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Du

(54) **LIQUID CRYSTAL DISPLAY PANEL**

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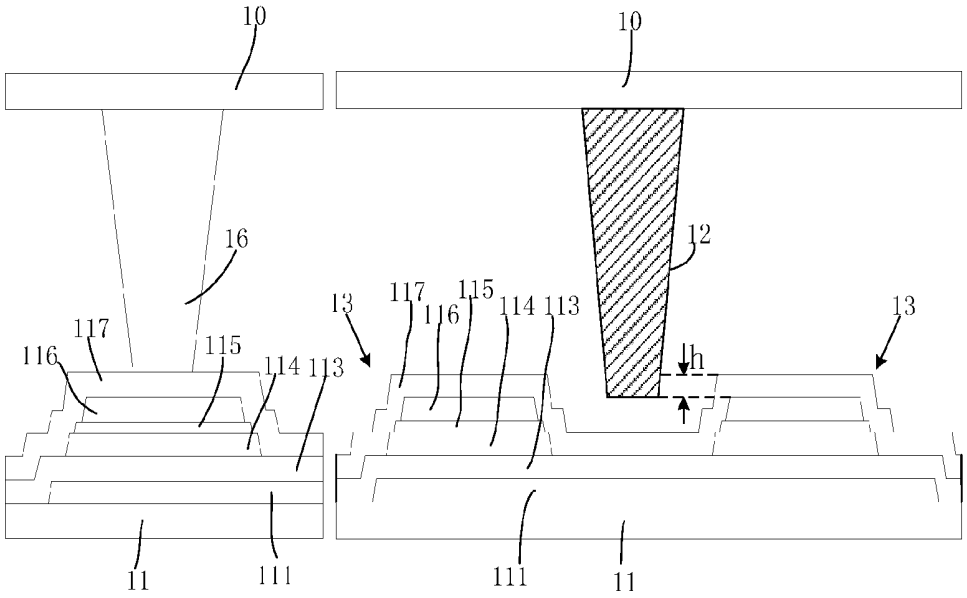
USPC **349/43**

(57) **ABSTRACT**

The present invention discloses a liquid crystal display panel. The liquid crystal display panel comprises at least one first spacer provided between first and second substrates. The bottom of the first spacer is connected with the first substrate, and the top thereof extends to the second substrate and is away from the second substrate. Wherein, the second substrate is provided with a blocking structure corresponding to the first spacer, which is used to cooperate with the corresponding first spacer to prevent the first substrate sliding opposite to the second substrate. The present invention can prevent the first substrate of the liquid crystal display panel sliding opposite to the second substrate.



