present disclosure, based on the description of the embodiments in the present disclosure and the prior art.

[0035] In the liquid crystal display panel provided by this embodiment, the structure of the set of layers is different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112, so that the liquid crystal molecules under the effect of electric fields deviate from their vertical positions, enabling the liquid crystal display panel to be light-transmissive, and thereby realizing the display function of the liquid crystal display panel.

[0036] Preferably, the structure of the set of layers being different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112, comprises the case in which: on the second common electrode 121 in the set of layers, there is formed with a slit 31, and the slit 31 is located at a position directly opposite to the pixel electrode 112.

[0037] In the scheme provided by this embodiment, the second common electrode 121 is formed with a slit 31 at a position directly opposite to the pixel electrode 112, in such a way that-in the case of power being supplied-the electric force between the pixel electrode 112 and the slit 31 is reduced. Meanwhile, with respect to the liquid crystal display panel shown in FIG. 2, as the electric field formed between the pixel electrode 112 and the second common electrode 121 corresponding to the first common electrode 111 is not weakened, the oblique electric field formed between the pixel electrode 112 and the second common electrode 121 corresponding to the first common electrode 111 is therefore increased. This makes the alignment direction of the liquid crystal molecules in the liquid crystal layer under the effect of the two electric fields deviate from a vertical position by a larger tilt angle with respect to the prior art, which further improves the light-transmittance of the liquid crystal display panel, and thereby enhancing the display effect of the liquid crystal display panel.

[0038] Further preferably, the width of the slit is consistent with the width of the pixel electrode 112.

[0039] Further, this embodiment may incorporate the scheme in the first embodiment. As shown in FIG. 5, preferably the structure of the set of layers being different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112, comprises the case in which:

[0040] The dielectric layer 122 in the set of layers comprises: a first dielectric unit 61 and a second dielectric unit 62, arranged at an interval and closely linked to each other; wherein, the first dielectric unit 61 is located at a position directly opposite to the first common electrode 111, and the second dielectric unit 62 is located at a position directly opposite to the pixel electrode 112; and moreover, the dielectric constant of the first dielectric unit 61 is greater than that of the second dielectric unit 62.

[0041] In this way, on the basis of the liquid crystal display panel shown in FIG. 4, the light-transmittance of the liquid crystal display panel can be further improved.

Third Embodiment:

[0042] As shown in FIG. 6, this embodiment provides a liquid crystal display panel, which comprises: a first substrate 11 and a second substrate 12, disposed opposite to each other to form a cell, as well as a liquid crystal layer 13 between the two substrates. On the first substrate, there is formed with a first common electrode 111 and a pixel electrode 112, arranged at an interval. On the second substrate, there is formed with a set of layers, the set of layers comprising: a second common electrode 121, and a dielectric layer 122 covering the side of the second common electrode 121 facing the first substrate 11. The structure of the set of layers is different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112.

[0043] Typically, the first substrate is an array substrate, and the second substrate is a color-filter substrate.

[0044] Among them, in the case of the liquid crystal display panel being supplied with power, the voltage applied to the first common electrode 111 is consistent with the voltage applied to the second common electrode 121; and the pixel electrode 112 is typically connected with a drain of a thin film transistor in the pixel structure on the first substrate.

[0045] Typically, the first common electrode 111, the second common electrode 121 and the pixel electrode 112 are all made of the material of indium-tin oxide (ITO).

[0046] Preferably, the structure of the set of layers being different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112, comprises the case in which:

[0047] The second common electrode 121 in the set of layers is in a concave-convex shape, wherein the distance between a concave-shaped portion 42 of the second common electrode 121 and the first substrate is smaller than the distance between a convex-shaped portion 41 of the second common electrode 121 and the first substrate; and moreover, the concave-shaped portion 42 of the second common electrode 121 is located at a position directly opposite to the first common electrode 111, and the convex-shaped portion 41 of the second common electrode 121 is located at a position directly opposite to the pixel electrode 112.

[0048] Among them, the method for making the second

common electrode in a concave-convex shape, may be as shown in FIG 6, which can be done as below: at the locations of the concave-shaped portions of the second common electrode on the second substrate, firstly an insulating substance is used to form a stripe with a certain thickness (represented by the pure black blocks in FIG. 6), and then the second common electrode is formed thereon.

[0049] In this embodiment, the concave-shaped portion of the second common electrode is located at a position directly opposite to the first common electrode, and the convex-shaped portion of the second common electrode is located at a position directly opposite to the pixel electrode, which makes the distance between the pixel electrode 112 and the concave-shaped portion 42 on the second common electrode 121 less than the distance between the pixel electrode 112 and the convex-shaped portion 41. Thus, with respect to the liquid crystal display panel shown in FIG. 2, the oblique electric field formed by the second common electrode and the pixel electrode is increased, so that the alignment direction of the liquid crystal molecules in the liquid crystal layer deviate from a vertical position by a larger tilt angle with respect to the prior art, which further improves the light-transmittance of the liquid crystal display panel, and thereby enhancing the display effect of the liquid crystal display panel.

[0050] Further preferably, the width of the concave-shaped portion 42 of the second common electrode 121 is consistent with the width of the first common electrode 111.

[0051] On the basis of the liquid crystal display panel shown in FIG. 6, the light-transmittance of the liquid crystal display panel can be further improved by adopting the following two ways.

