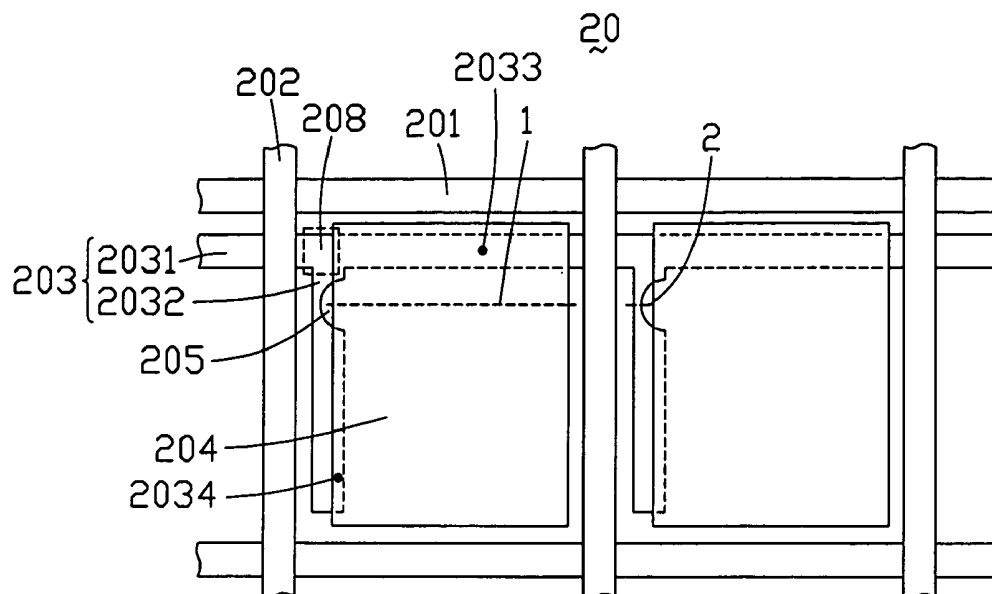




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A liquid crystal panel of the present disclosure includes a first common electrode defining a plurality of first common electrode portions, a plurality of second common electrode portions connected to the first common electrode, and a plurality of pixel electrodes. Each pixel electrode overlaps one of the first common electrode portions and a corresponding one of the second common electrode portions, thereby forming storage capacitors therebetween. Each second common electrode portion defines a first notch adjacent to the pixel electrode. There is no overlap between the pixel electrode and the second common electrode portion at the first notch.



