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(54) **LIQUID CRYSTAL DISPLAY DEVICE HAVING COMMON ELECTRODES WITH REDUCED RESISTANCE**

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G02F 1/1343 (2006.01)

(52) **U.S. Cl.** **349/141**; 349/139; 349/147

(58) **Field of Classification Search** 349/139, 349/141, 142, 147
See application file for complete search history.

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(57) **ABSTRACT**

A liquid crystal display (LCD) device includes a unit pixel defined by a gate line formed on a substrate and a data line crossing the gate line, a switching device formed in the unit pixel, a common electrode line formed parallel to the gate line, the common electrode line including a first transparent electrode layer and a first conductive layer, a common electrode having a conductive portion and a light transmitting portion formed within the unit pixel and connected to the common electrode line, the conductive portion formed along a periphery of the common electrode including a second transparent electrode layer and a second conductive layer, and the light transmitting portion including a third transparent electrode layer disposed in a middle portion of the common electrode includes a third transparent electrode layer, and a pixel electrode having a slit region arranged to face the common electrode.

7 Claims, 8 Drawing Sheets

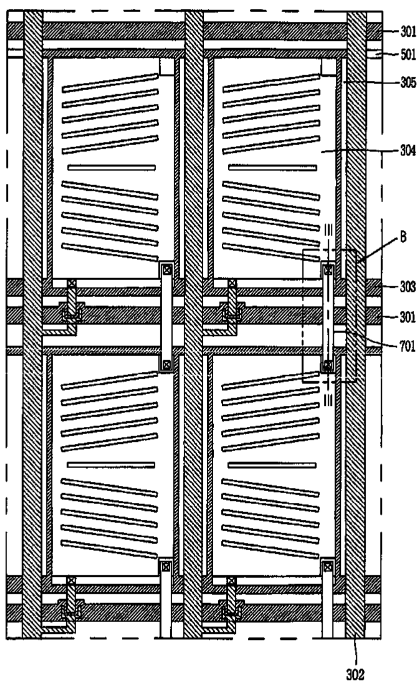


FIG. 1
RELATED ART

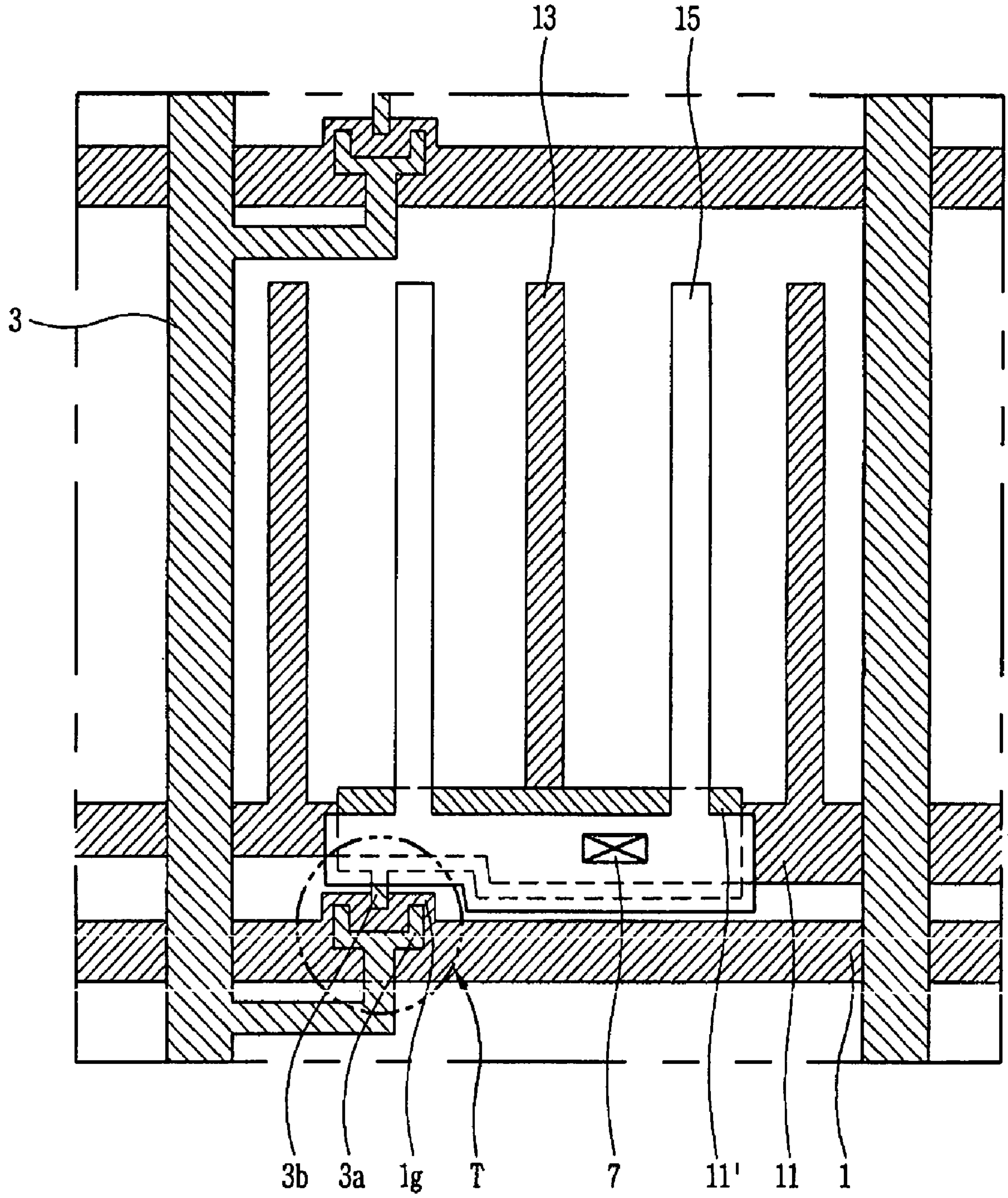


FIG. 2

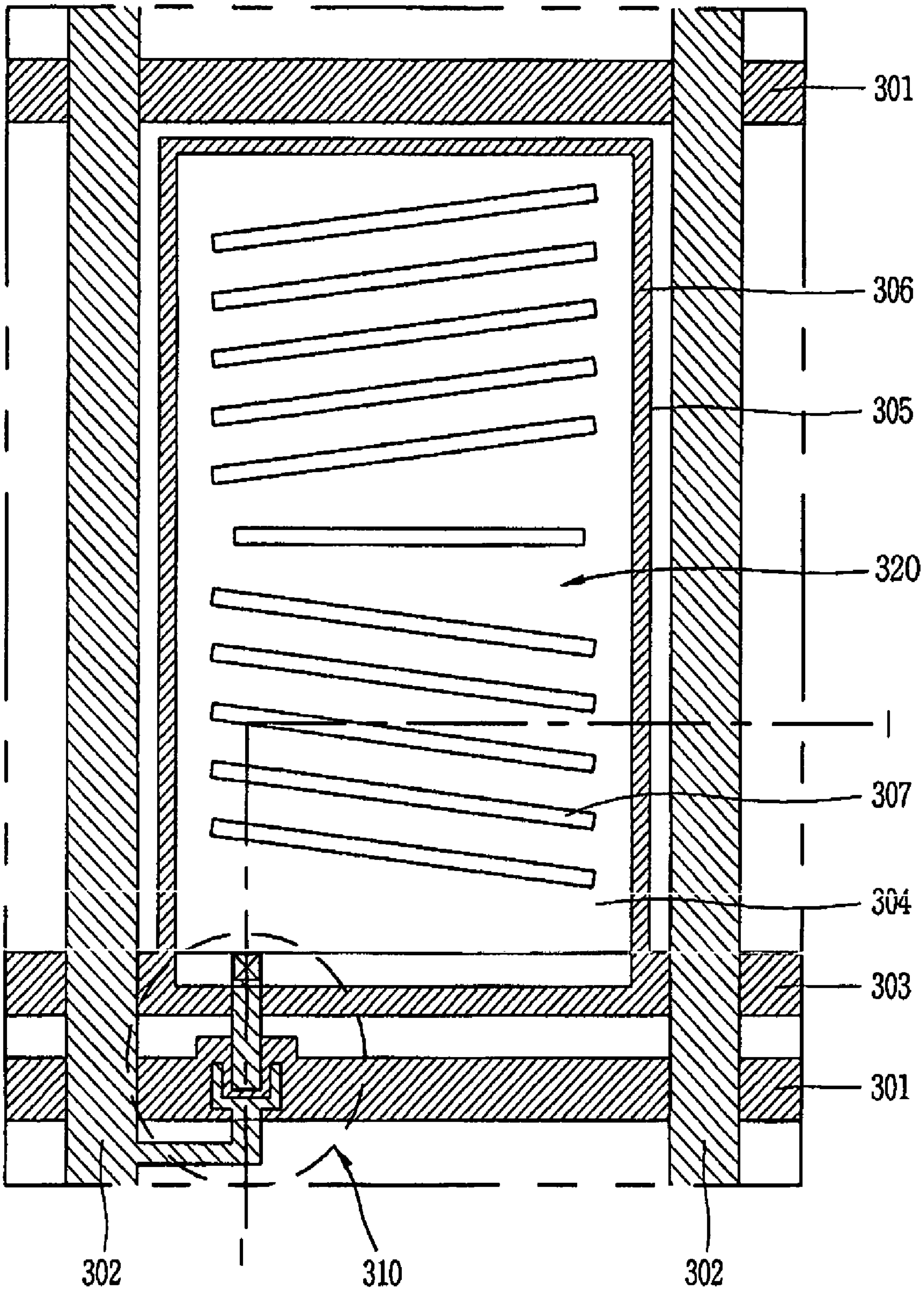


FIG. 3

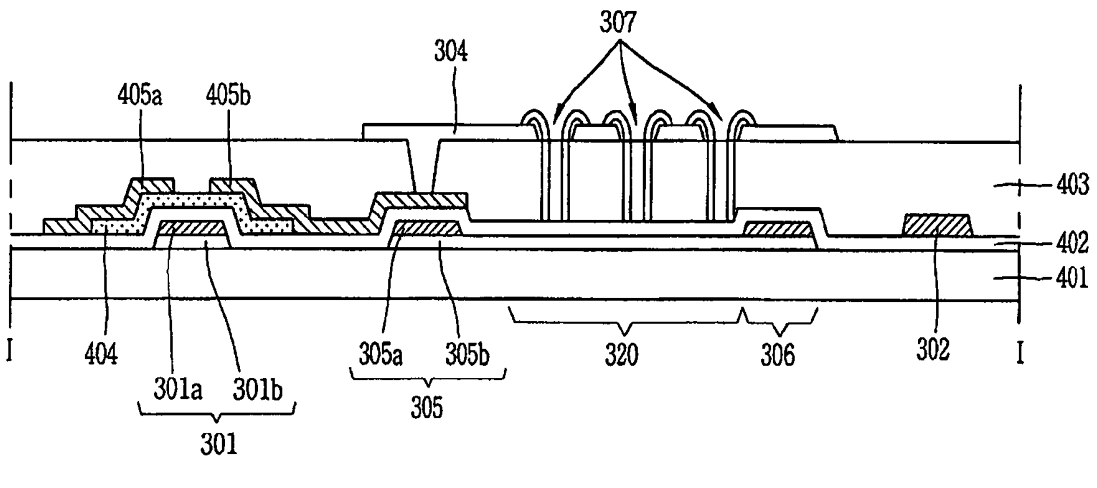

307
304
405a
405b
403
402
401
I
404
301a
301b
301
