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Kim et al.(10) **Pub. No.: US 2010/0245698 A1**(43) **Pub. Date: Sep. 30, 2010**(54) **LIQUID CRYSTAL DISPLAY DEVICE****Publication Classification**(76) Inventors: **Yong-Hwan Kim**, Seoul (KR);
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(57) **ABSTRACT**

The present invention relates to a liquid crystal display. The liquid crystal display has a lower panel including a first pixel area having a first pixel electrode and a first light leakage preventing member, a final pixel area having a second pixel electrode and a second light leakage preventing member, and middle pixel areas disposed between the first pixel area and the final pixel area, each of the middle pixel areas including a first middle pixel electrode and a second middle pixel electrode. Accordingly, light leakage may be effectively prevented at the first pixel area and the final pixel area that are disposed on the edge.

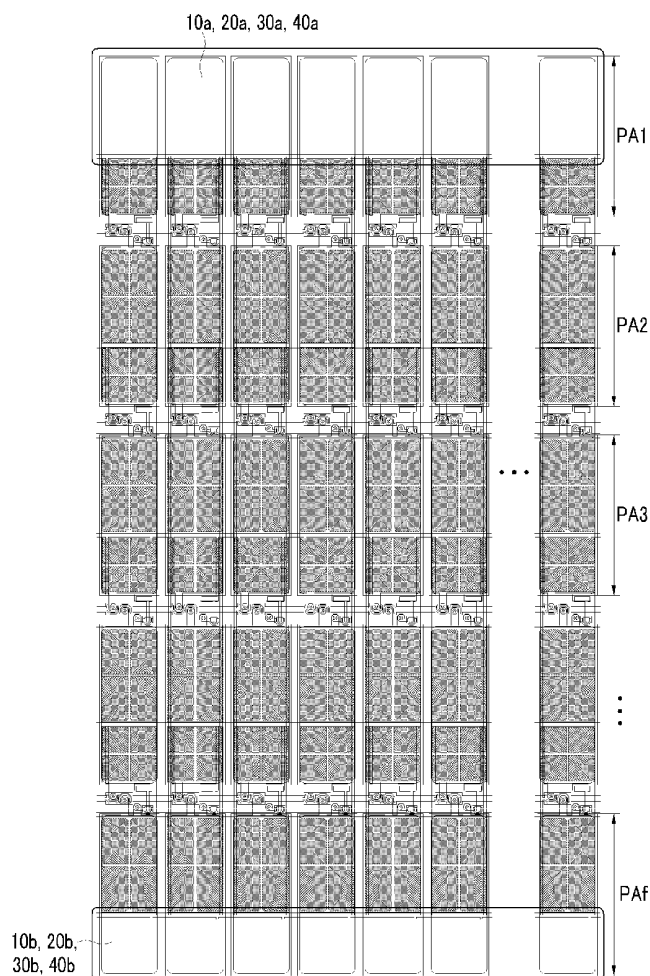


FIG.1

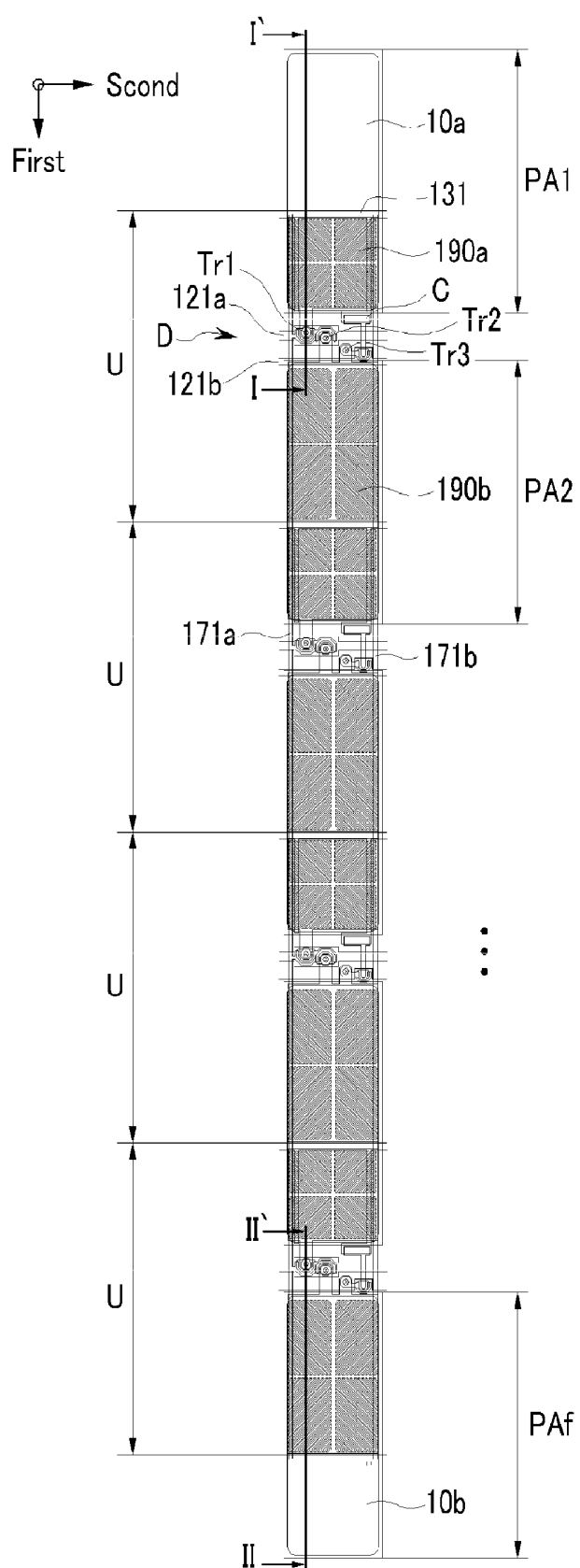


FIG. 2

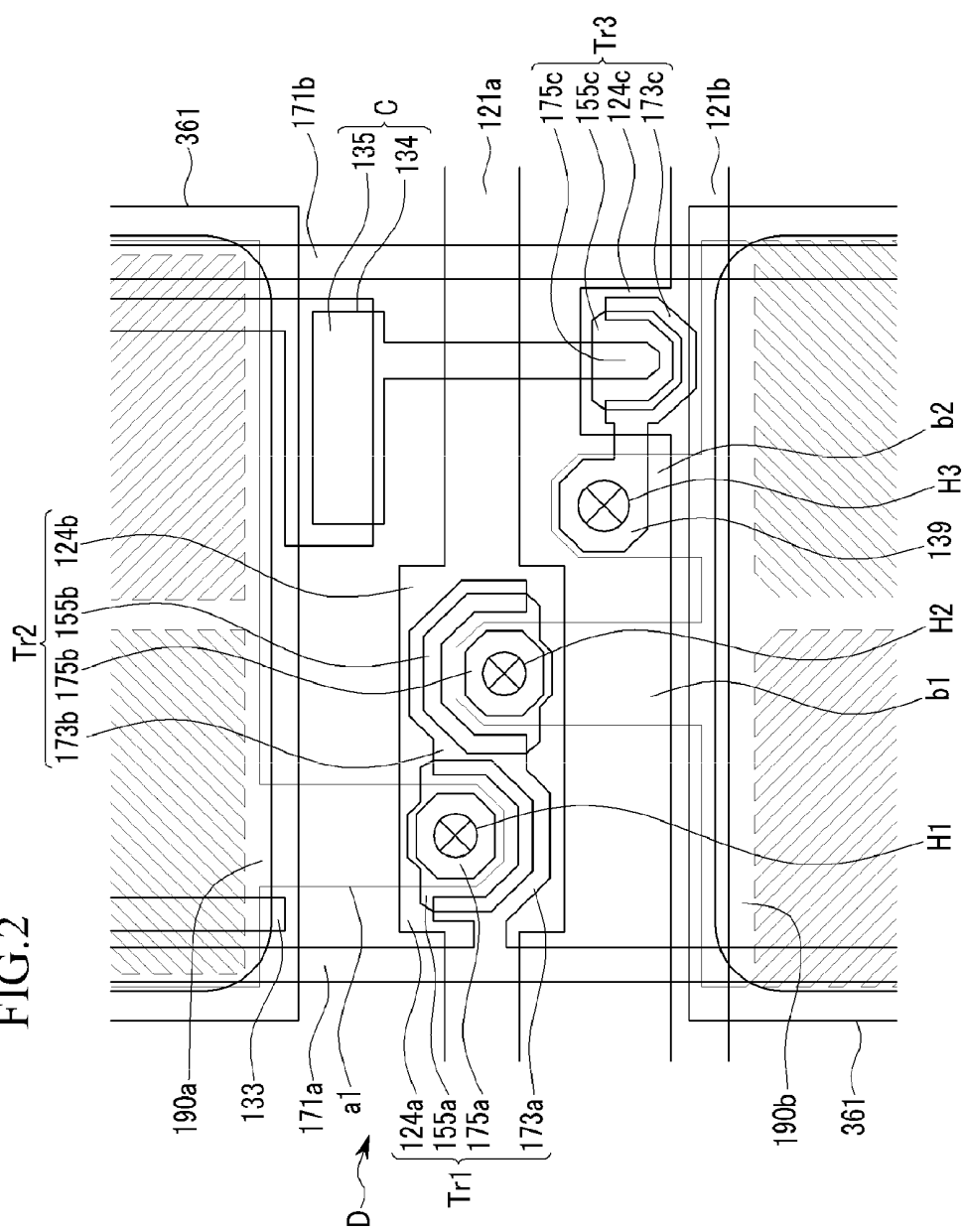


FIG.3

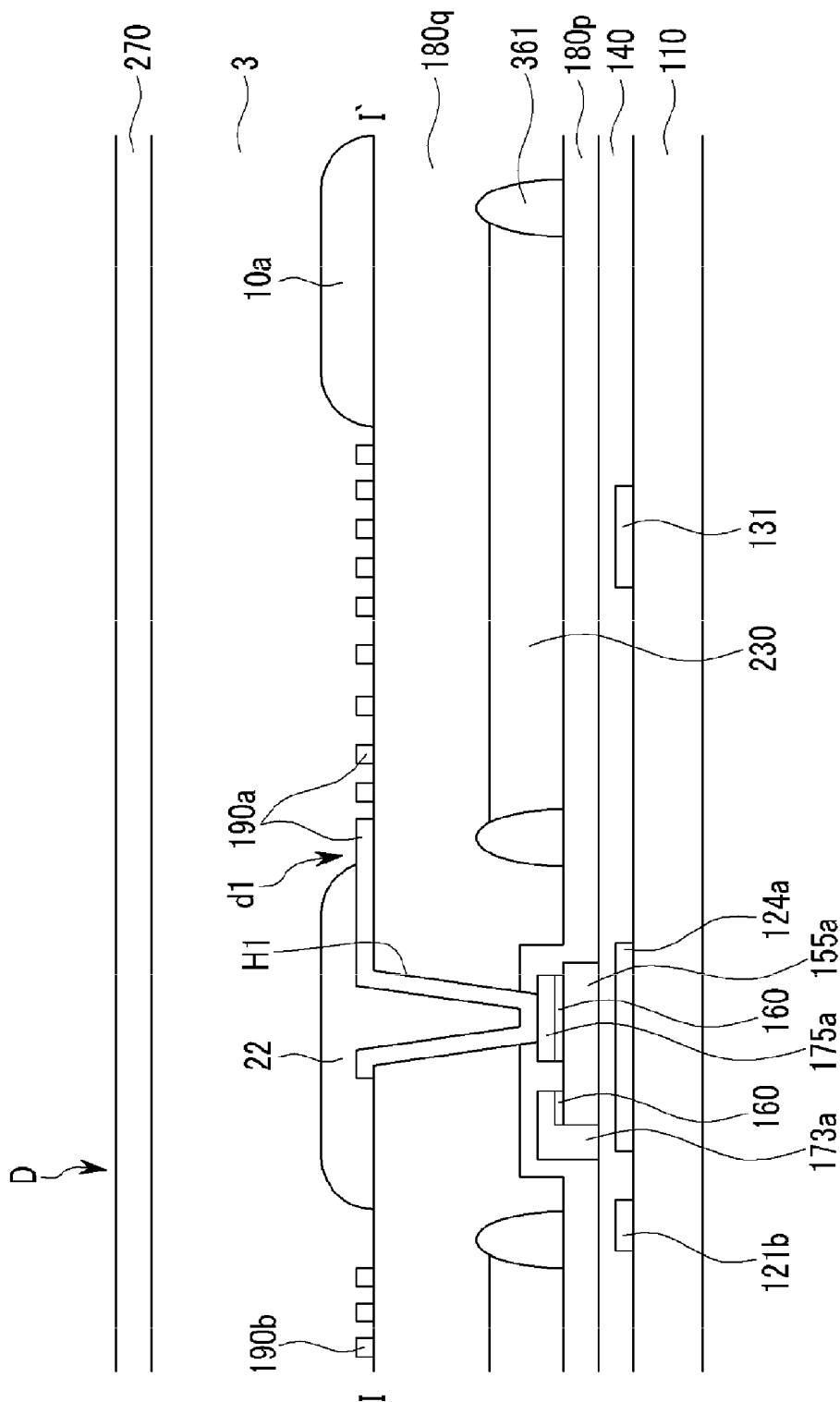


FIG. 5

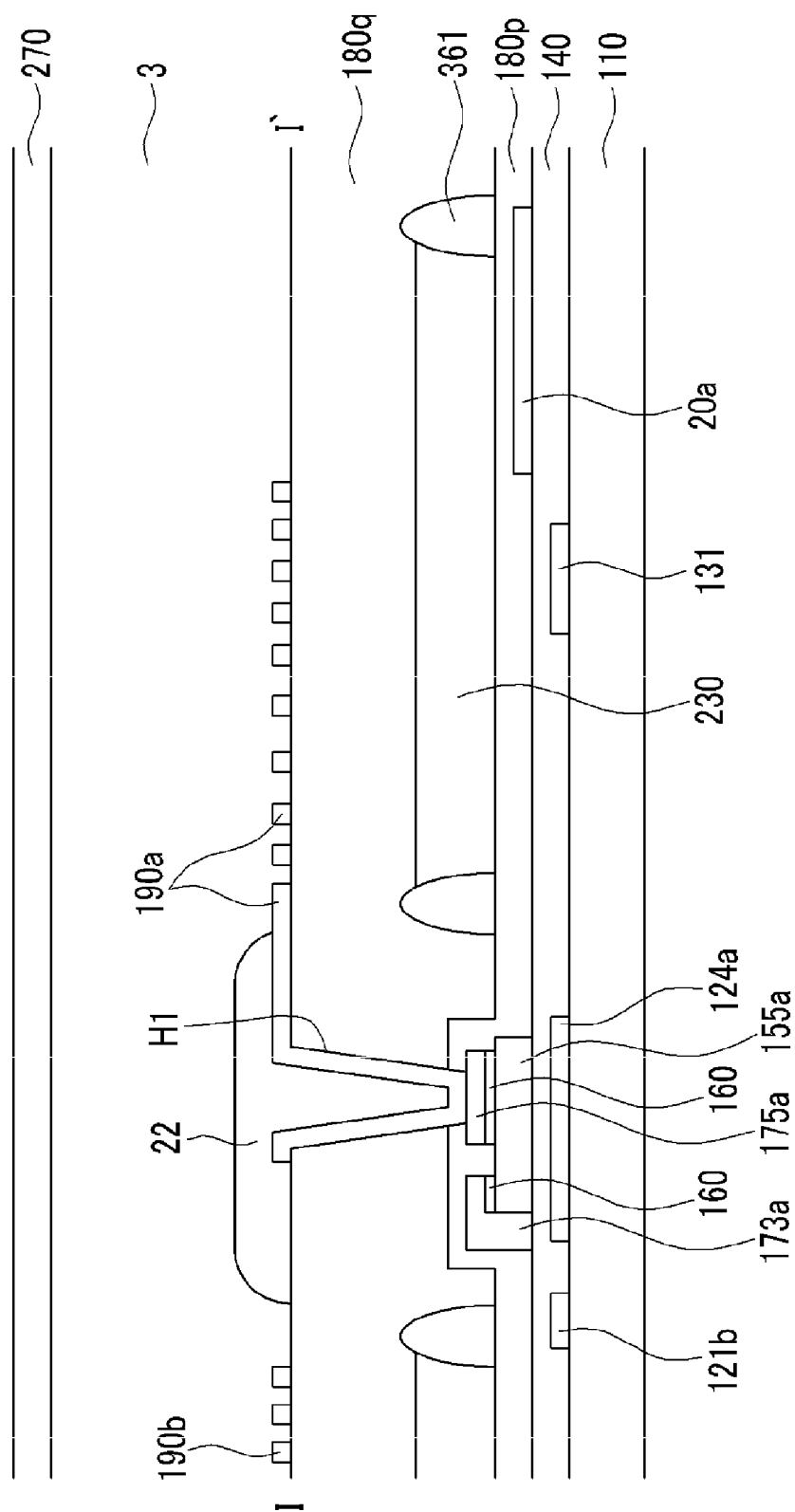


FIG. 9

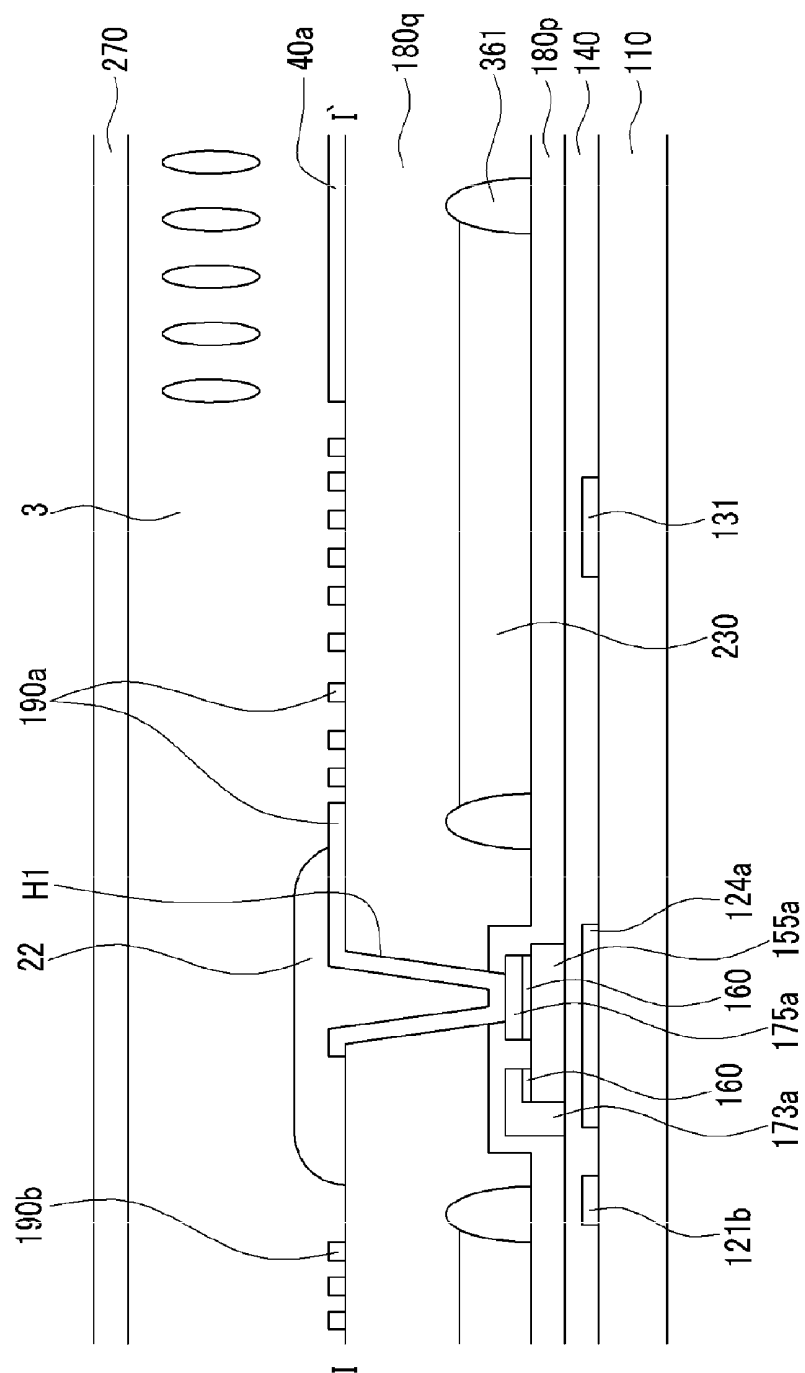
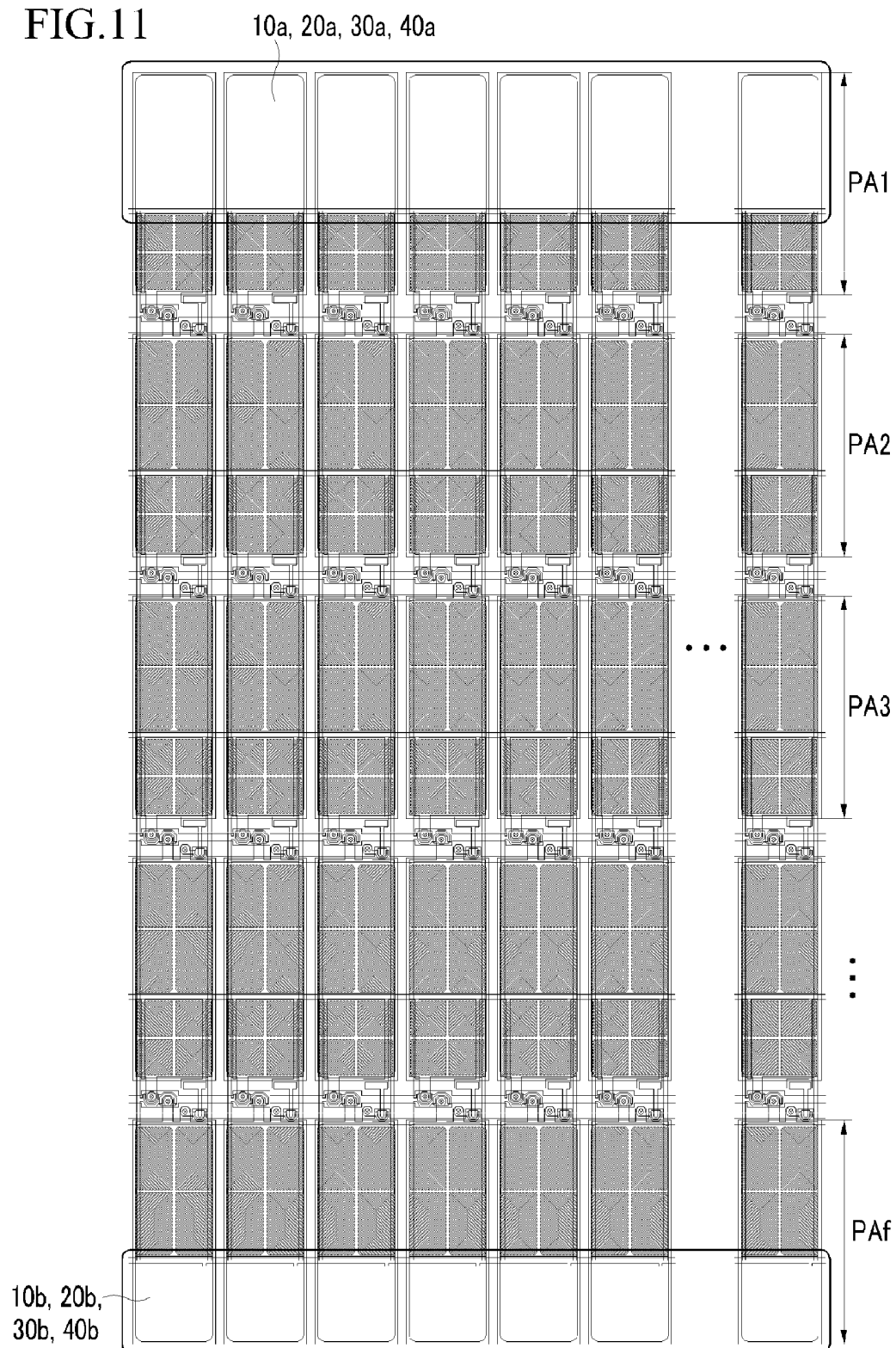