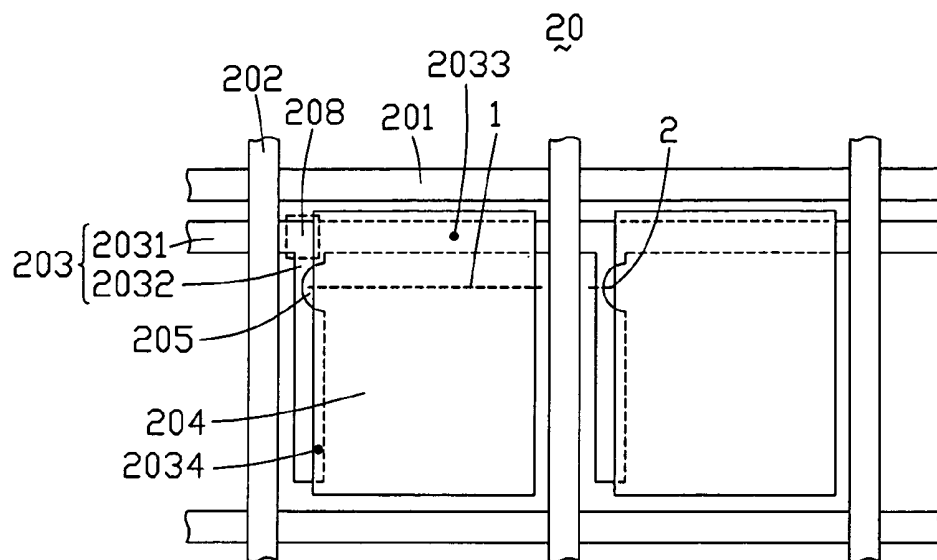


FIG. 1

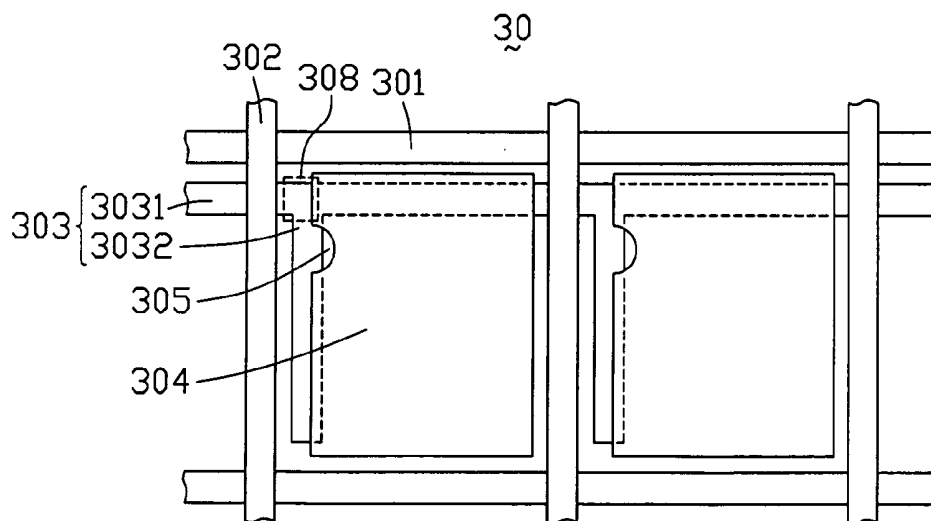


FIG. 2

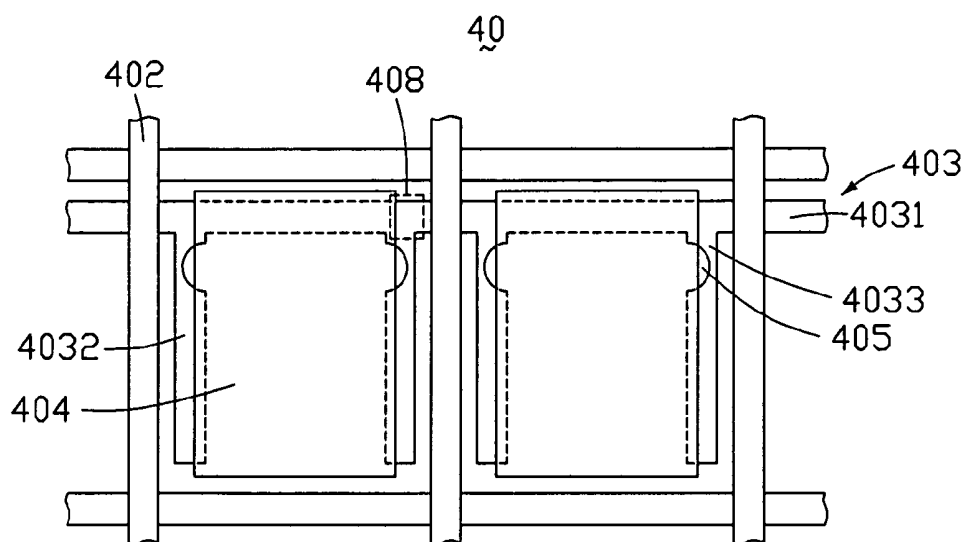


FIG. 3

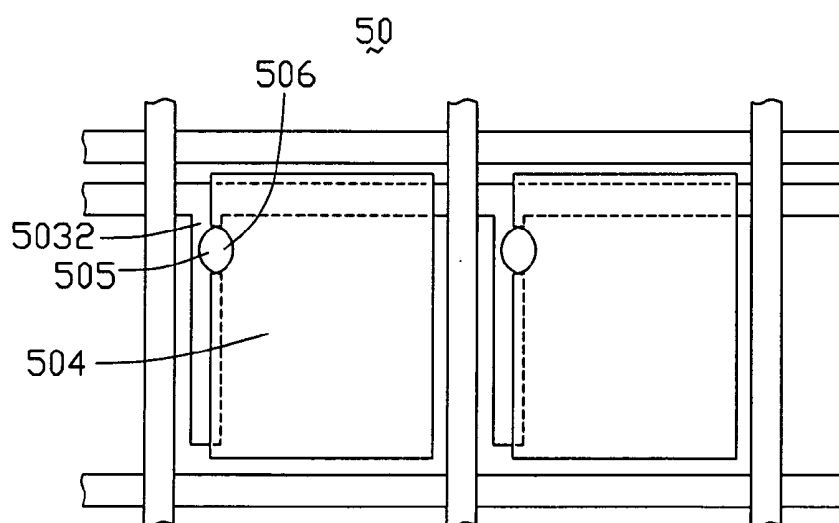


FIG. 4

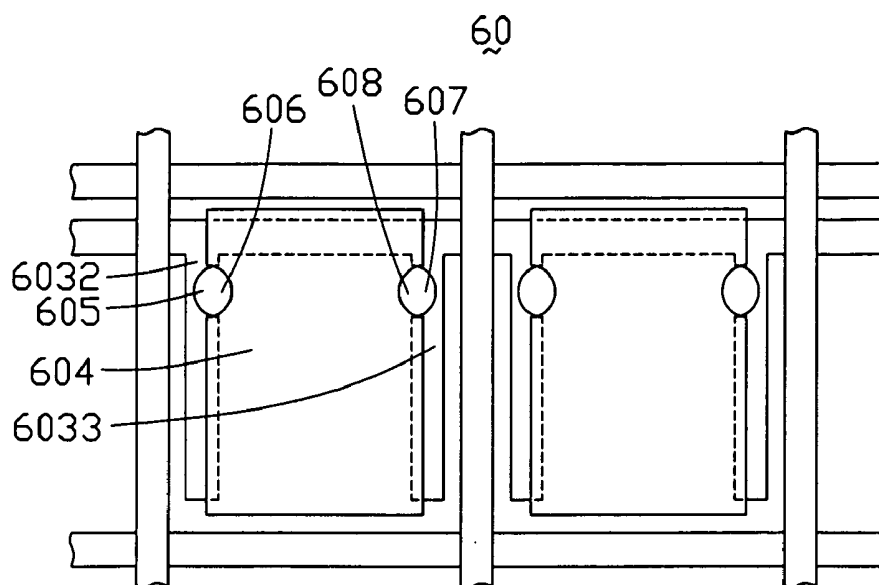