305a
305b
305
320
306
302
I

FIG. 4

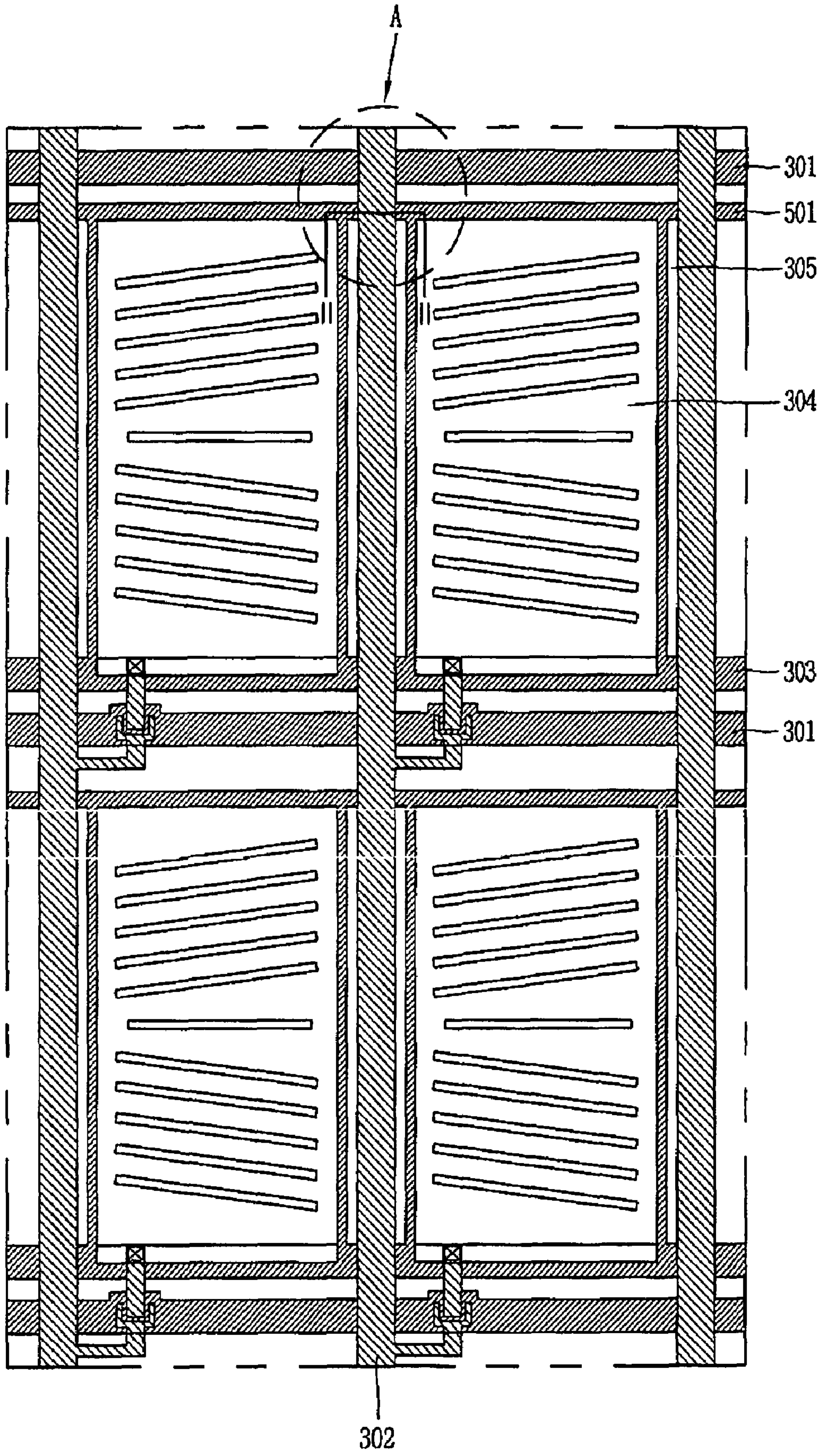


FIG. 5

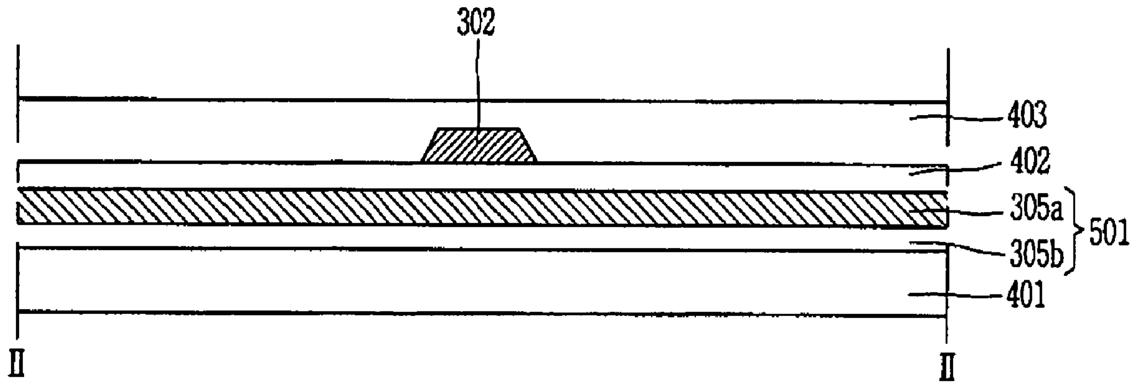


FIG. 6

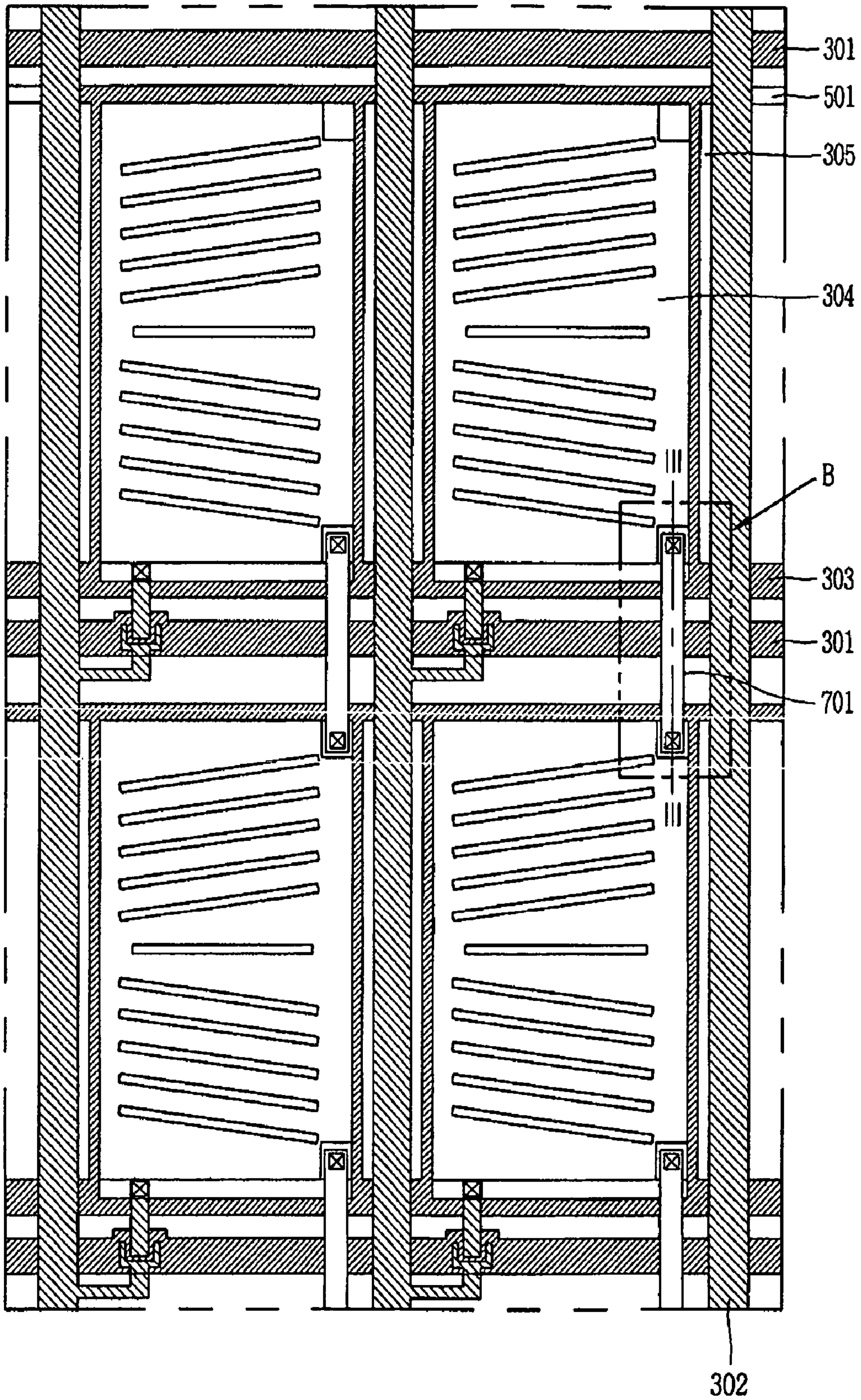


FIG. 7

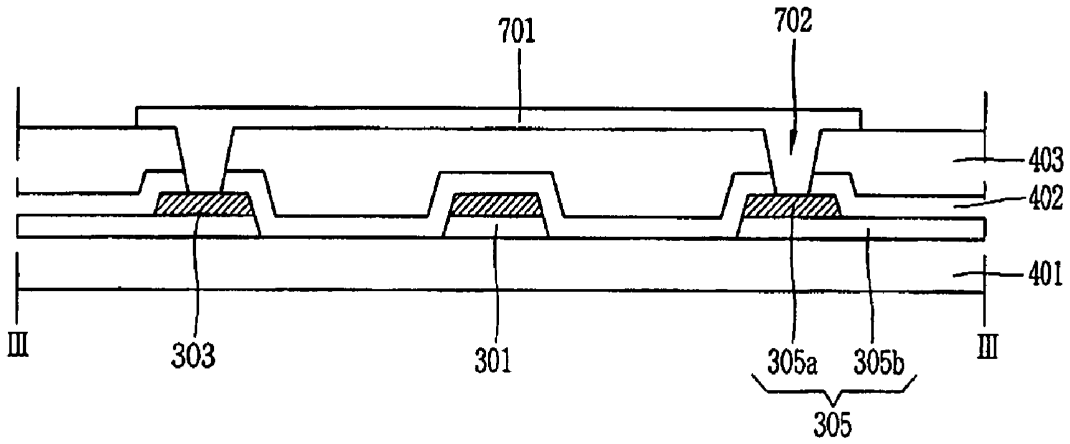

701
702
403
402
401
III
303
301
305a
305b
III
305

FIG. 8

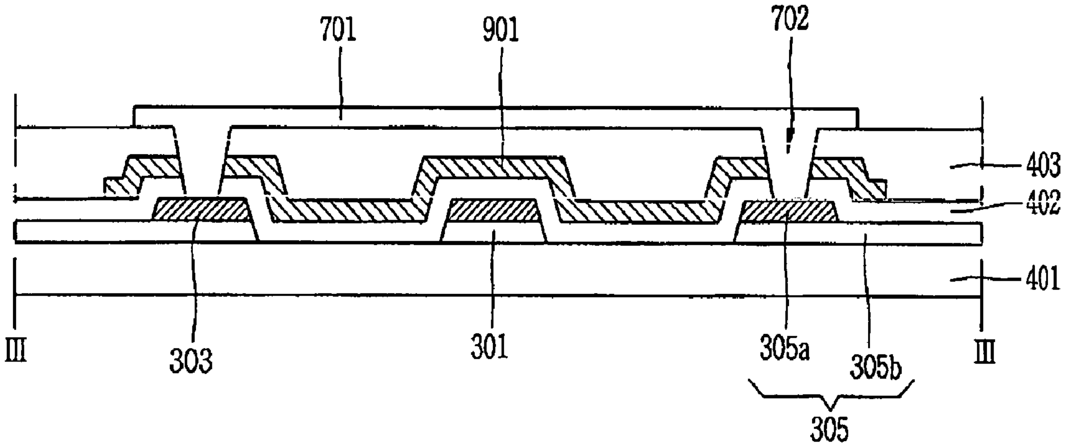

701
901
702
403
402
401
III
303
301
305a
305b
III
305

FIG. 9A

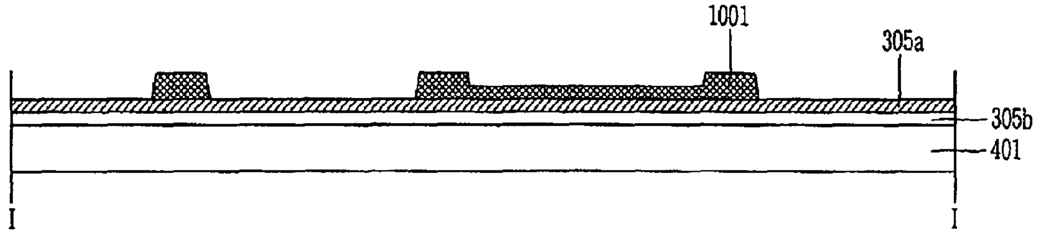


FIG. 9B

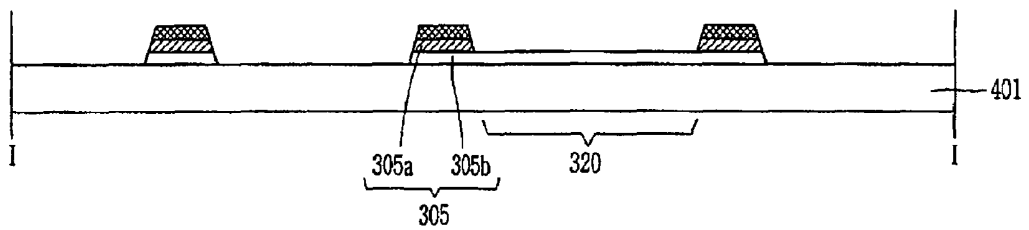


FIG. 9C

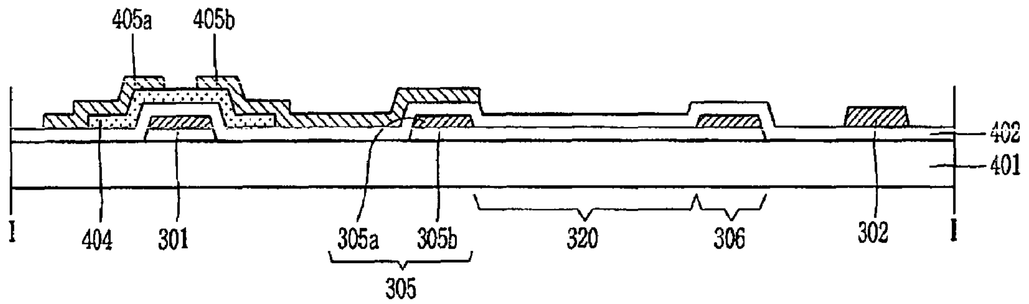
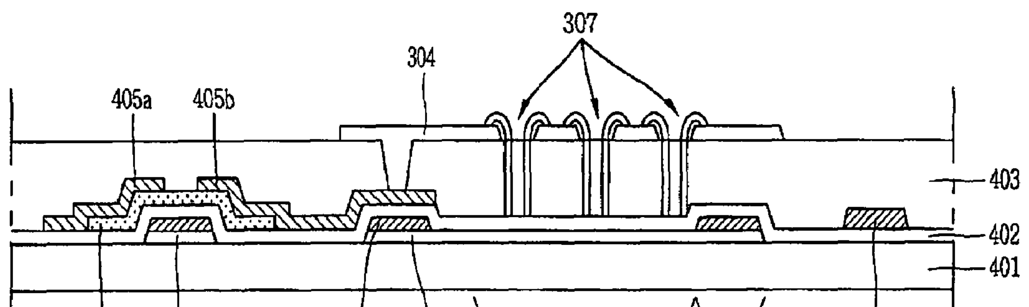


FIG. 9D



LIQUID CRYSTAL DISPLAY DEVICE HAVING COMMON ELECTRODES WITH REDUCED RESISTANCE

This application claims the benefit of the Korean Patent Application No. 2005-0058901 filed in Korea on Jun. 30, 2005, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a liquid crystal display device, and more particularly, to a structure of a fringe field switching mode (FFS mode) liquid crystal display device and a method for fabricating the same.

2. Discussion of the Related Art

As society has become increasingly technocentric, demands for various types of display devices have been on the rise. Research has been actively ongoing with respect to flat panel display devices, such as LCDs (liquid crystal displays), PDPs (plasma display panels), ELDs (electro luminescent displays), FEDs (field emission displays), VFDs (vacuum fluorescent displays), as well as other emerging display technologies. Of the aforementioned flat panel display devices, LCDs have received much attention because they are simple to mass produce, light and thin, and can easily be coupled to driving systems that produce high picture quality while consuming small amounts of power.