[0052] The first way: as shown in FIG. 7, based on the liquid crystal display panel shown in FIG. 6, the structure of the set of layers being different at a position directly opposite to the first common electrode 111 from that at a position directly opposite to the pixel electrode 112, further comprises the case in which:

[0053] The dielectric layer 122 in the set of layers comprises: a first dielectric unit 61 and a second dielectric unit 62, arranged at an interval and closely linked to each other; wherein, the first dielectric unit 61 is located at a position directly opposite to the first common electrode 111, and the second dielectric unit 62 is located at a position directly opposite to the pixel electrode 112; and the dielectric constant of the first dielectric unit 61 is greater than that of the second dielectric unit 62.

[0054] In this way, on the basis of the liquid crystal display panel shown in FIG. 6, the light-transmittance of the liquid crystal display panel can be further improved.

[0055] The second way: as shown in FIG 8, based on the liquid crystal display panel shown in FIG 6, the convex-shaped portion 41 of the second common electrode 121 is further formed with a slit 43, and the slit 43 is located at a position directly opposite to the pixel electrode 112. This scheme incorporates the scheme provided with a slit in the second embodiment, which makes the oblique electric field formed by the second common electrode 121 and the pixel electrode 112 further increased, so that the alignment direction of the liquid crystal molecules in the liquid crystal layer deviate from a vertical position by a larger tilt angle with respect to the prior art, which further improves the light-transmittance of the liquid crystal display panel.

[0056] Further preferably, the width of the slit 43 is consistent with the width of the pixel electrode 112.

[0057] In addition, for further improving the light-transmittance of the liquid crystal display panel, further preferably, as shown in FIG. 9, based on the liquid crystal display panel shown in FIG. 6, both the first way and the second way as described above can be adopted at the same time, so as to improve the light-transmittance of the liquid crystal display panel as much as possible. It should be noted that, the first implementation and the second implementation take the above description for reference, which is no more explained here.

[0058] An embodiment of the present disclosure further provides a liquid crystal display, which comprises a liquid crystal display panel, and a backlight source providing backlight for the liquid crystal display panel; the liquid crystal display panel may be any one of the liquid crystal display panels described above in accordance with the embodiments of the present disclosure.

[0059] The protection scope of the present invention is defined by the appended claims.

Claims

1. A vertical alignment liquid crystal display panel, comprising: a first substrate (11) and a second substrate (12), disposed opposite to each other to form a cell, as well as a liquid crystal layer (13) between the two substrates;

wherein, on the first substrate (11), there is formed a first common electrode (111) and a pixel electrode (112), arranged at an interval; on the second substrate, there is formed a set of layers, the set of layers comprising: a second common electrode (121), and a dielectric layer (122) covering the side of the second common electrode (121) facing the first substrate (11); and

the structure of the set of layers is different at a position directly opposite to the first common electrode (111) from that at a position directly opposite to the pixel electrode (112);

characterized in that the dielectric layer (122) in the set of layers comprises a first dielectric unit (61) and a second dielectric unit (62), arranged at an interval and closely linked to each other, wherein the first dielectric unit (61) is located at a position directly opposite to the first common electrode (111), and the second dielectric unit (62) is located at a position directly opposite to the pixel electrode (112); and the

dielectric constant of the first dielectric unit (61) is greater than that of the second dielectric unit (62).

2. The liquid crystal display panel according to Claim 1, **characterized in that**, the width of the first dielectric unit (61) is consistent with the width of the second dielectric unit (62).

3. The liquid crystal display panel according to any one of claims 1, 2,
characterized in that, the structure of the set of layers being different at a position directly opposite to the first common electrode (111) from that at a position directly opposite to the pixel electrode (112) comprises a case in which:

on the second common electrode (121) in the set of layers, there is formed a slit (31), and the slit (31) is located at a position directly opposite to the pixel electrode (112).

4. The liquid crystal display panel according to Claim 3, **characterized in that**, the width of the slit (31) is consistent with the width of the pixel electrode (112).

5. A vertical alignment liquid crystal display panel, which includes: a first substrate (11) and a second substrate (12), disposed opposite to each other to form a cell, as well as a liquid crystal layer (13) between the two substrates;
wherein, on the first substrate (11), there is formed a first common electrode (111) and a pixel electrode (112), arranged at an interval; on the second substrate (12), there is formed with a set of layers, the set of layers comprising: a second common electrode (121), and a dielectric layer (122) covering the side of the second common electrode (121) facing the first substrate (11),
the structure of the set of layers being different at a position directly opposite to the first common electrode (111) from that at a position directly opposite to the pixel electrode (112);
characterized in that: with respect to the second substrate (12), the second common electrode (121) in the set of layers is in a concave-convex shape,
wherein the distance between a concave-shaped portion (42) of the second common electrode (121) and the first substrate (11) is smaller than the distance between a convex-shaped portion (41) of the second common electrode (121) and the first substrate (11); and the concave-shaped portion (42) of the second common electrode (121) is located at a position directly opposite to the first common electrode (111), and the convex-shaped portion (41) of the second common electrode (121) is located at a position directly opposite to the pixel electrode (112).

6. The liquid crystal display panel according to Claim 5, **characterized in that**, the width of the concave-shaped portion (42) of the second common electrode (121) is consistent with the width of the first common electrode (111).