FIG. 5

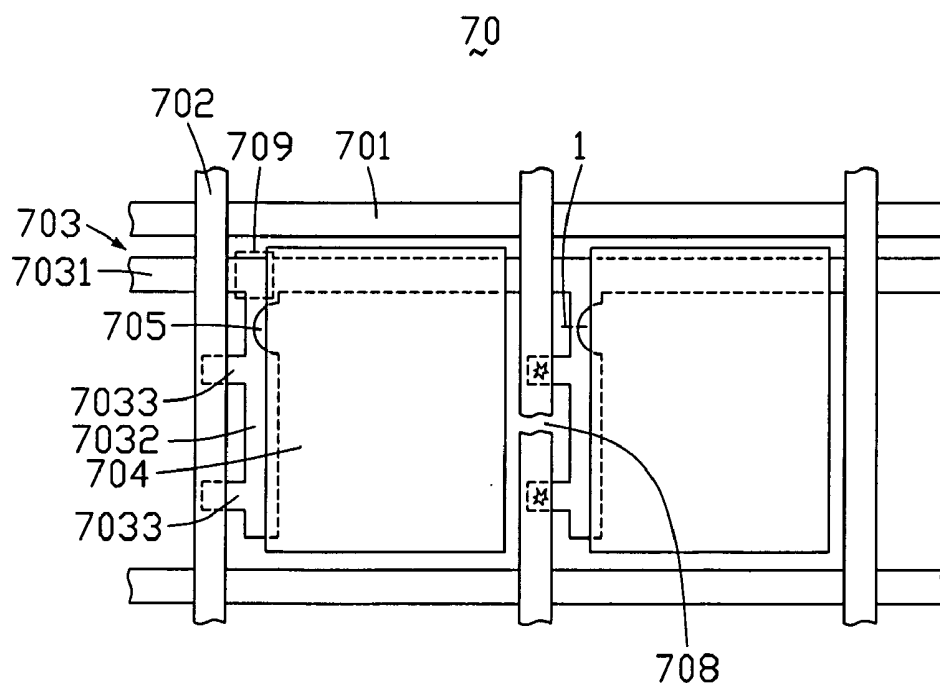


FIG. 6

LIQUID CRYSTAL PANEL HAVING NOTCHES FOR REPAIR

BACKGROUND

[0001] 1. Field of the Invention

[0002] Embodiments of the present disclosure relate to a liquid crystal panel.