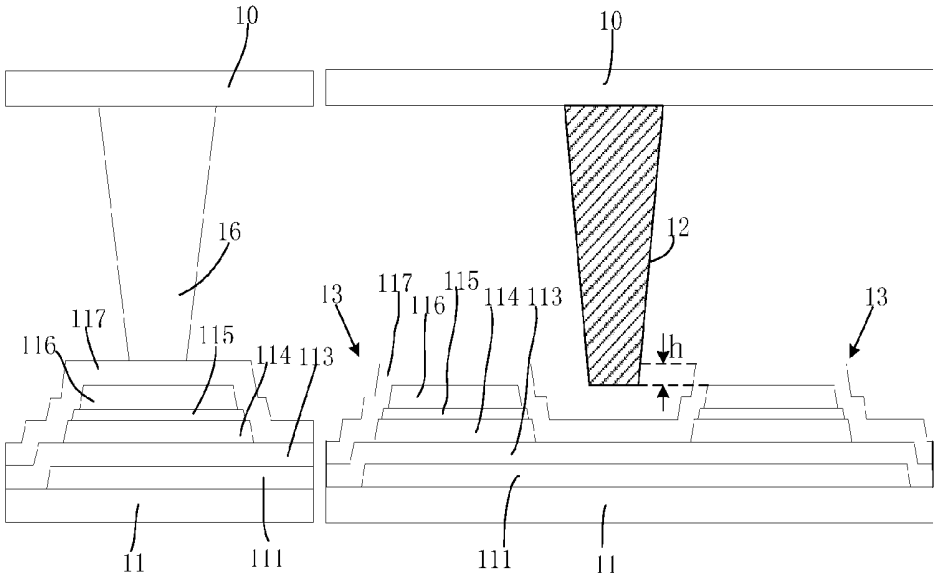

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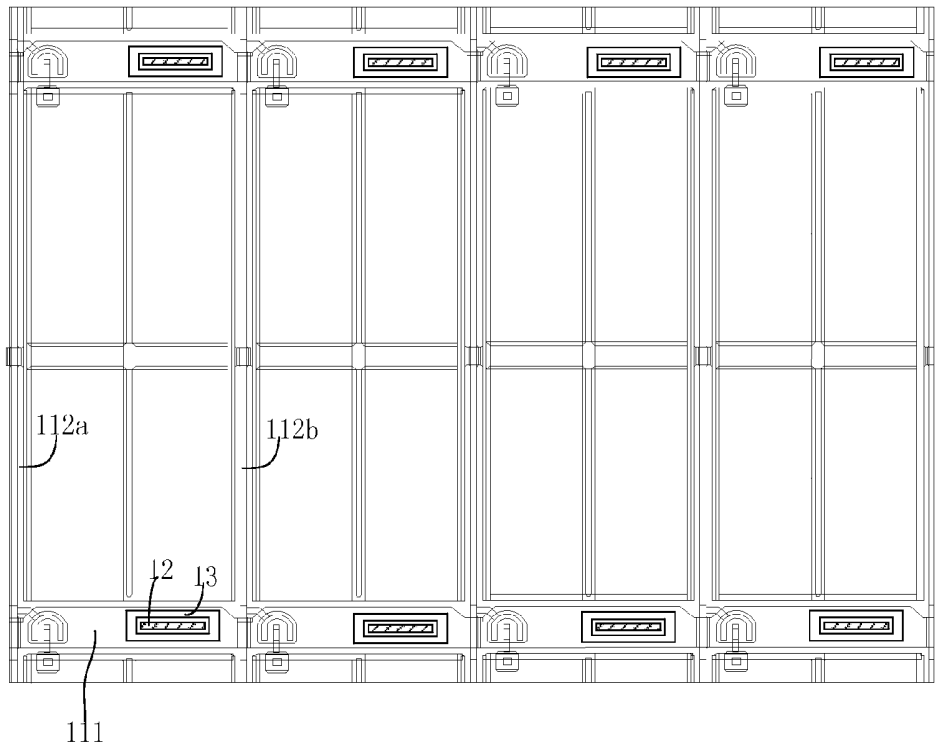
FIG. 1