7. The liquid crystal display panel according to Claim 5,**characterized in that**, the convex-shaped portion (41) of the second common electrode (121) is formed with a slit (43), and the slit (43) is located at a position directly opposite to the pixel electrode (112).

8. The liquid crystal display panel according to Claim 7, **characterized in that**, the width of the slit (43) is consistent with the width of the pixel electrode (112).

9. A liquid crystal display comprising: a liquid crystal display panel, and a backlight source providing backlight for the liquid crystal display panel, **characterized in that**, the liquid crystal display panel is in accordance with any one of claims 1 -8.

Patentansprüche

1. Vertikalausrichtungs-Flüssigkristallanzeigetafel, umfassend: ein erstes Substrat (11) und ein zweites Substrat (12), einander gegenüber angeordnet, um eine Zelle zu bilden, und eine Flüssigkristallschicht (13) zwischen den zwei Substraten;
wobei auf dem ersten Substrat (11) eine erste gemeinsame Elektrode (111) und eine Pixelelektrode (112), angeordnet bei einem Intervall, gebildet sind;
wobei auf dem zweiten Substrat ein Set aus Schichten gebildet ist, wobei das Set aus Schichten umfasst: eine zweite gemeinsame Elektrode (121) und eine dielektrische Schicht (122), welche die Seite der zweiten
gemeinsamen Elektrode (121), die zu dem ersten Substrat (11) zeigt, bedeckt; und
wobei die Struktur des Sets aus Schichten sich an einer Position direkt gegenüber der ersten gemeinsamen Elektrode (111) von der an einer Position direkt gegenüber der Pixelelektrode (112) unterscheidet;
dadurch gekennzeichnet, dass die dielektrische Schicht (122) in dem Set aus Schichten eine erste dielektrische Einheit (61) und eine zweite dielektrische Einheit (62) umfasst, angeordnet bei einem Intervall und dicht miteinander verbunden, umfasst,
wobei die erste dielektrische Einheit (61) an einer Position direkt gegenüber der ersten gemeinsamen Elektrode (111) lokalisiert ist, und wobei die zweite dielektrische Einheit (62) an einer Position direkt gegenüber der Pixelelektrode (112) lokalisiert ist; und
wobei die dielektrische Konstante der ersten dielektrischen Einheit (61) größer ist als diejenige der zweiten dielektrischen Einheit (62).

2. Flüssigkristallanzeigetafel gemäß Anspruch 1, **dadurch gekennzeichnet, dass** die Breite der ersten dielektrischen Einheit (61) mit der Breite der zweiten dielektrischen Einheit (62) konsistent ist.

3. Flüssigkristallanzeigetafel gemäß einem der Ansprüche, 1, 2, **dadurch gekennzeichnet, dass** das Abweichen der Struktur des Sets aus Schichten an einer Position direkt gegenüber der ersten gemeinsamen Elektrode (111) von derjenigen an einer Position direkt gegenüber der Pixelelektrode (112) einen Fall umfasst, wobei:

   auf der zweiten gemeinsamen Elektrode (121) in dem Set aus Schichten ist ein Schlitz (31 gebildet, und der Schlitz (31) ist bei einer Position direkt gegenüber der Pixelelektrode (112) lokalisiert.

4. Flüssigkristallanzeigetafel gemäß Anspruch 3, **dadurch gekennzeichnet, dass** die Breite des Schlitzes (31) mit der Breite der Pixelelektrode (112) konsistent ist.

5. Vertikalausrichtungs-Flüssigkristallanzeigetafel, welche aufweist: ein erstes Substrat (11) und ein zweites Substrat (12), die einander gegenüber angeordnet sind zur Bildung einer Zelle, und eine Flüssigkristallschicht (13) zwischen den zwei Substraten;
   wobei auf dem ersten Substrat (11) eine erste gemeinsame Elektrode (111) und eine Pixelelektrode (112), angeordnet bei einem Intervall, ausgebildet sind; wobei auf dem zweiten Substrat (12) ein Set aus Schichten gebildet ist, wobei das Set aus Schichten umfasst: eine zweite gemeinsame Elektrode (121) und eine dielektrische Schicht (122), welche die Seite der zweiten gemeinsamen Elektrode (121), die dem ersten Substrat (11) zugewandt ist, bedeckt,
   wobei die Struktur des Sets aus Schichten an einer Position direkt gegenüber der ersten gemeinsamen Elektrode (111) verschieden ist von derjenigen an einer Position direkt gegenüber der Pixelelektrode (112);
   dadurch gekennzeichnet, dass: bezüglich des zweiten Substrates (12) besitzt die zweite gemeinsame Elektrode (121) in dem Set aus Schichten eine konkav-konvexe Gestalt, wobei die Distanz zwischen einem konkav gestalteten Bereich (42) der zweiten gemeinsamen Elektrode (121) und dem ersten Substrat (11) kleiner ist als die Distanz zwischen einem konvex gestalteten Bereich (41) der zweiten gemeinsamen Elektrode (121) und dem ersten Substrat (11); und wobei der konkav gestaltete Bereich (42) der zweiten gemeinsamen Elektrode (121) an einer Position direkt gegenüber der ersten gemeinsamen Elektrode (111) lokalisiert ist, und wobei der konvex gestaltete Bereich (41) der zweiten gemeinsamen Elektrode (121) an einer Position direkt gegenüber der Pixelelektrode (112) lokalisiert ist.