[0003] 2. General Background

[0004] A typical liquid crystal display (LCD) is capable of displaying a clear and sharp image through thousands or even millions of pixels that make up the complete image. The liquid crystal display has thus been applied to various electronic equipment in which messages or pictures need to be displayed, such as mobile phones and notebook computers. A liquid crystal display generally includes a liquid crystal panel for displaying images, and a backlight for illuminating the liquid crystal panel.

[0005] In a process of fabricating the liquid crystal panel of the LCD, if an active substrate of the liquid crystal panel is not even enough, or when a heating or etching step is performed, a short circuit is liable to occur between a common electrode and a pixel electrode. In order to increase yield, the short circuit needs to be repaired.

[0006] However, when cutting one of the common and pixel electrodes to repair the short circuit therebetween, the common and pixel electrodes may both be inadvertently cut at the same time, thus creating another short circuit between the common and pixel electrodes. That is, the success rate of the repair process is apt to be low.

[0007] From the foregoing, it should be appreciated that there is a need for a liquid crystal display panel having an improved rate of success of repair.

SUMMARY

[0008] In one aspect, a liquid crystal panel includes a first common electrode defining a plurality of first common electrode portions, a plurality of second common electrode portions connected to the first common electrode, and a plurality of pixel electrodes. Each pixel electrode overlaps one of the first common electrode portions and a corresponding one of the second common electrode portions, thereby forming storage capacitors therebetween. Each second common electrode portion defines a first notch adjacent to the pixel electrode. There is no overlap between the pixel electrode and the second common electrode portion at the first notch.

[0009] In another aspect, a liquid crystal panel includes a first common electrode, a plurality of second common electrodes connected to the first common electrode, and a plurality of pixel electrodes. The pixel electrodes overlap respective portions of the first common electrode and the second common electrodes respectively, thereby forming storage capacitors therebetween. Each pixel electrode defines a first notch adjacent to a corresponding second common electrode with there being no overlap between the pixel electrode and the second common electrode at the first notch.

[0010] These and other objects and advantages of the present disclosure will become more apparent from the following description of certain inventive embodiments taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a schematic of two adjacent pixels of a liquid crystal panel according to a first embodiment of the present disclosure.

[0012] FIG. 2 is a schematic of two adjacent pixels of a liquid crystal panel according to a second embodiment of the present disclosure.

[0013] FIG. 3 is a schematic of two adjacent pixels of a liquid crystal panel according to a third embodiment of the present disclosure.

[0014] FIG. 4 is a schematic of two adjacent pixels of a liquid crystal panel according to a fourth embodiment of the present disclosure.

[0015] FIG. 5 is a schematic of two adjacent pixels of a liquid crystal panel according to a fifth embodiment of the present disclosure.

[0016] FIG. 6 is a schematic of two adjacent pixels of a liquid crystal panel according to a sixth embodiment of the present disclosure.

DETAILED DESCRIPTION

[0017] FIG. 1 is a schematic of two adjacent pixels of a liquid crystal panel 20 according to a first embodiment of the present disclosure. In this embodiment, the liquid crystal panel 20 may include a plurality of parallel gate lines 201, a plurality of parallel data lines 202 that are orthogonal to the gate lines 201, a plurality of common electrodes 203, and a plurality of pixel electrodes 204. The plurality of gate lines 201 and the plurality of data lines 202 define a plurality of pixels (not labeled). The plurality of pixel electrodes 204 are positioned in the pixels, respectively. In each pixel, the common electrode 203 may include a first common electrode portion 2031 and a second common electrode portion 2032 perpendicular to the first common electrode portion 2031. The first common electrode portion 2031 is parallel to the gate lines 201, and the second common electrode portion 2032 is parallel to the data lines 202. In each row of pixels, the first common electrode portions 2031 cooperatively form a single first common electrode (not labeled), which runs through the row of pixels. The second common electrode portions 2032 are electrically connected with the first common electrode at connection points 208, respectively.