112a
112b
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13
111

FIG. 2

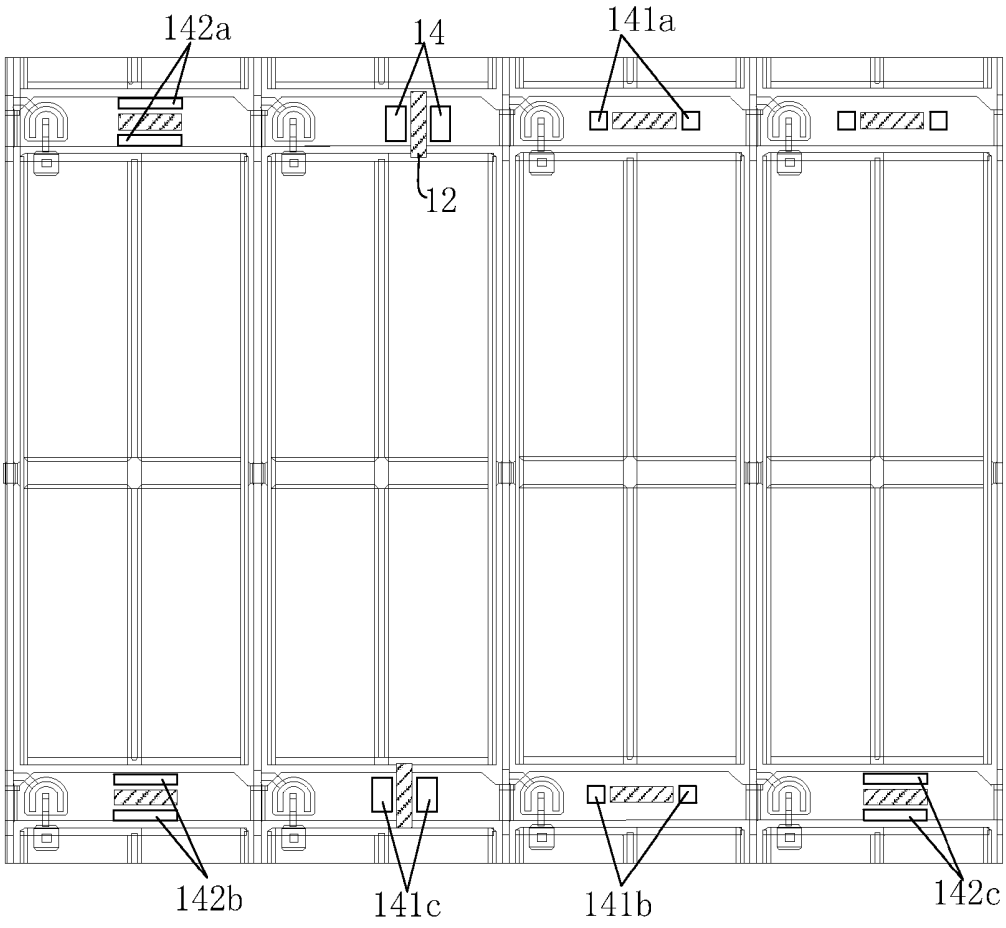


FIG. 3