6. Flüssigkristallanzeigetafel gemäß Anspruch 5, **dadurch gekennzeichnet, dass** die Breite des konkav gestalteten Bereiches (42) der zweiten gemeinsamen Elektrode (121) konsistent ist mit der Breite der ersten gemeinsamen Elektrode (111).

7. Flüssigkristallanzeigetafel gemäß Anspruch 5, **dadurch gekennzeichnet, dass** der konvex gestaltete Bereich (41) der zweiten gemeinsamen Elektrode (121) mit einem Schlitz (43) ausgebildet ist und dass der Schlitz (43) an einer Position direkt gegenüber der Pixelelektrode (112) lokalisiert ist.

8. Flüssigkristallanzeigetafel gemäß Anspruch 7, **dadurch gekennzeichnet, dass** die Breite des Schlitzes (43) mit der Breite der Pixelelektrode (112) konsistent ist.

9. Flüssigkristallanzeige, umfassend: eine Flüssigkristallanzeigetafel und eine Hintergrundlichtquelle, welche Hintergrundbeleuchtung für die Flüssigkristallanzeigetafel liefert, **dadurch gekennzeichnet, dass** die Flüssigkristallanzeigetafel gemäß einem der Ansprüche 1 - 8 ist.

Revendications

1. Un panneau d'affichage à cristaux liquides à alignement vertical, comprenant : un premier substrat (11) et un deuxième substrat (12) disposés l'un en face de l'autre pour former une cellule, ainsi qu'une couche de cristaux liquides (13) entre les deux substrats ;
   dans lequel sur le premier substrat (11) sont formés une première électrode commune (111) et une électrode de pixel (112) agencées à un intervalle ; sur le deuxième substrat est formé un ensemble de couches, l'ensemble de couches comprenant : une deuxième électrode commune (121), et une couche diélectrique (122) couvrant le côté de la deuxième électrode commune (121) faisant face au premier substrat (11) ; et
   la structure de l'ensemble de couches est différente à une position directement opposée à la première électrode commune (111) de celle à une position directement opposée à l'électrode de pixel (112) ;
   caractérisé en ce que la couche diélectrique (122) dans l'ensemble de couches comprend une première unité diélectrique (61) et une deuxième unité diélectrique (62) agencées à un intervalle et étroitement reliées entre elles, dans lequel la première unité diélectrique (61) est située à une position directement opposée à la première électrode commune (111), et

la deuxième unité diélectrique (62) est située à une position directement opposée à l'électrode de pixel (112) ; et la constante diélectrique de la première unité diélectrique (61) est supérieure à celle de la deuxième unité diélectrique (62).

2. Le panneau d'affichage à cristaux liquides selon la revendication 1, **caractérisé en ce que** la largeur de la première unité diélectrique (61) correspond à la largeur de la deuxième unité diélectrique (62).

3. Le panneau d'affichage à cristaux liquides selon l'une quelconque des revendications 1 et 2, **caractérisé en ce que** la structure de l'ensemble de couches qui est différente à une position directement opposée à la première électrode commune (111) de celle à une position directement opposée à l'électrode de pixel (112) comprend un cas dans lequel :

sur la deuxième électrode commune (121) dans l'ensemble de couches est formée une fente (31), et la fente (31) est située à une position directement opposée à l'électrode de pixel (112).

4. Le panneau d'affichage à cristaux liquides selon la revendication 3, **caractérisé en ce que** la largeur de la fente (31) correspond à la largeur de l'électrode de pixel (112).

5. Un panneau d'affichage à cristaux liquides à alignement vertical, qui comprend : un premier substrat (11) et un deuxième substrat (12) disposés en face l'un de l'autre pour former une cellule, ainsi qu'une couche de cristaux liquides (13) entre les deux substrats ;
dans lequel sur le premier substrat (11) sont formés une première électrode commune (111) et une électrode de pixel (112) agencées à un intervalle ; sur le deuxième substrat est formé un ensemble de couches, l'ensemble de couches comprenant : une deuxième électrode commune (121), et une couche diélectrique (122) couvrant le côté de la deuxième électrode commune (121) faisant face au premier substrat (11),
la structure de l'ensemble de couches étant différente à une position directement opposée à la première électrode commune (111) de celle à une position directement opposée à l'électrode de pixel (112) ;
caractérisé en ce que : concernant le deuxième substrat (12), la deuxième électrode commune (121) dans l'ensemble de couches est sous une forme concave-convexe, dans lequel la distance entre une portion de forme concave (42) de la deuxième électrode commune (121) et le premier substrat (11) est inférieure à la distance entre une portion de forme convexe (41) de la deuxième électrode commune (121) et le premier substrat (11) ; et la portion de forme concave (42) de la deuxième électrode commune (121) est située à une position directement opposée à la première électrode commune (111), et la portion de forme convexe (41) de la deuxième électrode commune (121) est située à une position directement opposée à l'électrode de pixel (112).

6. Le panneau d'affichage à cristaux liquides selon la revendication 5, **caractérisé en ce que** la largeur de la portion de forme concave (42) de la deuxième électrode commune (121) correspond à la largeur de la première électrode commune (111).

7. Le panneau d'affichage à cristaux liquides selon la revendication 5, **caractérisé en ce que** la portion de forme convexe (41) de la deuxième électrode commune (121) est formée avec une fente (43), et la fente (43) est située à une position directement opposée à l'électrode de pixel (112).