FIG. 11



LIQUID CRYSTAL DISPLAY DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2009-0027562 filed in the Korean Intellectual Property Office on Mar. 31, 2009, the entire contents of which are incorporated herein by reference.

BACKGROUND

[0002] (a) Field of the Invention

[0003] The present invention relates to a liquid crystal display and, more particularly, to a liquid crystal display having high efficiency for preventing light leakage.

(b) Discussion of Related Art

[0004] Currently, various flat panel displays have been developed and used, including a liquid crystal display with a liquid crystal layer formed between a lower panel and an upper panel. In general, such liquid crystal displays includes a plurality of pixel areas where color filters are disposed. However, when the color filters are formed in the pixel areas through Inkjet printing, severe light leakage is generated at the pixel areas disposed on the edge.

[0005] Therefore, there is a need for flat panel displays that reduce the amount of light leakage from the edge.

[0006] The information disclosed in this Background section is only for the enhancement of understanding of the background of the invention. It therefore may contain information that does not constitute prior art that is already known in this country to a person of ordinary skill in the art.

SUMMARY

[0007] In accordance with some embodiments of the invention, a flat panel display is disclosed that substantially reduces the amount of light leakage at first pixel areas and final pixel areas that are disposed on the edge of the display. According to some embodiments of the present invention, a liquid crystal display can include a lower panel having a first pixel area including a first pixel electrode and a first light leakage preventing member; a final pixel area including a second pixel electrode and a second light leakage preventing member; and middle pixel areas arranged between the first pixel area and the final pixel area, the middle pixel areas each including a first middle pixel electrode and a second middle pixel electrode.

[0008] In some embodiments, the second pixel electrode may be larger than the first pixel electrode, and the second light leakage preventing member may be smaller than the first light leakage preventing member. The size of the first light leakage preventing member may be the same as that of the second pixel electrode, and the size of the second light leakage preventing member may be the same as that of the first pixel electrode.

[0009] In some embodiments, a light blocking member disposed between the pixel areas and including an organic material having black pigments may be further included. The first light leakage preventing member and the second light leakage preventing member may be formed with the same material as the light blocking member.

[0010] In some embodiments, the liquid crystal display may further include a substrate, a partition disposed on the substrate and enclosing the first, final, and middle pixel areas,

a color filter disposed inside the partition, and an insulating layer disposed on the partition and the color filter, wherein the first light leakage preventing member and the second light leakage preventing member may be disposed on the insulating layer.

[0011] In some embodiments, the liquid crystal display may further include a substrate, a partition disposed on the substrate and enclosing the first, final, and middle pixel areas, a color filter disposed inside the partition, and an insulating layer disposed on the partition and the color filter, and the first light leakage preventing member and the second light leakage preventing member are disposed on the insulating layer.

[0012] In some embodiments, the liquid crystal display may further include a driving circuit unit disposed between the pixel areas and including at least one transistor. The first light leakage preventing member and the second light leakage preventing member may be formed with the same layer as the drain electrode or the source electrode of the transistor. The first light leakage preventing member and the second light leakage preventing member may be formed using the same material as the drain electrode or the source electrode. The transistor may include a gate electrode, a gate insulating layer disposed on the gate electrode, a semiconductor pattern overlapping the gate electrode on the gate insulating layer, a drain electrode disposed on the semiconductor pattern, a source electrode disposed on the semiconductor pattern, and ohmic contact layers disposed between the drain electrode and the semiconductor pattern, and the source electrode and the semiconductor pattern. A passivation layer disposed on the transistor and the gate insulating layer may be further included, and the first light leakage preventing member and the second light leakage preventing member may be disposed between the gate insulating layer and the passivation layer.

[0013] In some embodiments, the first light leakage preventing member and the second light leakage preventing member may be disposed with the same layer as the gate electrode of the transistor. In addition, the first light leakage preventing member and the second light leakage preventing member may include the same material as the gate electrode of the transistor. The liquid crystal display may further include a storage electrode line disposed with the same layer as the gate electrode, and the first light leakage preventing member and the second light leakage preventing member may be coupled to the storage electrode line.

[0014] In some embodiments, the transistor may include a substrate, a gate electrode disposed on the substrate, a gate insulating layer disposed on the gate electrode, a semiconductor pattern overlapping the gate electrode on the gate insulating layer, a drain electrode disposed on the semiconductor pattern, a source electrode disposed on the semiconductor pattern, and ohmic contact layers disposed between the drain electrode and the semiconductor pattern, and the source electrode and the semiconductor pattern, and the first light leakage preventing member and the second light leakage preventing member, may be disposed between the substrate and the gate insulating layer.

[0015] In some embodiments, the liquid crystal display may further include a liquid crystal layer disposed on the lower panel, and an upper panel disposed on the liquid crystal layer and having a common electrode, wherein the first light leakage preventing member and the second light leakage preventing member include a transparent electrode material, and a voltage difference between the common electrode and the first light leakage preventing member, and the common

electrode and the second light leakage preventing member, is "0". The common electrode may be electrically coupled to the first light leakage preventing member, and the common electrode may be electrically coupled to the second light leakage preventing member.

[0016] In some embodiments, the lower panel may include a substrate, a partition disposed on the substrate and corresponding to the outer of the pixel areas, a color filter disposed inside the partition, and an insulating layer disposed on the partition and the color filter, and the first light leakage preventing member and the second light leakage preventing member may be disposed on the insulating layer.

[0017] The first pixel area, the middle pixel areas, and the final pixel area may be sequentially arranged in all pixel columns. At least two first light leakage preventing members may be coupled to each other, and at least two second light leakage preventing members may be coupled to each other. The first light leakage preventing members may be integrally formed, and the second light leakage preventing members may be integrally formed. Accordingly, the first light leakage preventing member and the second light leakage preventing member may be disposed at the first pixel area and the final pixel area that are disposed on the edge. Accordingly, the light leakage may be effectively prevented at the edge of the pixel area. Also, in some embodiments, the neighboring first light leakage preventing members can be coupled to each other, or the neighboring second light leakage preventing members can be coupled to each other, such that the region for preventing the light leakage is extended, thereby increasing the light leakage preventing efficiency.

[0018] These and other embodiments are further discussed below with respect to the following figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. 1 shows a top plan view of a lower panel of a liquid crystal display according to an exemplary embodiment of the present invention.

[0020] FIG. 2 shows an enlarged view of a driving circuit unit shown in FIG. 1.

[0021] FIG. 3 shows a cross-sectional view taken along the line I-I' of FIG. 1.

[0022] FIG. 4 shows a cross-sectional view taken along the line II-IP of FIG. 1.

[0023] FIGS. 5 and 6 illustrate cross-sectional views of a lower panel of a liquid crystal display according to some embodiments of the present invention.