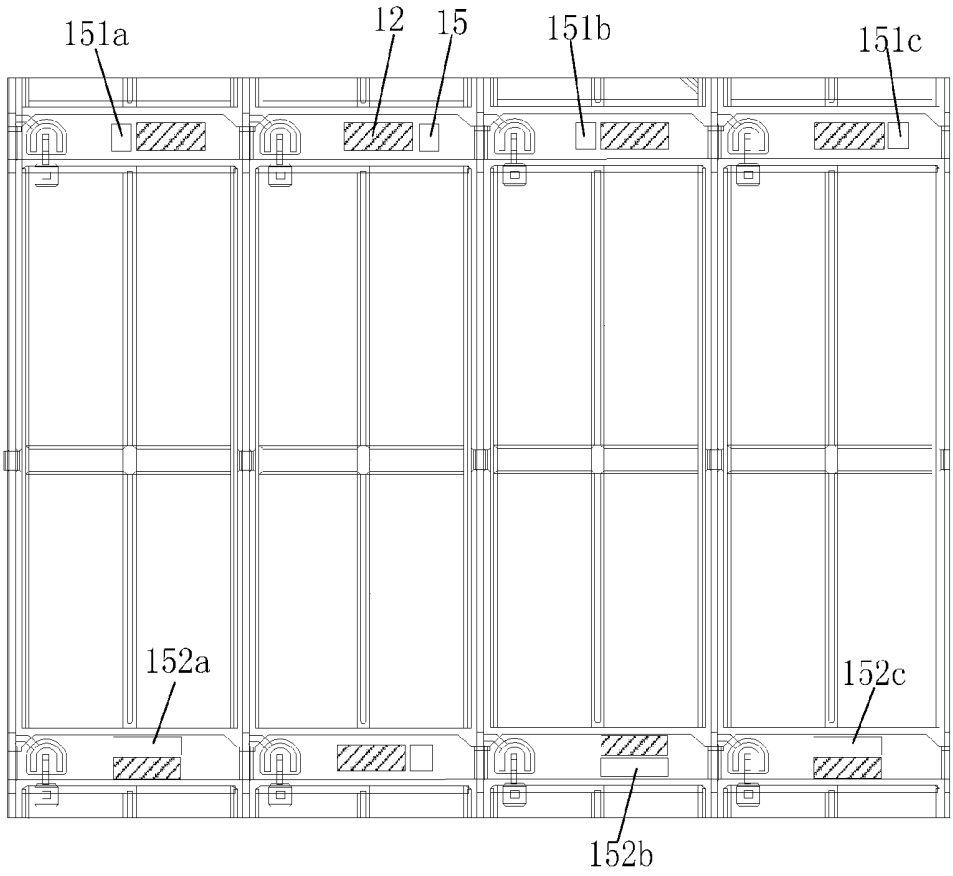


FIG. 4

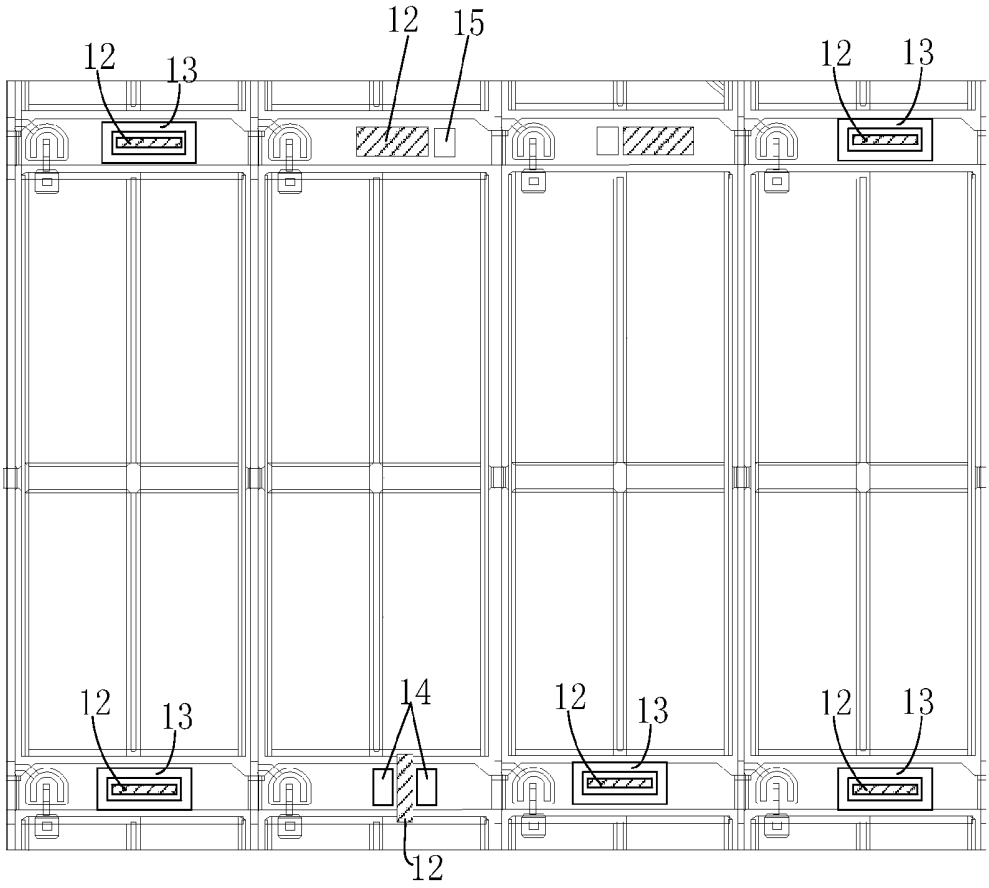
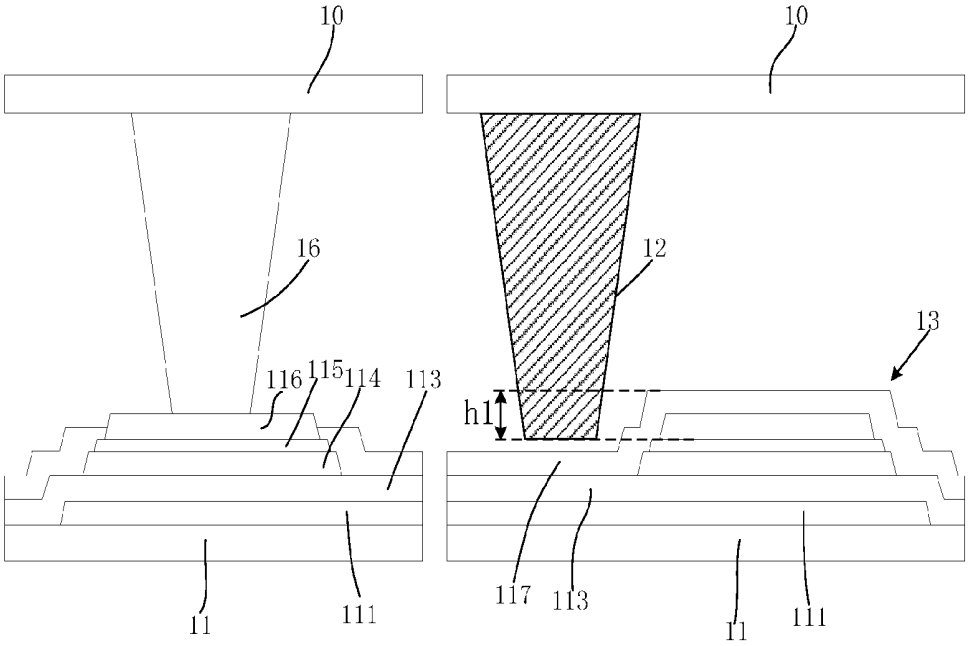