8. Le panneau d'affichage à cristaux liquides selon la revendication 7, **caractérisé en ce que** la largeur de la fente (43) correspond à la largeur de l'électrode de pixel (112).

9. Un dispositif d'affichage à cristaux liquides, comprenant : un panneau d'affichage à cristaux liquides, et une source de rétroéclairage procurant un rétroéclairage pour le panneau d'affichage à cristaux liquides, **caractérisé en ce que** le panneau d'affichage à cristaux liquides est selon l'une quelconque des revendications 1 à 8.

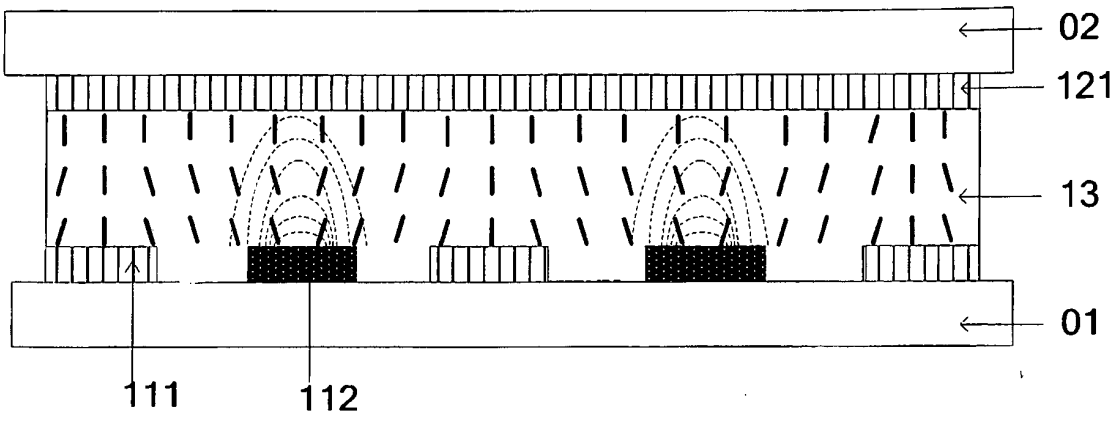

FIG.1

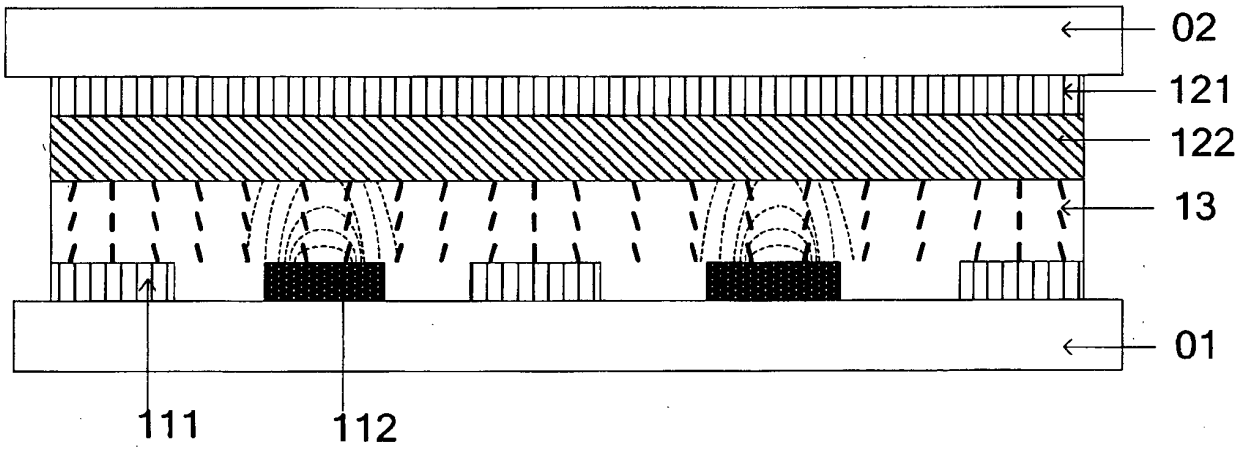

FIG.2

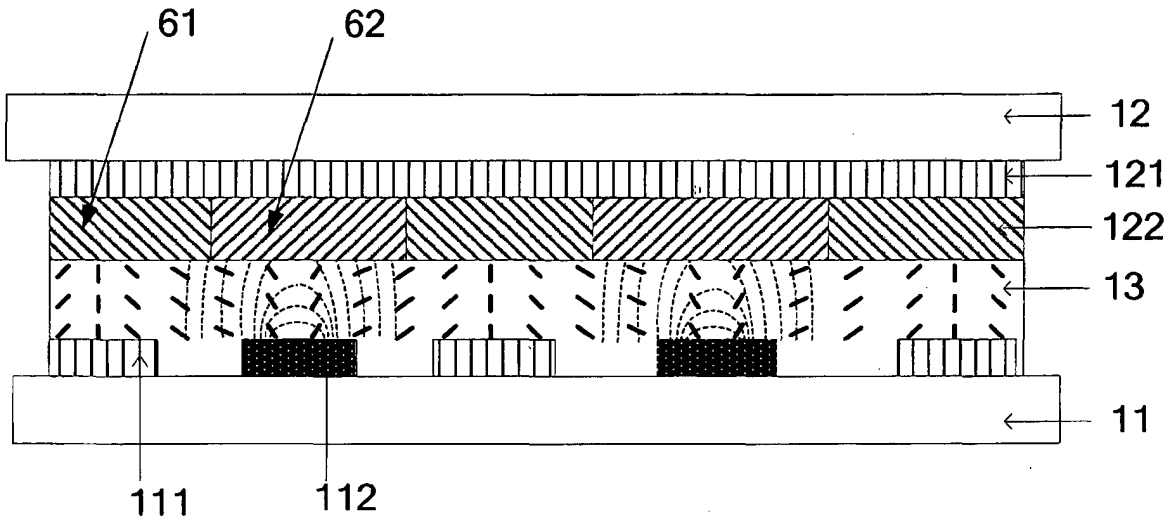