[0018] In each pixel, the pixel electrode 204 partially overlaps the first common electrode portion 2031 and the second common electrode portion 2032, thereby forming a storage capacitor therebetween. The second common electrode portion 2032 defines a notch 205 adjacent to the connection point 208 and the pixel electrode 204. Thus, there is no overlap between the pixel electrode 204 and the second common electrode portion 2032 at the notch 205. In the illustrated embodiment, the notch 205 is semicircular or in the shape of a segment on a chord.

[0019] When a first short circuit point 2033 between the pixel electrode 204 and the first common electrode portion 2031 is detected, the pixel electrode 204 and the first common electrode portion 2031 can be disconnected by means of cutting the pixel electrode 204 along a cutting line 1 which corresponds to the notch 205.

[0020] When a second short circuit point 2034 between the pixel electrode 204 and the second common electrode portion 2032 is detected, the pixel electrode 204 and the second common electrode portion 2032 can be disconnected by means of cutting the second common electrode portion 2032 along a cutting line 2 which corresponds to the notch 205.

[0021] In summary, in each pixel, there is no overlap between the pixel electrode 204 and the second common electrode portion 2032 at the notch 205, and the cutting lines 1, 2 both correspond to the notch 205. When cutting the pixel

electrode **204** or the second common electrode portion **2032** along the cutting line **1** or **2** to solve the respective short circuit problem, only one of the pixel electrode **204** and the second common electrode portion **2032** is cut. Therefore, there is little or no risk of another short circuit being created. Therefore, the rate of success of repair of the liquid crystal panel **20** is improved.

[0022] FIG. 2 is a schematic of two adjacent pixels of a liquid crystal panel **30** according to a second embodiment of the present disclosure. In this embodiment, the liquid crystal panel **30** may include a plurality of parallel gate lines **301**, a plurality of parallel data lines **302** that are orthogonal to the gate lines **301**, a plurality of common electrodes **303**, and a plurality of pixel electrodes **304**. The plurality of gate lines **301** and the plurality of data lines **302** define a plurality of pixels (not labeled). The plurality of pixel electrodes **304** are positioned in the pixels, respectively. In each pixel, the common electrode **203** may include a first common electrode portion **3031**, and a second common electrode portion **3032** perpendicular to the first common electrode portion **3031**. The first common electrode portion **3031** is parallel to the gate lines **301**, and the second common electrode portion **3032** is parallel to the data lines **302**. In each row of pixels, the first common electrode portions **3031** cooperatively form a single first common electrode (not labeled), which runs through the row of pixels. The second common electrode portions **3032** are electrically connected with the first common electrode at connection points **308**, respectively.

[0023] In each pixel, the pixel electrode **304** partially overlaps the first common electrode portion **2031** and the second common electrode portion **2032**, thereby respectively forming a storage capacitor therebetween. The pixel electrode **304** defines a notch **305** adjacent to the connection point **308** and the second common electrode portion **3032**. Thus, there is no overlap between the pixel electrode **304** and the second common electrode portion **3032** at the notch **305**. In the illustrated embodiment, the notch **305** is semicircular or in the shape of a segment on a chord.

[0024] FIG. 3 is a schematic of two adjacent pixels of a liquid crystal panel **40** according to a third embodiment of the present disclosure. The liquid crystal panel **40** is similar to the liquid crystal panel **20** of the first embodiment. However, a common electrode **403** in each pixel of the liquid crystal panel **40** further includes a third common electrode portion **4033**. In each pixel, the third common electrode portion **4033** is electrically connected with a first common electrode portion **4031** of a common electrode **403** at a connection point **408**. The pixel electrode **404** partially overlaps the third common electrode portion **4033**, thereby forming a storage capacitor therebetween. The third common electrode portion **4033** defines a notch **405** adjacent to the connection point **408** and the pixel electrode **404**. Thus, there is no overlap between the pixel electrode **404** and the third common electrode portion **4033** at the notch **405**. The third common electrode portion **4033** and the second common electrode portion **4032** are symmetrically opposite each other across a width of the pixel. In the illustrated embodiment, the notch **405** is semicircular or in the shape of a segment on a chord.