FIG. 5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111

FIG. 6

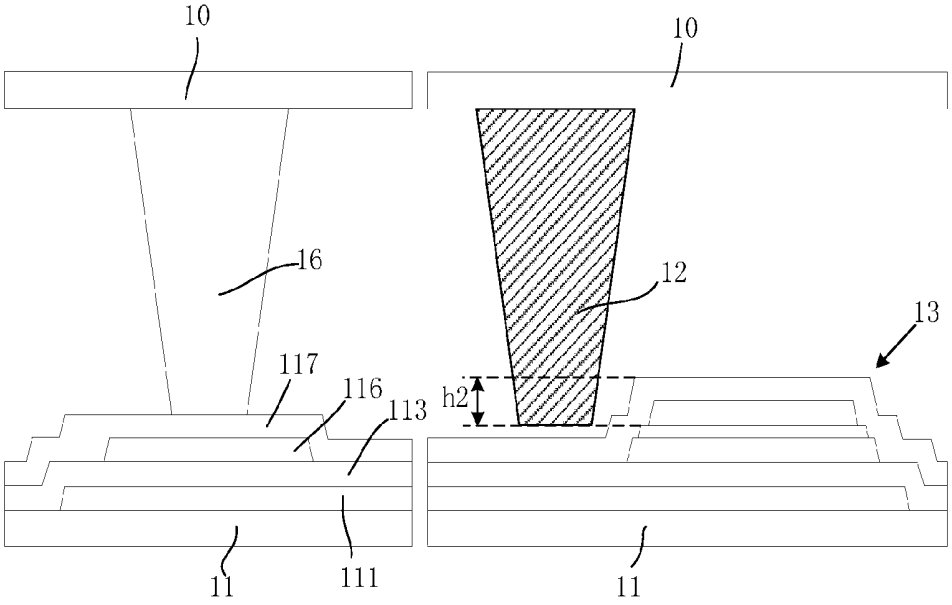
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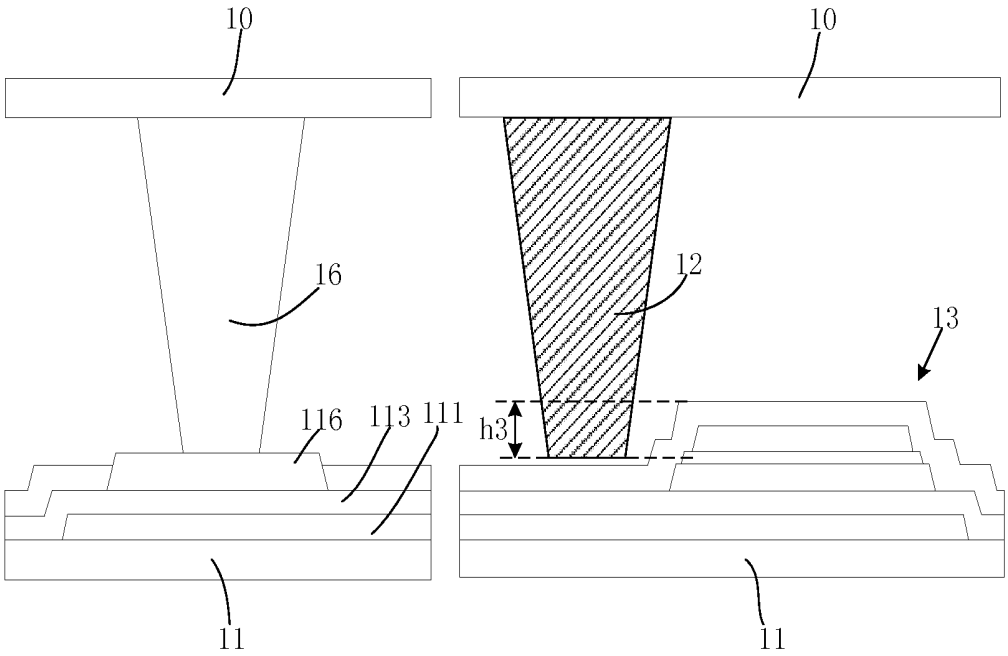
FIG. 7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h3
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FIG. 8