FIG.3

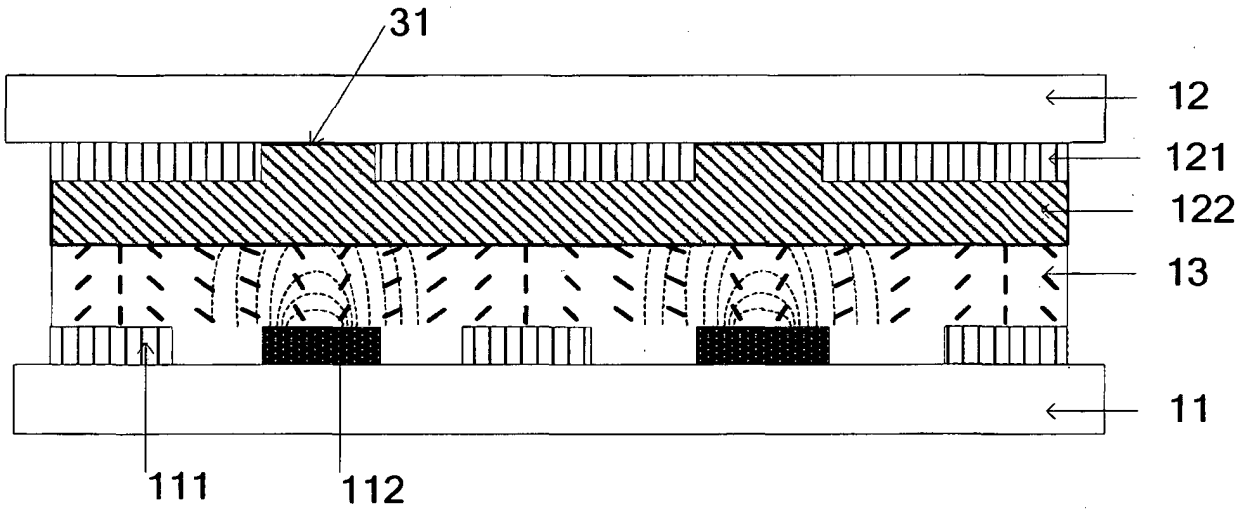

FIG.4

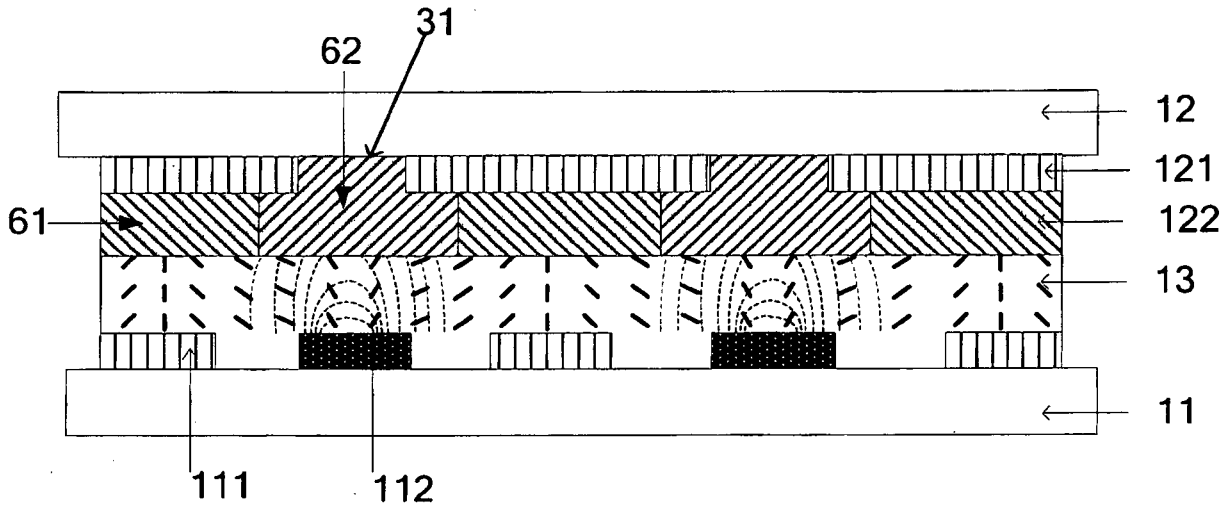

FIG.5

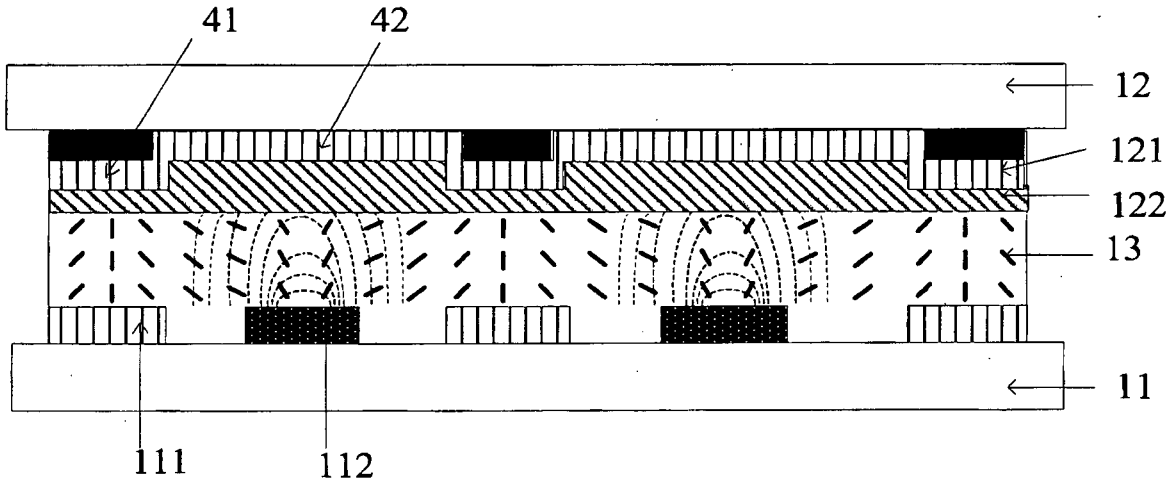

FIG.6

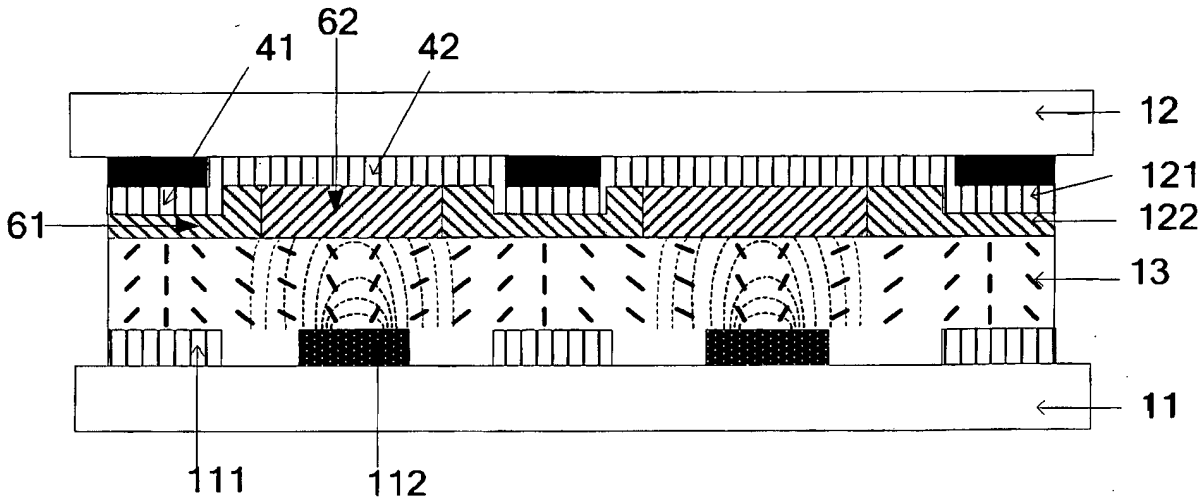
62
41
42
12
121
61
122
13
11
111
112

FIG.7

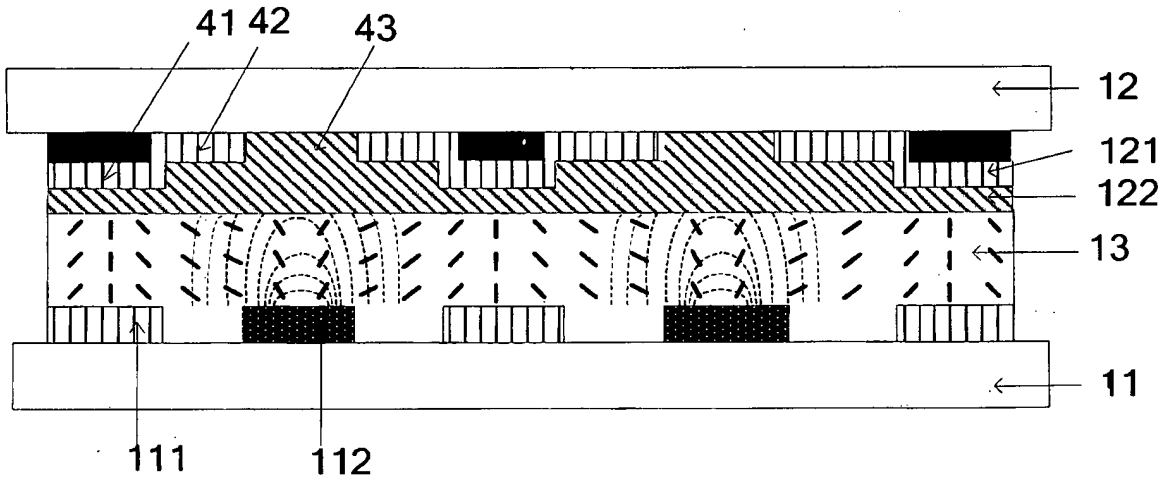
41 42
43
12
121
122
13
11
111
112

FIG.8

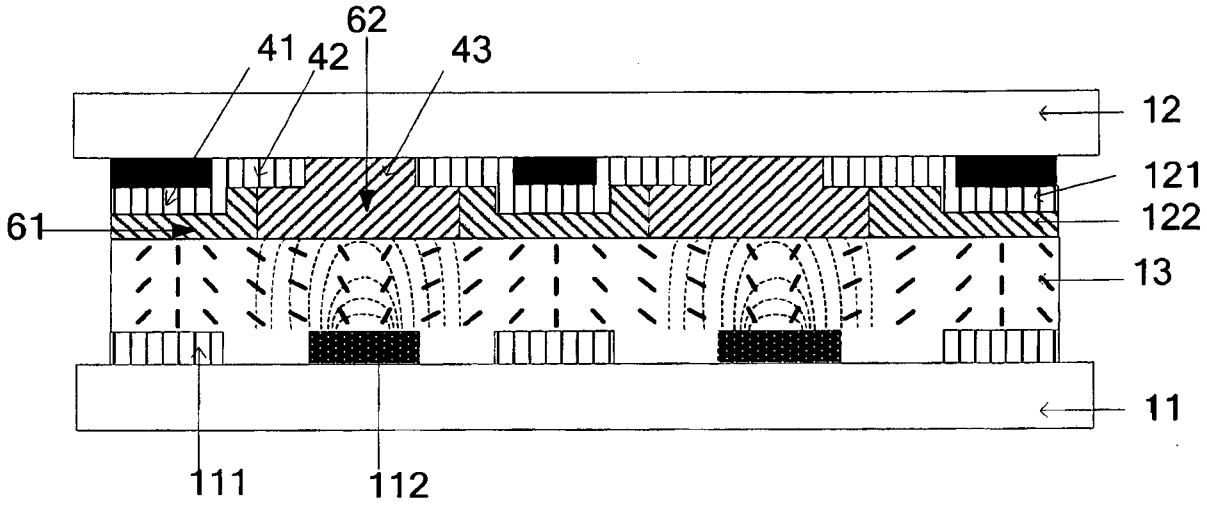

FIG.9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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专利名称(译)	液晶显示面板和液晶显示器		
公开(公告)号	EP2755081B1	公开(公告)日	2017-04-05
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当前申请(专利权)人(译)	京东方科技集团股份有限公司.		
[标]发明人	SUZUKI TERUAKI		