[0025] FIG. 4 is a schematic of two adjacent pixels of a liquid crystal panel **50** according to a fourth embodiment of the present disclosure. The liquid crystal panel **50** is similar to the liquid crystal panel **20** of the first embodiment. However, a pixel electrode **504** in each pixel of the liquid crystal panel **50** includes a notch **506** corresponding to a notch **505** of a

corresponding second common electrode portion **5032**. In the illustrated embodiment, each of the notches **505**, **506** is semicircular or in the shape of a segment on a chord.

[0026] FIG. 5 is a schematic of two adjacent pixels of a liquid crystal panel **60** according to a fifth embodiment of the present disclosure. The liquid crystal panel **60** is similar to the liquid crystal panel **40** of the third embodiment. However, a pixel electrode **604** in each pixel of the liquid crystal panel **60** defines two notches **606**, **608** at two opposite sides adjacent to a second common electrode portion **6032** and a third common electrode portion **6033**, respectively. The notches **606**, **608** respectively correspond to notches **605**, **607** of the second and third common electrode portions **6032**, **6033**. In the illustrated embodiment, each of the notches **605**, **606**, **607**, **608** is semicircular or in the shape of a segment on a chord. In one alternative embodiment, the notch **608** of the pixel electrode **604** may be omitted.

[0027] FIG. 6 is a schematic of two adjacent pixels of a liquid crystal panel **70** according to a sixth embodiment of the present disclosure. In this embodiment, the liquid crystal panel **70** may include a plurality of parallel gate lines **701**, a plurality of parallel data lines **702** that are orthogonal to the gate lines **701**, a plurality of common electrodes **703**, and a plurality of pixel electrodes **704**. The plurality of gate lines **701** and the plurality of data lines **702** define a plurality of pixels (not labeled). The plurality of pixel electrodes **704** are positioned in the pixels, respectively. In each pixel, the common electrode **703** may include a first common electrode portion **7031**, and a second common electrode portion **7032** perpendicular to the first common electrode portion **7031**. The first common electrode portion **7031** is parallel to the gate lines **701**, and the second common electrode portion **7032** is parallel to the data lines **702**. In each row of pixels, the first common electrode portions **7031** cooperatively form a single first common electrode (not labeled), which runs through the row of pixels. The second common electrode portions **7032** are electrically connected with the first common electrode at connection points **709**, respectively.

[0028] In each pixel, the pixel electrode **704** partially overlaps the first common electrode portion **7031** and the second common electrode portion **7032**, thereby respectively forming a storage capacitor therebetween. The second common electrode portion **7032** defines a notch **705** adjacent to the connection point **709** and the pixel electrode **704**. Thus, there is no overlap between the pixel electrode **704** and the second common electrode portion **7032** at the notch **705**. The second common electrode portion **7032** further includes two protrusions **7033** perpendicularly extending in a same direction to an underside of the nearest adjacent data line **702**. One of the protrusions **7033** is relatively near the connection point **709**, and the other protrusion **7033** is far away from the connection point **709**.

[0029] When a break **708** in the data line **702** is detected, the two protrusions **7033** are connected to the data line **702** respectively by a welding method, and the second common electrode portion **7032** is cut along a cutting line **1** at the notch **709**. Accordingly, the two separated parts of the data line **702** are reconnected through a portion of the second common electrode portion **7032**, and therefore the data line **702** can work normally.