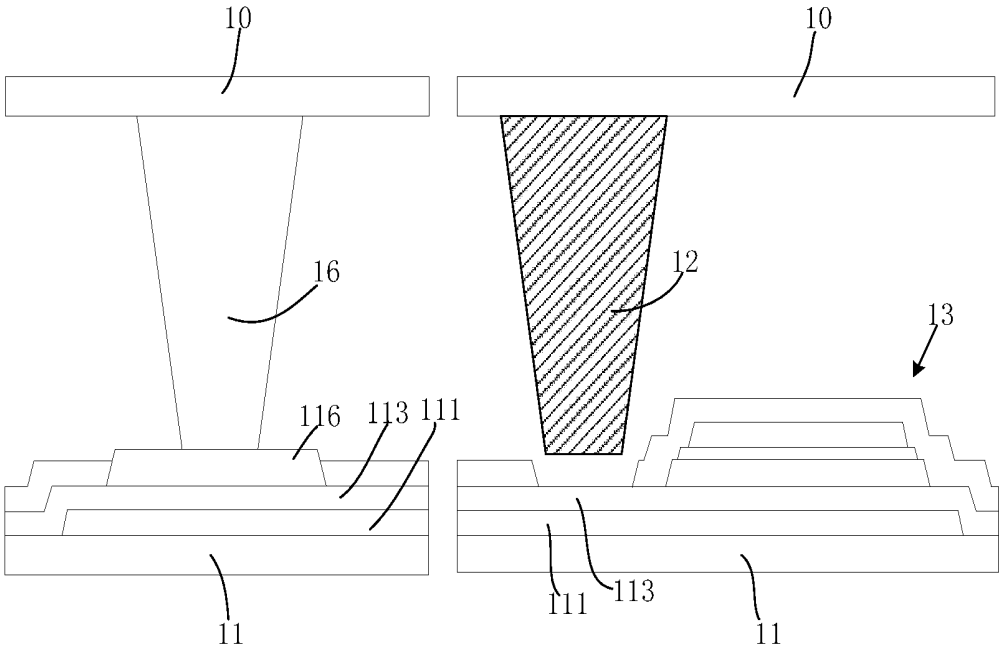
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FIG. 9

LIQUID CRYSTAL DISPLAY PANEL

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to the field of display technology, and in particular to a liquid crystal display panel.