[0024] FIGS. 7 and 8 illustrate cross-sectional views of a lower panel of a liquid crystal display according to some embodiments of the present invention.

[0025] FIGS. 9 and 10 illustrate cross-sectional views of a liquid crystal display according to some embodiments of the present invention.

[0026] FIG. 11 shows a top plan view of an arrangement of pixel areas included in a lower panel of a liquid crystal display according to some embodiments of the present invention.

DETAILED DESCRIPTION

[0027] Exemplary embodiments of the present invention will be hereinafter described in detail with reference to the accompanying drawings. The structural shapes, sizes, ratios, numbers, etc. are schematically illustrated in the accompanying drawings such that they may be altered more or less. The drawings are shown from the viewpoint of observation such

that the direction or location of view in the drawings may be variously changed, depending upon the position of the observer. Even when reference is made to different elements, like reference numerals may be used to designate those elements. When the terms "include," "have," "consist of," or the like are used, the relevant subject may include other parts unless the term "only" is used to define the contents thereof. When explanation is made by way of a singular term, it may be interpreted in a plural manner as well as in a singular manner. Even when the numerical values, shapes, size comparisons, positional relations, etc. are not explained with the adverb "about" or "substantially," they may be so interpreted to include the common error ranges. Even when the terms of "after," "before," "and," "here," "subsequently," or the like are introduced, they are not meant to define temporal sequences. The terms of "the first," "the second," . . . , etc. are used only for convenience in distinction selectively, commutatively, or repeatedly, and are not meant to be read in any defined manner. It will be understood that when an element is referred to as being "on," "over," "above," "below," or "beside" another element, it can be directly on the other element or one or more intervening elements may also be present between the two elements. When the connective "or" is used to connect two elements, it is meant to indicate the respective elements and a combination thereof, but when the quantifier "any one of" is attached to the connective, it is meant to indicate only the respective elements.

[0028] FIG. 1 shows a top plan view of a lower panel of a liquid crystal display according to some embodiments of the present invention. FIG. 2 shows an enlarged view of a driving circuit unit such as that shown in FIG. 1. FIG. 3 shows a cross-sectional view taken along the line I-I' of FIG. 1. FIG. 4 shows a cross-sectional view taken along the line II-IP of FIG. 1. Amongst other elements, FIGS. 1-4 show a liquid crystal layer 3 (FIGS. 3 and 4), a first light leakage preventing member 10a (FIGS. 1 and 3), a second light leakage preventing member 10b (FIGS. 1 and 4), a substrate 110 (FIGS. 3 and 4), a first gate electrode 124a (FIGS. 2-4), a storage electrode line 131 (FIG. 3), a storage electrode 133 (FIG. 2), a gate insulating layer 140 (FIGS. 3 and 4), a first semiconductor pattern 155a (FIGS. 2-4), an ohmic contact layer 160 (FIGS. 3 and 4), a first source electrode 173a (FIGS. 2-4), a first drain electrode 175a (FIGS. 2-4), a passivation layer 180p (FIGS. 3 and 4), an insulating layer 180q (FIGS. 3 and 4), a first pixel electrode 190a (FIGS. 1-4), a second pixel electrode 190b (FIGS. 1-4), a color filter 230 (FIGS. 3 and 4), a common electrode 270 (FIGS. 3 and 4), and a partition 361 (FIGS. 3 and 4).

[0029] Referring to FIG. 1, a pixel as one formation unit U includes a first pixel electrode 190a, a second pixel electrode 190b that is larger than the first pixel electrode 190a, and a driving circuit unit D disposed between the first pixel electrode 190a and the second pixel electrode 190b, the driving unit D including a transistor Tr (Tr1 and Tr2 are shown). Formation unit U is continuously formed according to one direction by Inkjet printing.

[0030] As shown in FIG. 1, a region of substantially the same size where the pixel electrodes are disposed is defined as a pixel area PA. In the case where the first pixel electrode 190a, the second pixel electrode 190b, and the driving circuit unit D are formed as one formation unit U by using the Inkjet printing, pixel areas PA₂, through PA_{N-1}, which are disposed on the middle position between the first pixel area PA₁ where the first pixel shown in FIG. 1 is started and the final pixel area

PA_{*f*} where the final pixel is ended, include first pixel electrode 190*a* and second pixel electrode 190*b*. However, as shown in FIG. 1, the first pixel area PA₁ only includes first pixel electrode 190*a* and final pixel area PA_{*f*} only includes second pixel electrode 190*b*.

[0031] According to some embodiments of the present invention, a light leakage preventing member can be disposed in the portion where the first pixel electrode 190*a* is not occupied in the first pixel area PA₁, where the first pixel is started, and the portion where the second pixel electrode 190*b* is not occupied in the final pixel area PA_{*f*}, where the final pixel is ended. Further, for convenience of explanation only, five pixel areas PA are shown in FIG. 1, however there may be any number of pixel areas PA and there may be substantially more than five.

[0032] As shown in FIGS. 3 and 4, driving circuit unit D is disposed on a substrate 110. As shown in FIG. 2, in some embodiments, driving circuit unit D can include a first transistor Tr₁, a second transistor Tr₂, a third transistor Tr₃, and a down capacitor C for realizing a charge sharing method, however it is not limited thereto. For example, driving circuit unit D may include a charge pump, which would utilize a different structure.

[0033] Referring to FIG. 2, driving circuit unit D can include a storage electrode line 131, a storage electrode 133, a capacitor lower electrode 134, a first gate line 121*a*, a first gate electrode 124*a*, a second gate electrode 124*b*, a third gate electrode 124*c*, and a second gate line 121*b*. As shown in FIGS. 3 and 4, driving circuit unit D is disposed on substrate 110. As shown in FIGS. 3 and 4, storage electrode line 131, first gate line 121*a*, and second gate line 121*b* are separated in a first direction, defined as shown in FIG. 1, and are sequentially arranged. Also, storage electrode line 131, first gate line 121*a*, and second gate line 121*b* are extended in a second direction intersecting the first direction, as defined in FIG. 1.

[0034] Storage electrode 133 may be a pair and extends from storage electrode line 131 in the first direction. The capacitor lower electrode 134 is extended from the storage electrode 133 in the second direction.

[0035] As illustrated in FIG. 2, first gate electrode 124*a* and the second gate electrode 124*b* are coupled to first gate line 121*a*. A portion of first gate line 121*a* having a wide width may be used as first gate electrode 124*a* and as second gate electrode 124*b*. Third gate electrode 124*c* is coupled to second gate line 121*b*. A portion of second gate line 121*b* having a wide width may be used as third gate electrode 124*c*.

[0036] As shown in FIGS. 3 and 4, a gate insulating layer 140 is formed on storage electrode line 131, storage electrode 133, capacitor lower electrode 134, first gate line 121*a*, first gate electrode 124*a*, second gate electrode 124*b*, third gate electrode 124*c*, and second gate line 121*b*. As shown in FIG. 2, a first semiconductor pattern 155*a*, a second semiconductor pattern 155*b*, and a third semiconductor pattern 155*c* are respectively disposed on first gate electrode 124*a*, second gate electrode 124*b*, and third gate electrode 124*c* on gate insulating layer 140.

[0037] As shown in FIG. 2, a first data line 171*a* is disposed on the left side of the pixel area PA on gate insulating layer 140. A second data line 171*b* is disposed on the right side of the pixel area PA on gate insulating layer 140. First data line 171*a* is extended in the first direction and is disposed further outside than first and second semiconductor patterns 155*a* and 155*b*. Second data line 171*b* is disposed at the right side

of the pixel area PA on gate insulating layer 140. Second data line 171*b* is extended in the first direction.