An LCD device is generally a transmissive display device. More particularly, an LCD device displays a desired image by controlling, pixel by pixel, the amount of light transmitted through a pixel. Pixel control is achieved by individually supplying data signals according to image information to the pixels arranged in a matrix configuration. Such an LCD device is commonly driven by an active matrix (AM) method. In the active matrix method, a switching device such as a thin film transistor (TFT) is added to each pixel. A voltage is applied to liquid crystal molecules of the pixel region through the switching device to drive the liquid crystal molecules in each pixel region.

The LCD device may be classified into various display modes according to the driving characteristics of the liquid crystal molecules. Of the several display modes, a TN (twisted nematic) mode LCD device has generally been used. The TN mode LCD device drives liquid crystal molecules such that an electric field perpendicular to the substrate is turned ON/OFF. Accordingly, orientation of the liquid crystal molecules is at an angle of 0~90° to a substrate.

Because the liquid crystal molecules in a TN mode LCD device is driven perpendicularly to the substrate, viewing angle characteristics of such a device is not very good. Namely, an angle at which the display can be viewed is limited because color and brightness of an image from a screen varies depending on the direction or angle that a viewer observes the LCD device. To overcome such a disadvantage, a new viewing angle technology, namely, an in-plane switching (IPS) mode LCD device has been proposed.