[0030] It is to be further understood that even though numerous characteristics and advantages of the present embodiments have been set out in the foregoing description, together with details of the structures and functions of the

embodiments, the disclosure is illustrative only; and that changes may be made in detail, especially in matters of shape, size and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A liquid crystal panel comprising:
a first common electrode defining a plurality of first common electrode portions;
a plurality of second common electrode portions connected to the first common electrode;
a plurality of pixel electrodes each overlapping one of the first common electrode portions and a corresponding one of the second common electrode portions, thereby forming storage capacitors therebetween, each second common electrode portion defining a first notch adjacent to the pixel electrode, wherein there is no overlap between the pixel electrode and the second common electrode portion at the first notch.
2. The liquid crystal panel in claim 1, wherein each of the pixel electrodes defines a second notch corresponding to the first notch of the respective second common electrode portion.
3. The liquid crystal panel in claim 2, wherein each of the second common electrode portions is connected with the first common electrode at a respective first connection point, the first notch being adjacent to the first connection point.
4. The liquid crystal panel in claim 3, further comprising a plurality of parallel gate lines and a plurality of parallel data lines orthogonal to the gate lines, the gate lines and the data lines defining a plurality of pixels, the pixel electrodes being positioned in the pixels respectively.
5. The liquid crystal panel in claim 4, wherein the first common electrode is parallel to the gate lines and runs through a row of the pixels, and the second common electrode portions are positioned in the pixels respectively and are parallel to the data lines.
6. The liquid crystal panel in claim 5, further comprising a plurality of third common electrode portions, the third common electrode portions each being connected with the first common electrode at a respective second connection point, each third common electrode portion and an adjacent second common electrode portion being symmetrically opposite each other across a width of the respective pixel, the corresponding pixel electrode overlapping the third common electrode portion thereby forming a storage capacitor therebetween.
7. The liquid crystal panel in claim 6, wherein the third common electrode portion defines a third notch adjacent to the pixel electrode, with there being no overlap between the pixel electrode and the third common electrode portion at the third notch.
8. The liquid crystal panel in claim 7, wherein the pixel electrode further defines a fourth notch corresponding to the third notch of the third common electrode portion.
9. The liquid crystal panel in claim 4, wherein each second common electrode portion further comprises two protrusions

perpendicularly extending in a same direction to an underside of the nearest adjacent data line, one of the protrusions being relatively near the first connection point, and the other protrusion being far away from the first connection point.

10. A liquid crystal panel comprising:
a first common electrode;
a plurality of second common electrodes connected to the first common electrode;
a plurality of pixel electrodes overlapping respective portions of the first common electrode and the second common electrodes respectively, thereby forming storage capacitors therebetween, each pixel electrode defining a first notch adjacent to a corresponding second common electrode with there being no overlap between the pixel electrode and the second common electrode at the first notch.
11. The liquid crystal panel in claim 10, wherein each of the second common electrodes is connected with the first common electrode at a respective first connection point, the first notch being adjacent to the first connection point.
12. The liquid crystal panel in claim 11, further comprising a plurality of parallel gate lines and a plurality of parallel data lines orthogonal to the gate lines, the gate lines and the data lines defining a plurality of pixels, the pixel electrodes being positioned in the pixels respectively.
13. The liquid crystal panel in claim 12, wherein the first common electrode is parallel to the gate lines and runs through a row of the pixels, and the second common electrodes are positioned in the pixels respectively and are parallel to the data lines.
14. The liquid crystal panel in claim 13, further comprising a plurality of third common electrodes, the third common electrodes each being connected with the first common electrode at a respective second connection point, each third common electrode and an adjacent second common electrode being symmetrically opposite each other across a width of the respective pixel, the corresponding pixel electrode overlapping the third common electrode thereby forming a storage capacitor therebetween.
15. The liquid crystal panel in claim 14, wherein the pixel electrode further defines a second notch adjacent to the third common electrode with there being no overlap between the pixel electrode and the third common electrode at the second notch.
16. The liquid crystal panel in claim 15, wherein the second notch is adjacent to the second connection point.
17. The liquid crystal panel in claim 14, wherein the third common electrode defines a third notch adjacent to the pixel electrode with there being no overlap between the pixel electrode and the third common electrode at the third notch.
18. The liquid crystal panel in claim 17, wherein the third notch is adjacent to the second connection point.

* * * * *

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摘要(译)

本公开的液晶面板包括：第一公共电极，限定多个第一公共电极部分；多个第二公共电极部分，连接到第一公共电极；以及多个像素电极。每个像素电极与第一公共电极部分中的一个和第二公共电极部分中的相应一个重叠，从而在它们之间形成存储电容器。每个第二公共电极部分限定与像素电极相邻的第一凹口。在第一凹口处的像素电极和第二公共电极部分之间没有重叠。