[0038] As shown in FIG. 2, a first source electrode 173*a* is extended from first data line 171*a*. As shown in FIG. 3, first source electrode 173*a* partially overlaps first semiconductor pattern 155*a*. A second source electrode 173*b* is extended from first source electrode 173*a*, thereby partial overlapping second semiconductor pattern 155*b*. A third source electrode 173*c* partially overlaps third semiconductor pattern 155*c*.

[0039] As shown in FIG. 3, first drain electrode 175*a* is separated from first source electrode 173*a* on first semiconductor pattern 155*a*. As illustrated in FIG. 2, second drain electrode 175*b* is separated from the second source electrode 173*b* on second semiconductor pattern 155*b*. A third drain electrode 175*c* is separated from third source electrode 173*c* on the third semiconductor pattern 155*c*.

[0040] As shown in FIG. 2, a contact region 139 has a shape extending from third source electrode 173*c*. Also, a capacitor upper electrode 135 is extended from the third drain electrode 175*c* and overlaps capacitor lower electrode 134.

[0041] As shown in FIGS. 3 and 4, a passivation layer 180*p* is formed on the above-described structures. Also, an insulating layer 180*q* is formed on passivation layer 180*p*. Insulating layer 180*q* and passivation layer 180*p* have a first hole H₁ (shown in FIGS. 2 through 4), a second hole H₂ (shown in FIG. 2), and a third hole H₃ (shown in FIG. 2) respectively exposing a first drain electrode 175*a*, a second drain electrode 175*b*, and contact region 139, respectively.

[0042] As shown in FIGS. 3 and 4, first pixel electrode 190*a* and second pixel electrode 190*b* are disposed on insulating layer 180*q*. As shown in FIGS. 2 through 4, first pixel electrode 190*a* and second pixel electrode 190*b* are disposed between first data line 171*a* and second data line 171*b*, and are opposite to each other via first and second semiconductor patterns 155*a* and 155*b*.

[0043] As shown in FIGS. 2 and 3, first pixel electrode 190*a* has an extension a1. Extension a1 of first pixel electrode 190*a* is coupled to first drain electrode 175*a* through first hole H₁. As shown in FIG. 2, second pixel electrode 190*b* includes a first extension b1 and a second extension b2. First extension b1 of second pixel electrode 190*b* is coupled to the second drain electrode 175*b* through second hole H₂. Second extension b2 of second pixel electrode 190*b* is coupled to the contact region 139 through third hole H₃.

[0044] As shown in FIG. 2, first gate electrode 124*a*, first source electrode 173*a*, first drain electrode 175*a*, and first semiconductor pattern 155*a* form first transistor Tr₁. Second gate electrode 124*b*, second source electrode 173*b*, second drain electrode 175*b*, and second semiconductor pattern 155*b* form second transistor Tr₂. Third gate electrode 124*c*, third source electrode 173*c*, third drain electrode 175*c*, and third semiconductor pattern 155*c* form third transistor Tr₃. Capacitor lower electrode 134, gate insulating layer 140, and capacitor upper electrode 135 form a down capacitor C.

[0045] Third transistor Tr₃ may realize a charge sharing effect between first pixel electrode 190*a* and second pixel electrode 190*b*. Third transistor Tr₃ is turned on in a state where first and second transistors Tr₁ and Tr₂ are turned on, and charges are moved from second pixel electrode 190*b* to down capacitor C. In that case, the voltage of first pixel electrode 190*a* is maintained higher than the voltage of second pixel electrode 190*b*. Accordingly, problems such as

lateral visibility may be solved through creating a voltage difference between first pixel electrode **190a** and second pixel electrode **190b**.

[0046] Referring to FIGS. 1 and 3, first transistor Tr_i of driving circuit unit D includes first gate electrode **124a** on substrate **110**, gate insulating layer **140** on first gate electrode **124a**, first semiconductor pattern **155a** overlapping first gate electrode **124a** on gate insulating layer **140**, first drain electrode **175a** on first semiconductor pattern **155a**, first source electrode **173a** on first semiconductor pattern **155a**, an ohmic contact layer **160** between first drain electrode **175a** and first semiconductor pattern **155a**, first source electrode **173a**, and first semiconductor pattern **155a**. Passivation layer **180p** is disposed on substrate **110** and driving circuit unit D. Also, a partition **361** is disposed on passivation layer **180p**. Partition **361** is disposed to correspond to the outer part of the pixel area PA. That is, partition **361** encloses pixel area PA. A color filter **230** is also formed in pixel area PA and disposed inside partition **361**.

[0047] As shown in FIGS. 3 and 4, insulating layer **180q** is formed on passivation layer **180p**, color filter **230**, and partition **361**. First pixel electrode **190a** is coupled to first drain electrode **175a** of first transistor Tr_i by passing through insulating layer **180q**. Passivation layer **180p** is disposed to be extended to the portion of the first pixel area PA_1 on insulating layer **180q**.

[0048] Also, as shown in FIG. 3, a first light leakage preventing member **10a** is disposed on the portion of insulating layer **180q** in first pixel area PA_1 where first pixel electrode **190a** does not exist. In some embodiments, first light leakage preventing member **10a** includes an organic material include black pigments. Here, the size of the first light leakage preventing member **10a** may be substantially the same as that of second pixel electrode **190b**.

[0049] Also shown in FIG. 3, second pixel electrode **190b** is extended to the portion of second pixel area PA_2 on insulating layer **180q**. Also, first pixel electrode **190a** is positioned at the portion where second pixel electrode **190b** is not disposed among the portion of insulating layer **180q** corresponding to second pixel area PA_2 . That is, first pixel area PA_1 includes first pixel electrode **190a** and first light leakage preventing member **10a** shown in FIG. 3, and second pixel area PA_2 includes second pixel electrode **190b** shown in FIG. 3, as well as first pixel electrode **190a** of second pixel area PA_2 that is not shown in FIG. 3. As shown in FIGS. 3 and 4, a light blocking member **22** on insulating layer **180q** is disposed in driving circuit unit D between pixel areas PA. Light blocking member **22** may include substantially the same material as first light leakage preventing member **10a**. Light blocking member **22** may be positioned on the portion of first pixel electrode **190a** coupled to first drain electrode **175a** of first transistor Tr_i above driving circuit unit D. In this case, first pixel electrode **190a** may fill the contact hole of insulating layer **180q**.

[0050] Referring to FIGS. 1 and 4, first pixel electrode **190a** and second pixel electrode **190b** are disposed on middle pixel areas PA_2 , through PA_{f-1} between first pixel area PA_1 and final pixel area PA_f . However, second pixel electrode **190b** is disposed to be extended to the portion of the final pixel area PA_f on insulating layer **180q** in final pixel area PA_f . Also, a second light leakage preventing member **10b**, which may be made of an organic material including black pigments, is disposed on the portion where second pixel electrode **190b** does not exist on insulating layer **180q** corresponding to final pixel area PA_f .

In some embodiments, the size of second light leakage preventing member **10b** may be smaller than that of first light leakage preventing member **10a**. For example, the size of second light leakage preventing member **10b** may be substantially the same as that of first pixel electrode **190a**.

[0051] FIGS. 5 and 6 are cross-sectional views of a lower panel of a liquid crystal display according to some embodiments of the present invention. FIGS. 5 and 6 are cross-sectional view taken along the lines I-I' and II-II' shown in FIG. 1. As shown in FIGS. 5 and 6, a lower panel of a liquid crystal display according to embodiments as shown is substantially the same as the embodiments illustrated in FIGS. 1 through 4, except for the light leakage preventing member. Accordingly, the same components are indicated by the same reference numerals, and the description thereof is omitted.

[0052] Referring to FIG. 5, a first light leakage preventing member **20a** is disposed in first pixel area PA_1 under the portion where the first pixel electrode **190a** does not exist. First light leakage preventing member **20a** is formed on insulating layer **140** and insulating layer **180q** is then deposited over insulating layer **140** and first leakage preventing member **20a**. Here, the size of the first light leakage preventing member **20a** may be substantially the same as that of second pixel electrode **190b**.