The IPS mode LCD device generates an in-plane electric field that drives the orientation of the liquid crystal molecules parallel to the substrate along the direction of the in-plane electric field. More particularly, when a voltage is applied to an electrode in an IPS mode LCD device, an in-plane electric field is generated on the substrate and aligns the liquid crystal molecules horizontally, thereby increasing the viewing angle as compared to that of the TN mode LCD device.

FIG. **1** is a schematic plan view illustrating a structure of a unit pixel of an IPS mode LCD device according to a related art. As shown, a unit pixel is defined by a gate line **1** and a data line **3**, which are formed of a metallic layer and arranged horizontally and vertically, respectively, on a first substrate of the LCD device. Specifically, an LCD device has (n×m) pixels corresponding to the intersection of n-number of gate lines and m-number of data lines. For purposes of simplifying the explanation of the related art, FIG. **1** shows only one pixel among the (n×m) number of pixels.

At the intersection of the gate line **1** and the data line **3**, a switching device, such as a thin film transistor (T) including a gate electrode **1***g*, a semiconductor layer (not shown), and source/drain electrodes **3***a* and **3***b*, is formed. The gate electrode **1***g* and the source electrode **3***a* are connected to the gate line **1** and the data line **3**, respectively, such that the switching device (T) is turned ON with a signal inputted through the gate line **1** to transmit an image signal supplied through the data line **3** to the unit pixel.

A common electrode line **11** transmitting a common signal is arranged parallel to the gate line **1** within the unit pixel. At least one pair of electrodes driving the liquid crystal molecules, namely, a common electrode **13** and a pixel electrode **15**, are arranged in parallel to the data line **3**, thereby generating an in-plane electric field parallel to the substrate. Here, the common electrode line **11** and the common electrode **13** are formed simultaneously by extending the common electrode **13** perpendicularly from the common electrode line **11**.

The pixel electrode **15** is formed on a passivation layer (not shown) covering an entire substrate. The pixel electrode is arranged near the source/drain electrodes **3***a* and **3***b* and is connected to the drain electrode **3***b* through a contact hole **7**. Additionally, a storage capacitor is formed by a storage electrode **11'** extending from the drain electrode **3***b* and overlapping the common electrode line **11** with an interposing gate insulation layer (not shown) formed therebetween.

On a second substrate (not shown) facing the first substrate, a black matrix for preventing leakage of unnecessary light, a color filter for generating color, and an overcoat layer for flattening are formed. Also, an alignment layer (not shown) for determining an initial direction of alignment for the liquid crystals are is formed on facing surfaces of the first and second substrates. A liquid crystal layer is formed in a gap between the first substrate and the second substrate.