发明人	SUZUKI, TERUAKI		
IPC分类号	G02F1/1343 G02F1/1337		
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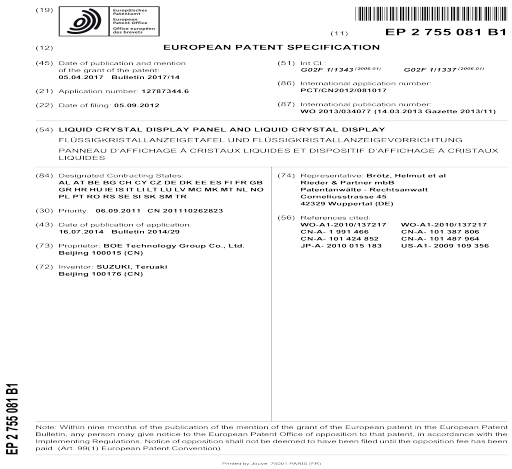
其他公开文献	EP2755081A4 EP2755081A1		
外部链接	Espacenet		

摘要(译)

公开了一种液晶显示面板和液晶显示器。液晶显示面板包括：第一基板和第二基板，彼此相对设置以形成单元，以及在两个基板之间的液晶层。在第一基板上，形成有间隔排列的第一公共电极和像素电极;在所述第二基板上形成有一组层，所述一组层包括：第二公共电极，以及覆盖所述第二公共电极的面向所述第一基板的一侧的介电层;并且，该组层的结构在与第一公共电极直接相对的位置处与在与像素电极正对的位置处的层的结构不同。


(19) Europäisches Patentamt European Patent Office Office européen des brevets

(11) EP 2 755 081 B1

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(87) International publication number: WO 2013/034077 (14.03.2013 Gazette 2013/11)

(54) LIQUID CRYSTAL DISPLAY PANEL AND LIQUID CRYSTAL DISPLAY

FLÜSSIGKRISTALLANZEIGETAFEL UND FLÜSSIGKRISTALLANZEIGEVORRICHTUNG

PANNEAU D'AFFICHAGE À CRISTAUX LIQUIDES ET DISPOSITIF D'AFFICHAGE À CRISTAUX LIQUIDES

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(73) Proprietor: BOE Technology Group Co., Ltd. Beijing 100015 (CN)

(72) Inventor: SUZUKI, Teruaki Beijing 100176 (CN)

(74) Representative: Brötz, Helmut et al Rieder & Partner mbB Patentanwälte - Rechtsanwalt Corneliusstrasse 45 42329 Wuppertal (DE)

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EP 2 755 081 B1

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