[0053] First light leakage preventing member **20a** may be formed through the same process as drain electrode **175** or source electrode **173** of one transistor Tr included in driving circuit unit D. In this case, first light leakage preventing member **20a** includes the same material as drain electrode **175** or the source electrode **173**, and is disposed between gate insulating layer **140** and passivation layer **180p** like drain electrode **175** or source electrode **173**.

[0054] In some embodiments, first light leakage preventing member **20a** may be formed through the same process as first drain electrode **175a** or first source electrode **173a** of first transistor Tr_i . As another example, first light leakage preventing member **20a** may be formed through the same process as second drain electrode **175b** or second source electrode **173b** of second transistor Tr_2 . As another example, first light leakage preventing member **20a** may be formed through the same process as third drain electrode **175c** or third source electrode **173c** of third transistor Tr_1 , and the first light leakage preventing member **20a** may be separated from drain electrode **175** and source electrode **173**.

[0055] Referring to FIG. 6, a second light leakage preventing member **20b** is disposed in pixel area PA_f on the portion where the second pixel electrode **190b** is not positioned. Here, the size of the second light leakage preventing member **20b** may be smaller than that of the first light leakage preventing member **20a**. In some embodiments, the size of the second light leakage preventing member **20b** may be substantially the same as that of the first pixel electrode **190a**.

[0056] The second light leakage preventing member **20b** may be formed through the same process as that forming drain electrode **175** or that forming source electrode **173** of one transistor Tr included in driving circuit unit D. In this case, second light leakage preventing member **20b** includes the same material as drain electrode **175** or source electrode **173**. Further, second light leakage preventing member **20b** is disposed between gate insulating layer **140** and passivation layer **180p** like drain electrode **175** or source electrode **173**.

[0057] In some embodiments, second light leakage preventing member **20b** may be formed through the same process as first drain electrode **175a** or first source electrode **173a**

of first transistor T_n . In some embodiments, second light leakage preventing member $20b$ may be formed through the same process as second drain electrode $175b$ or second source electrode $173b$ of second transistor Tr_2 . In some embodiments, second light leakage preventing member $20b$ may be formed through the same process as third drain electrode $175c$ or third source electrode $173c$ of third transistor Tr_i . Also, second light leakage preventing member $20b$ may be separated from drain electrode 175 and source electrode 173 .

[0058] FIGS. 7 and 8 are cross-sectional views of a lower panel of a liquid crystal display according to some embodiments of the present invention. Here, FIGS. 5 and 6 are cross-sectional view taken along the lines I-I' and II-II' shown FIG. 1. The lower panel of the liquid crystal display shown in FIGS. 7 and 8 is substantially the same as that shown in FIGS. 1 to 4, except for the light leakage preventing member. Accordingly, the same components are indicated by the same reference numerals, and the description thereof is omitted.

[0059] Referring to FIG. 7, a first light leakage preventing member $30a$ is disposed on first pixel area PA_1 in the portion where first pixel electrode $190a$ does not exist. Here, the size of the first light leakage preventing member $30a$ may be substantially the same as that of second pixel electrode $190b$. First light leakage preventing member $30a$ may be formed through the same process as that used to form gate electrode 124 of one transistor Tr included in driving circuit unit D. In this case, first light leakage preventing member $30a$ includes the same material as gate electrode 124 , and is disposed between gate insulating layer 140 and passivation layer $180p$, like gate electrode 124 . In some embodiments, first light leakage preventing member $30a$ may be coupled to gate electrode 124 , or first light leakage preventing member $30a$ may be separated from gate electrode 124 .

[0060] In some embodiments, first light leakage preventing member $30a$ may be formed through the same process as that forming first gate electrode $124a$ of first transistor T_n . In some embodiments, first light leakage preventing member $30a$ may be formed through the same process as that forming second gate electrode $124b$ (referring to FIG. 2) of second transistor Tr_2 . In some embodiments, first light leakage preventing member $30a$ may be formed through the same process as that forming third gate electrode $124c$ (referring to FIG. 2) of third transistor Tr_i . Also, first light leakage preventing member $30a$ may be separated or electrically coupled with gate electrodes 124 .

[0061] Further, in some embodiments, storage electrode line 131 may be formed with the same layer as first gate electrode $124a$ in the process of forming first gate electrode $124a$. Here, storage electrode line 131 may be coupled to first light leakage preventing member $30a$.

[0062] Referring to FIG. 8, a second light leakage preventing member $30b$ is disposed in pixel area PA_2 on the portion where second pixel electrode $190b$ is not positioned. Here, the size of second light leakage preventing member $30b$ may be smaller than that of first light leakage preventing member $30a$. For example, the size of second light leakage preventing member $30b$ may be substantially the same as that of first pixel electrode $190a$. Second light leakage preventing member $30b$ may be formed through the same process as that forming gate electrode 124 of one transistor Tr included in driving circuit unit D. In this case, second light leakage preventing member $30b$ includes the same material as gate electrode 124 . Further, second light leakage preventing member $30b$ is disposed between gate insulating layer 140 and passi-

vation layer $180p$ like gate electrode 124 . Also, second light leakage preventing member $30b$ may or may not be coupled to gate electrode 124 .

[0063] In some embodiments, second light leakage preventing member $30b$ may be formed through the same process as that forming first gate electrode $124a$ of first transistor T_n . In some embodiments, second light leakage preventing member $30b$ may be formed through the same process as that forming second gate electrode $124b$ (referring to FIG. 2) of second transistor Tr_2 . In some embodiments, second light leakage preventing member $30b$ may be formed through the same process as that forming third gate electrode $124c$ (referring to FIG. 2) of third transistor Tr_i . Also, second light leakage preventing member $30b$ may be separated from the gate electrodes 124 or may be coupled to gate electrodes 124 .

[0064] Further, in some embodiments storage electrode line 131 may be formed with the same layer as first gate electrode $124a$ in the process forming first gate electrode $124a$. In some embodiments, storage electrode line 131 may be coupled to second light leakage preventing member $30b$.

[0065] FIGS. 9 and 10 show cross-sectional views of a liquid crystal display according to some embodiments of the present invention. FIGS. 9 and 10 are cross-sectional view taken along the lines I-I' and II-II' shown FIG. 1, respectively. A lower panel of a liquid crystal display shown in FIGS. 9 and 10 is substantially the same as that shown in FIGS. 1 to 4, except for the light leakage preventing member. Accordingly, the same components are indicated by the same reference numerals, and the description thereof is omitted. Also, FIGS. 9 and 10 show a liquid crystal layer 3 and an upper panel 270 for explanation of the operation of the light leakage preventing member as well as the lower panel of the liquid crystal display.

[0066] Referring to FIG. 9, a first light leakage preventing member $40a$ is disposed on insulating layer $180q$ in first pixel area PA_1 in the portion where first pixel electrode $190a$ is not disposed. Here, the size of first light leakage preventing member $40a$ may be substantially the same as that of second pixel electrode $190b$. First light leakage preventing member $40a$ may include a transparent electrode material such as indium tin oxide (ITO).

[0067] An upper panel including a common electrode 270 is disposed to face the lower panel of the liquid crystal display. A liquid crystal layer 3 is disposed between common electrode 270 and layer $180q$ of the lower panel of the liquid crystal display. Also, an alignment layer (not shown) may be disposed between the lower panel and the liquid crystal layer 3, and the upper panel and the liquid crystal layer 3.

[0068] Referring to FIG. 10, a second light leakage preventing member $40b$ is disposed on the portion where the second pixel electrode $190b$ is not disposed, on the portion of insulating layer $180q$ in final pixel area PA_2 . The size of second light leakage preventing member $40b$ may be smaller than that of first light leakage preventing member $40a$. For example, the size of second light leakage preventing member $40a$ may be substantially the same as that of first pixel electrode $190a$. Second light leakage preventing member $40b$ may, for example, include a transparent electrode material such as ITO.