In the IPS mode LCD device having the above-described structure, an in-plane electric field is generated on the substrate because the common electrode **13** and the pixel electrode **15** are all disposed on the same substrate. Accordingly, the liquid crystal molecules in the liquid crystal layer are driven along the in-plane electric field parallel direction to the substrate, namely, the orientation of the liquid crystal molecules is parallel to the substrate. Hence, an image displayed on the front surface of the LCD device can be viewed from any directions, such as from the right, left, lower, and upper sides, thereby fundamentally improving the characteristics of the viewing angle.

One of the disadvantages in the related art IPS mode LCD device is that an aperture area of the LCD device is decreased and the transmittance of light is degraded. The common electrode **13** and the pixel electrode **15** are generally opaque metallic layers disposed in the pixel region where an image is displayed, thereby decreasing the quality of the image. Furthermore, because of the generally opaque nature of the common electrode **13** and the pixel electrode **15**, a stronger backlight is needed to provide proper brightness, thereby increasing power consumption. In order to solve the aforementioned problems, using transparent material for the electrode pair has been proposed. However, this solution only slightly improves the aperture ratio, and there is no significant effect on improving light transmittance characteristics of the display.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to an LCD device having common electrodes with reduced resistance that substantially obviates one or more problems due to limitations and disadvantages of the related art.

An object of the present invention is to provide an LCD device and a fabrication method of the same with increased aperture ratio.

Another object of the present invention is to provide an LCD device and a fabrication method of the same with reduced resistance when the aperture ratio is increased.

Yet another object of the present invention is to provide an LCD device and a fabrication method of the same with reduced interference between a data line and a common electrode.

Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, a liquid crystal display (LCD) device includes a unit pixel defined by a gate line formed on a substrate and a data line crossing the gate line, a switching device formed in the unit pixel, a common electrode line formed parallel to the gate line, the common electrode line including a first transparent electrode layer and a first conductive layer, a common electrode having a conductive portion and a light transmitting portion formed within the unit pixel and connected to the common electrode line, the conductive portion formed along a periphery of the common electrode including a second transparent electrode layer and a second conductive layer, and the light transmitting portion including a third transparent electrode layer disposed in a middle portion of the common electrode includes a third transparent electrode layer, and a pixel electrode having a slit region arranged to face the common electrode.

In another aspect, a method for fabricating a liquid crystal display (LCD) device includes forming a gate line, a common electrode line, and a common electrode on a substrate, the common electrode line being parallel to the gate line and including a transparent electrode layer and a conductive layer, the common electrode being connected to the common electrode line and including the transparent electrode layer and the conductive layer, forming a gate insulation layer covering the gate line, common electrode line, and the common electrode, forming an active layer on the gate insulation layer, forming a data line, a source electrode, and a drain electrode, the source and drain electrodes being formed on the active layer, forming a passivation layer, and forming a pixel electrode on the passivation layer and connected to the drain electrode through a contact hole, the pixel electrode including a slit region.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention. In the drawings:

FIG. **1** is a plan view illustrating a unit pixel of an IPS mode LCD device according to the related art;

FIG. **2** is a plan view that illustrates a unit pixel of an LCD device in accordance with a first exemplary embodiment of the present invention;

FIG. **3** is a sectional view taken along line I-I of FIG. **2**;

FIG. **4** is a plan view of a unit pixel that illustrates a second exemplary embodiment of the present invention;

FIG. **5** is a sectional view taken along line II-II of FIG. **4**;

FIG. **6** is a plan view of a unit pixel that illustrates a third exemplary embodiment of the present invention;

FIG. **7** is a sectional view taken along line III-III of FIG. **6**;

FIG. **8** is a sectional structure of a conductive path in accordance with a fourth exemplary embodiment of the present invention; and

FIGS. **9**A to **9**D are views that sequentially illustrate a fabrication process in accordance with an exemplary embodiment of the present invention.

It will be apparent to those skilled in the art that various modifications and variations can be made in the LCD device of the present invention and the method of fabricating the same without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

An exemplary structure of an LCD device in accordance with a first exemplary embodiment of the present invention is described with reference to FIGS. **2** and **3**. In particular, FIG. **2** is a plan view of an exemplary unit pixel in accordance with the present invention. FIG. **3** is a sectional view taken along line I-I of FIG. **2**.

FIG. **2** shows one unit pixel for the purpose of simplicity in describing an exemplary embodiment of the present invention. An LCD device in accordance with the present invention includes a plurality of gate lines **301** and a plurality of data lines **302** formed on a substrate. The data line **302** crosses the gate lines **301** at a right angle and defines a unit pixel. A common electrode line **303** parallel to the gate line **301** and applying a voltage to a common electrode is formed on the same layer as the gate line **301**. In the first exemplary embodiment of the present invention, the gate line **301** and the common electrode line **303** are made of multiple layers by stacking a transparent electrode material and a conductive material on a bare glass substrate. Also, a thin film transistor **310** for switching a unit pixel is formed at the unit pixel.

A common electrode **305** is formed at the unit pixel and electrically connected to the common electrode line **303**. The common electrode **305** includes a light transmitting portion

320 transmitting light and a conductive portion 306 encompassing an edge of the light transmitting portion. The light transmitting portion 320 is formed of a transparent conductive material such as indium-tin-oxide (ITO). The conductive portion 306 is formed such that the transparent conductive material and a conductive material having good conductivity, such as a metal layer, are stacked to form a bank. The common electrode 305 is formed by sequentially stacking a first electrode layer, which is the transparent electrode material, and a second electrode layer, which is the conductive material having good conductivity, and then removing the second electrode layer from the light transmitting portion 320. To reduce the fabrication process, the gate line 301 may also be formed during the same process of forming the common electrode 305 by stacking the first electrode layer and the second electrode layer to form the gate line 301.

A pixel electrode 304 facing the common electrode 305 and forming an in plane electric field is formed at the unit pixel. The pixel electrode 304 is formed of a transparent electrode material and includes at least one slit portion 307 formed by, for example, cutting and removing a portion of the transparent electrode material. Through the slit portion 307, an in-plane electric field having a parabola shape is formed between the common electrode 305 and the pixel electrode 304.

Because the common electrode and the pixel electrode are transparent, an aperture ratio is improved. Light transmittance is further improved by the slit portions formed upon removing the transparent electrode material. In addition, as an in-plane electric field having a parabola shape is formed through the slit portions, liquid crystals in a direction parallel to the substrate is easily facilitated.

The conductive portion 306 formed at an edge of the common electrode 305 is formed of a conductive material such as metal or the like. The conductive material is connected to the common electrode line 303. Because transparent electrode materials such as ITO generally have lower electrical conductivity than conductive materials, transmission of image information may be delayed if only the transparent electrode material is used, thus degrading picture quality. Therefore, in order to smoothly supply a common voltage to a unit pixel, an upper conductive layer of the common electrode line 303 and the conductive portion 306 of the common electrode 305 are electrically connected to reduce resistance and smoothly provide a common voltage to the unit pixel. Furthermore, the conductive portion 306 overlaps the pixel electrode 304, thereby increasing the capacity of the storage capacitor.

A sectional structure of the LCD device in accordance with the first exemplary embodiment of the present invention will now be described with reference to FIG. 3. As shown in FIG. 3, a gate line 301 and a common electrode 305 are formed on a substrate 401, such as bare glass. The gate line 301 is formed by stacking a conductive material 301*a* and a transparent electrode material 301*b*. The common electrode 305 includes a light transmitting portion 320 transmitting light and a conductive portion 306 formed along an edge of the light transmitting portion 320. The light transmitting portion 320 is formed of a transparent electrode material 305*b*, and the conductive portion 306 includes a transparent electrode material 305*b* and a conductive line 305*a* formed of a conductive material. The conductive line 305*a* is formed of the same material as an upper conductive material of the common electrode line 303.

A gate insulation layer 402 covering the gate line 301 and the common electrode 305 is formed. An active layer 404 is further formed on the gate insulation layer, and source and drain electrodes 405*a* and 405*b* connected to the active layer 404 are formed on the active layer 404. When the source and drain electrodes 405*a* and 405*b* are formed, a data line 302 providing data signals to the source electrode 405*a* is formed at the same time. Furthermore, the source and drain electrodes 405*a* and 405*b* are protected by a passivation layer 403. Thereafter, a pixel electrode 304 is formed on the passivation layer 403 and connected to the drain electrode 405*b*. The pixel electrode 304 includes a plurality of slit portions 307. When voltage is applied, an in-plane electric field having a parabola shape is formed through the slit portions 307.

In the first exemplary embodiment of the present invention, the conductive line 305*a* connected to the common electrode line 303 is formed at the edge of the common electrode 305 formed in the unit pixel to reducing resistance. FIGS. 4 and 5 show a second exemplary embodiment of the present invention. In the second exemplary embodiment, to better reduce resistance of the common electrode 305, a connection line 501 electrically connecting neighboring common electrodes with each other in the gate line direction is further provided. FIG. 4 is a plan view of the second exemplary embodiment, and FIG. 5 is a sectional view of region A taken along line II-II of FIG. 4.

Reference numeral 501 of FIG. 4 indicates a connection line, and the connection line 501 connects common electrodes 305 of neighboring unit pixels with each other in the direction of the gate line. The connection line 501 is formed in each unit pixel and may be formed simultaneously in the step of forming the gate line 301 and the common electrode line 303. The connection line 501 may be formed by stacking a transparent electrode material constituting a transparent electrode layer 305*a* of the common electrode 305 and a conductive material constituting a conductive line 305*a* of the common electrode 305. The rest of the structure is the same as that of the first exemplary embodiment.

A third exemplary embodiment of the present invention for further reducing resistance of the common electrode 305 will now be described with reference to FIGS. 6 and 7. FIG. 6 is a plan view of the third embodiment of the present invention, and FIG. 7 is a sectional view of region B taken along line III-III of FIG. 6.

The third exemplary embodiment illustrated in FIG. 6 is characterized in that a conductive path connecting neighboring pixel electrodes 304 with each other in a direction of the data line 302. Referring to FIG. 7, a conductive line 701 is formed of a transparent electrode material, which is the same as that of the pixel electrode 304, and is connected to the common electrode 305 through a contact hole 702. Preferably, the conductive line 701 is connected to a conductive portion 305*a* of the common electrode 305 in order to improve conductivity. The contact hole 702 may be simultaneously formed in the step of removing a portion of the passivation layer 403 and exposing the drain electrode 405*b*, and the conductive line 701 may be formed simultaneously in the step of forming the pixel electrode 304.

FIG. 8 illustrates another conductive path, which is a fourth exemplary embodiment of the present invention. FIG. 8 illustrates a plurality of conductive lines for further improving conductivity of the conductive path. As shown in FIG. 8, a conductive path includes a first conductive line 901 formed of the same conductive material as that of the source and drain electrodes 405*a* and 405*b*, and a second conductive line 701 formed of the same material as that of the pixel electrode 304. The first conductive line 901 is formed of the material used for the source and drain electrodes 405*a* and 405*b*, such as one selected from Mo, Mo alloy, Al, Al alloy, Ti, Ti alloy, Ta, Ta alloy, Co, Co alloy, Ni, Ni alloy and Cr. However, other materials can be used as appropriate. Because these materials have better conductivity compared to transparent electrode materials, such as ITO or the like, resistance of the conductive path connected between the common electrodes **305** can be lowered. Additionally, because the conductive path is formed at an edge of the common electrodes **305** as mentioned above, greenish discoloration of a display screen due to improper application of the common voltage may be reduced while minimizing cross talk problems generated between the data line **302** and the common electrode **305**. In particular, a common electrode having uniform sectional profile is formed by using a diffraction mask to form the conductive path, thereby resolving cross talk problems.

FIGS. **9**A to **9**D illustrates an exemplary fabrication process according to the present invention with respect to the first exemplary embodiment of the present invention taken along view line I-I of FIG. **2**. However, the fabrication may be applied with respect to the other exemplary embodiments without departing from the scope of the present invention.

As shown in FIG. **9**A, a transparent electrode material, such as ITO or TZO, is applied onto a substrate **401**, such as glass, by a sputtering method, for example, to form a transparent electrode layer **305***b*. Then, a first conductive layer **305***a* is formed on the transparent electrode layer **305***b*. The first conductive layer **305***a* may be a metallic material or other materials having good conductivity and ohmic contact properties with the transparent electrode layer **305***b*.

Thereafter, photoresist is applied on the first conductive layer **305***a* and processed with diffractive exposure, thereby forming photoresist pattern **1001** having a step difference. The photoresist pattern **1001** defines a gate line (**301**), a common electrode (**305**), and a common electrode line (**303**). In the case of the second exemplary embodiment of the present invention (FIGS. **4** and **5**), the photoresist pattern may further define a connection line (**501**).

As shown in FIG. **9**B, a first conductive layer **305***a* and a transparent electrode layer **305***b* are sequentially etched by using the photoresist pattern **1001** as an etching mask. As a result, a gate line **301**, a common electrode **305**, and a common electrode line **303** are formed. In particular, the photoresist pattern **1001** is ashed to define a light transmitting portion **320** of the common electrode **305**. Namely, the photoresist pattern **1001** patterned by the diffractive exposure is relatively thin at the light transmitting region **320**. This thin portion of the photoresist on the light transmitting portion **320** is removed by ashing, thereby exposing the first conductive layer **305***a* before the etching process. Then, the first conductive layer **305***a* of the light transmitting portion **320** is removed using the ashed photoresist pattern as an etching mask, to thereby complete the light transmitting portion **320**.