[0069] An upper panel including a common electrode 270 is disposed to face the lower panel of the liquid crystal display. The liquid crystal layer 3 is disposed between the common electrode 270 and the lower panel of the liquid crystal display. Also, an alignment layer (not shown) may be dis-

posed between the lower panel and the liquid crystal layer 3, and the upper panel and the liquid crystal layer 3.

[0070] A voltage difference is not generated between the first light leakage preventing member 40a and the common electrode 270. That is, the first light leakage preventing member 40a may be electrically coupled to common electrode 270. In this case, the liquid crystal molecules of liquid crystal layer 3 are not inclined between the first light leakage preventing member 40a and common electrode 270, thereby realizing the light leakage preventing effect.

[0071] FIG. 11 shows a top plan view of pixel areas included in a lower panel of a liquid crystal display according to some embodiments of the present invention. Referring to FIG. 11, the pixel areas are arranged in the row direction and the column direction. Pixel areas of the same kind are arranged in the row direction, and the first pixel area PA₁, the middle pixel areas PA₂ through PA_{f-1}, and the final pixel area PA_f are sequentially arranged in the column direction. That is, the first pixel area PA₁, the middle pixel areas PA₂ through PA_{f-1}, and the final pixel area PA_f may be sequentially arranged in all pixel columns.

[0072] As described in FIGS. 1 to 10, the first pixel area PA₁ includes the first light leakage preventing members 10a, 20a, 30a, and 40a, and the final pixel area PA_f includes the second light leakage preventing members 10b, 20b, 30b, and 40b. In some embodiments, at least two first light leakage preventing members 10a, 20a, 30a, and 40a are coupled in the row direction. Also, at least two second light leakage preventing members 10b, 20b, 30b, and 40b are coupled in the row direction. Further, the first light leakage preventing members 10a, 20a, 30a, and 40a are integrally formed. Also, the second light leakage preventing members 10b, 20b, 30b, and 40b are integrally formed. The structure in which the first light leakage preventing members 10a, 20a, 30a, and 40a, and the second light leakage preventing members 10b, 20b, 30b, and 40b are connected in the row direction has the extended area such that the light leakage may be efficiently prevented.

[0073] While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims. Therefore, this invention is limited only by the following claims.

What is claimed is:

1. A liquid crystal display comprising a lower panel, wherein the lower panel includes:
 - a first pixel area including a first pixel electrode and a first light leakage preventing member;
 - a final pixel area including a second pixel electrode and a second light leakage preventing member; and
 - middle pixel areas arranged between the first pixel area and the final pixel area, the middle pixel areas each including a first middle pixel electrode and a second middle pixel electrode.
2. The liquid crystal display of claim 1, wherein the second pixel electrode is larger than the first pixel electrode, and the second light leakage preventing member is smaller than the first light leakage preventing member.
3. The liquid crystal display of claim 2, wherein the size of the first light leakage preventing member is the same as that of the second pixel electrode, and

the size of the second light leakage preventing member is the same as that of the first pixel electrode.

4. The liquid crystal display of claim 1, further comprising a light blocking member disposed between the pixel areas and including an organic material having black pigments.
5. The liquid crystal display of claim 4, wherein the first light leakage preventing member and the second light leakage preventing member are formed with the same material as the light blocking member.
6. The liquid crystal display of claim 5, further comprising:
 - a substrate;
 - a partition disposed on the substrate and enclosing the first, final, and middle pixel areas;
 - a color filter disposed inside the partition; and
 - an insulating layer disposed on the partition and the color filter,
 wherein the first light leakage preventing member and the second light leakage preventing member are disposed on the insulating layer.
7. The liquid crystal display of claim 1, further comprising:
 - a substrate;
 - a partition disposed on the substrate and enclosing the first, final, and middle pixel areas;
 - a color filter disposed inside the partition; and
 - an insulating layer disposed on the partition and the color filter,
 wherein the first light leakage preventing member and the second light leakage preventing member are disposed on the insulating layer.
8. The liquid crystal display of claim 1, further comprising a driving circuit unit disposed between the pixel areas and including at least one transistor.
9. The liquid crystal display of claim 8, wherein the first light leakage preventing member and the second light leakage preventing member are formed with the same layer as the drain electrode or the source electrode of the transistor.
10. The liquid crystal display of claim 9, wherein the first light leakage preventing member and the second light leakage preventing member are formed using the same material as the drain electrode or the source electrode.
11. The liquid crystal display of claim 10, wherein the transistor includes a gate electrode, a gate insulating layer disposed on the gate electrode, a semiconductor pattern overlapping the gate electrode on the gate insulating layer, a drain electrode disposed on the semiconductor pattern, a source electrode disposed on the semiconductor pattern, and ohmic contact layers disposed between the drain electrode and the semiconductor pattern, and the source electrode and the semiconductor pattern, a passivation layer is disposed on the transistor and the gate insulating layer, and the first light leakage preventing member and the second light leakage preventing member are disposed between the gate insulating layer and the passivation layer.
12. The liquid crystal display of claim 11, wherein the first light leakage preventing member and the second light leakage preventing member are disposed with the same layer as the gate electrode of the transistor.

- 13.** The liquid crystal display of claim **12**, wherein the first light leakage preventing member and the second light leakage preventing member include the same material as the gate electrode of the transistor.
- 14.** The liquid crystal display of claim **13**, further comprising
a storage electrode line disposed with the same layer as the gate electrode,
wherein the first light leakage preventing member and the second light leakage preventing member are connected to the storage electrode line.
- 15.** The liquid crystal display of claim **14**, wherein the transistor includes a substrate, a gate electrode disposed on the substrate, a gate insulating layer disposed on the gate electrode, a semiconductor pattern overlapping the gate electrode on the gate insulating layer, a drain electrode disposed on the semiconductor pattern, a source electrode disposed on the semiconductor pattern, and ohmic contact layers disposed between the drain electrode and the semiconductor pattern, and the source electrode and the semiconductor pattern, and
the first light leakage preventing member and the second light leakage preventing member are disposed between the substrate and the gate insulating layer.
- 16.** The liquid crystal display of claim **1**, further comprising:
a liquid crystal layer disposed on the lower panel; and
an upper panel disposed on the liquid crystal layer and having a common electrode,
wherein the first light leakage preventing member and the second light leakage preventing member include a transparent electrode material, and
a voltage difference between the common electrode and the first light leakage preventing member, and the common electrode and the second light leakage preventing member, is "0".
- 17.** The liquid crystal display of claim **16**, wherein the common electrode is electrically connected to the first light leakage preventing member, and
the common electrode is electrically connected to the second light leakage preventing member.
- 18.** The liquid crystal display of claim **17**, wherein the lower panel includes:
a substrate;
a partition disposed on the substrate and corresponding to the outer part of the pixel areas;
a color filter disposed inside the partition; and
an insulating layer disposed on the partition and the color filter,
wherein the first light leakage preventing member and the second light leakage preventing member are disposed on the insulating layer.
- 19.** The liquid crystal display of claim **1**, wherein the first pixel area, the middle pixel areas, and the final pixel area are sequentially arranged in all pixel columns.
- 20.** The liquid crystal display of claim **19**, wherein at least two first light leakage preventing members are connected to each other, and at least two second light leakage preventing members are connected to each other.
- 21.** The liquid crystal display of claim **20**, wherein the first light leakage preventing members are integrally formed, and
the second light leakage preventing members are integrally formed.

* * * * *

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摘要(译)

液晶显示器本发明涉及液晶显示器。液晶显示器具有下面板，该下面板包括具有第一像素电极和第一光泄漏防止构件的第一像素区域，具有第二像素电极和第二光泄漏防止构件的最终像素区域，以及设置在其间的中间像素区域。在第一像素区域和最终像素区域中，每个中间像素区域包括第一中间像素电极和第二中间像素电极。因此，可以在设置在边缘上的第一像素区域和最终像素区域处有效地防止漏光。