Here, the gate line **301**, the common electrode line **303**, and a conductive portion **306** constituting an edge of the common electrode **305** are formed by stacking the transparent electrode layer **305***b* and the first conductive layer **305***a*, thereby improving electrical conductivity. Because the edges of the common electrode **305** are etched using a thick photoresist pattern **1001** by the diffractive exposure process, the common electrode **305** having an accurate shape are formed. Generally, when the edges of a common electrode are etched using the photoresist pattern formed using a half exposure process, the photoresist formed by the half exposure may result in uneven sectional profiles at the edges, resulting in the common electrode not being uniformly parallel to the data line **302**. This results in generation of different parasitic capacitances along the unit pixel causing cross talk and greenish screen problems. However, by using diffractive expose on the photoresist to generate the photoresist pattern **1001**, thick photoresist along the edges allow etching to be performed at least twice forming a common electrode having even and uniform edges. Once the common electrode **305** and gate line **301** are formed, the remaining photoresist is removed.

As shown in FIG. **9**C, a gate insulation layer **402** is formed to cover the substrate where the gate line **301** and the common electrode **305** are formed. Then, an active layer **404** and source/drain electrodes **405***a* and **405***b* are formed, respectively. The process of forming the active layer **404** and the source/drain electrodes **405***a* and **405***b* includes forming a semiconductor layer on the gate insulation layer **402**, forming an ohmic contact layer (not shown) on the semiconductor layer, forming a second conductive layer on the ohmic contact layer, and patterning the semiconductor layer and the second conductive layer to form the active layer **404** and the source/drain electrodes **405***a* and **405***b*. The active layer **404** and the source/drain electrodes **405***a* and **405***b* may be formed by diffraction exposure.

A data line **302** is formed in the step of forming the source and drain electrodes **405***a* and **405***b*. In the case of the third exemplary embodiment, the conductive line **901** may also be formed in the step of forming the source and drain electrodes **405***a* and **405***b*.

As shown in FIG. **9**D, a passivation layer **403** is then formed to cover the source and drain electrodes **405***a* and **405***b*. After the formation of the passivation layer **403**, a contact hole for exposing the drain electrode **405***b* is formed on the passivation layer **403**. When the contact hole is formed, other contact holes, such as contact holes **702** that for the conductive path of the second and third exemplary embodiments, are formed at the same time.

Then, a transparent electrode material is applied on the passivation layer **403** including the contact hole, and pixel electrode **304** is formed by a photolithography process. The pixel electrode **304** includes slits **307** formed by removing the transparent electrode material. When voltage is applied to the pixel electrode **304**, an in-plane electric field having a parabola shape is formed between the common electrode **305** and the pixel electrode **304** through the slits **307**.

In the third exemplary embodiment, a contact line **701** connecting neighboring common electrodes **305** in the direction of the data line **302** is formed during the step of forming the pixel electrode **304**. Through the aforementioned process, an exemplary LCD device in accordance with the present invention is completed.

As described above, the LCD device in accordance with the present invention includes a transparent common electrode and a pixel electrode to improve an aperture ratio. The pixel electrode further includes slits to form an in-plane electrode field having a parabola shape such that a viewing angle can be improved. In addition, electrical resistance of the common electrode is reduced by a conductive line formed along the edges of the common electrode, thereby smoothly transmitting a signal. By patterning the edge of the common electrode through a diffractive exposure process, formation of a profile of the common electrode is precisely controlled, thereby preventing cross talk and greenish screen problems. Further, a connection line and a conductive path to interconnect common electrodes together allow smooth transmission of a common voltage to the common electrodes.

As described heretofore, precise control of liquid crystal alignment is achieved by an in-plane electric field having a parabola shape. As a result, a viewing angle is improved. Also, by reducing resistance of the common electrode, the common voltage is smoothly applied, thereby improving image quality. Because the fabrication process of the present invention allows formation of precise profiles of the common electrode, signal interference between the data line and the pixel is reduced, thereby further improving image quality.

It will be apparent to those skilled in the art that various modifications and variations can be made in the LCD device of the present invention and the method of fabricating the same without departing form the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A liquid crystal display (LCD) device, comprising:

a unit pixel defined by a gate line formed on a substrate and a data line crossing the gate line;

a switching device formed in the unit pixel;

a common electrode line formed parallel to the gate line, the common electrode line including a first transparent electrode layer and a first conductive layer;

a common electrode having a conductive portion and a light transmitting portion formed within the unit pixel and connected to the common electrode line, the conductive portion formed along a periphery of the common electrode including a second transparent electrode layer and a second conductive layer, and the light transmitting portion including a third transparent electrode layer disposed in a middle portion of the common electrode includes a third transparent electrode layer;

a conductive path formed on the common electrode in a direction of the data line and electrically connecting the common electrodes of neighboring unit pixels, wherein the conductive path comprises a first conductive path formed of the same conductive material as a material of the data line and a second conductive path formed of the same material as that of the pixel electrode; and

a pixel electrode having a slit region arranged to face the common electrode.

2. The LCD device of claim 1, wherein the conductive portion is connected to the common electrode line.

3. The LCD device of claim 1, further comprising a connection line formed parallel to the gate line and electrically connecting the common electrodes.

4. The LCD device of claim 3, wherein the connection line is connected to the conductive portion.

5. The LCD device of claim 1, wherein the first, second, and third transparent electrode layers are formed from the same transparent electrode layer.

6. The LCD device of claim 1, wherein the first and second conductive layers are formed from the same conductive layer.

7. The LCD device of claim 1, wherein the gate line is formed of the first transparent electrode layer and the first conductive layer.

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专利名称(译)	具有电阻降低的公共电极的液晶显示装置		
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申请(专利权)人(译)	LG.PHILIPS CO. , LTD.		
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摘要(译)

液晶显示（LCD）装置包括由形成在基板上的栅极线和与栅极线交叉的数据线限定的单位像素，形成在单位像素中的开关装置，与栅极线平行形成的公共电极线，公共电极线包括第一透明电极层和第一导电层，公共电极具有导电部分和光透射部分，光电传输部分形成在单元像素内并连接到公共电极线，导电部分沿着公共电极线的周边形成。包括第二透明电极层和第二导电层的公共电极，包括设置在公共电极的中间部分的第三透明电极层的光透射部分包括第三透明电极层和具有设置的狭缝区域的像素电极面对公共电极。