[0003] 2. The Related Arts

[0004] Liquid crystal display panel is an important part of the liquid crystal display. With the gradual maturity of the liquid crystal display technology, large-size liquid crystal display panel also becomes more common.

[0005] The upper and lower substrates of the large-size liquid crystal display panel are prone to slide oppositely causing dislocation when being impacted during transportation, which will result in poor display effects of the liquid crystal display panel.

[0006] Therefore, it needs to provide a liquid crystal display to solve the above problems.

SUMMARY OF THE INVENTION

[0007] The technical issue to be solved by the present invention is to provide a liquid crystal display, which can prevent the first substrate of the liquid crystal display panel sliding opposite to the second substrate.

[0008] In order to solve the above issue, a technical solution adopted by the present invention is to provide a liquid crystal display panel comprising: a first substrate and a second substrate provided oppositely, and at least one first spacer and a second spacer provided between the first substrate and the second substrate; the second substrate being provided with a gate line and a data line intersecting each other, multiple layers being provided on the gate line, the multiple layers comprising sequentially a gate insulating layer, a semiconductor active layer, an ohmic contact layer, a drain-source layer and a passivation layer, the first spacer being provided corresponding to the gate line, the bottom of the first spacer being connected with the first substrate, the top the first spacer extending to the second substrate and being away from the second substrate, the bottom of the second spacer being connected with the first substrate, the top of the second spacer being connected with the second substrate; wherein, the second substrate is provided with a blocking structure corresponding to the first spacer, the blocking structure is located between the two adjacent data lines and extends to the first substrate, the height of the blocking structure overlaps that of the first spacer in the height direction of the liquid crystal display panel, which is used to cooperate with the first spacer to prevent the first substrate sliding opposite to the second substrate, the blocking structure is a convex structure surrounding the first spacer, the blocking structure is formed by partially etching the multiple layers.

[0009] Wherein, the region of the first spacer corresponding to the second substrate is sequentially provided with the gate line and the gate insulating layer.

[0010] In order to solve the above issue, another technical solution adopted by the present invention is to provide a liquid crystal display panel, comprising: a first substrate and a second substrate provided oppositely, and at least one first spacer provided between the first substrate and the second substrate; the second substrate being provided with a gate line and a data line intersecting each other, the first spacer being provided corresponding to the gate line, the bottom of the first spacer being connected with the first substrate, the top the first spacer extending to the second substrate and being away from the second substrate; wherein, the second substrate is provided with a blocking structure corresponding to the first spacer, the blocking structure is located between the two adjacent data lines and extends to the first substrate, the height of the blocking structure overlaps that of the first spacer in the height direction of the liquid crystal display panel, which is used to cooperate with the first spacer to prevent the first substrate sliding opposite to the second substrate.

[0011] Wherein, the blocking structure is a convex structure surrounding the first spacer.

[0012] Wherein, the blocking structure is a convex structure provided at two opposite sides of the first spacer, or the blocking structure is a convex structure provided at one side of the first spacer.

[0013] Wherein, multiple layers is provided on the gate line, the blocking structure is formed by partially etching the multiple layers, the multiple layers comprises sequentially a gate insulating layer, a semiconductor active layer, an ohmic contact layer, a drain-source layer and a passivation layer.

[0014] Wherein, the liquid crystal display panel further comprises a second spacer provided between the first substrate and the second substrate, the bottom of the second spacer is connected with the first substrate, the top of the second spacer is connected with the second substrate.

[0015] Wherein, the region of the first spacer corresponding to the second substrate is sequentially provided with the gate line and the gate insulating layer.

[0016] Wherein, the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the semiconductor active layer, the ohmic contact layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

[0017] Wherein, the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the drain-source layer and the passivation lay the top of the second spacer abuts on the passivation layer.

[0018] Wherein, the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

[0019] Wherein, the region of the first spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer and the passivation layer.

[0020] Wherein, the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the semiconductor active layer, the ohmic contact layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

[0021] Wherein, the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the drain-source layer and the passivation layer, the top of the second spacer abuts on the passivation layer.

[0022] Wherein, the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

[0023] The benefits of the present invention are as follows. Differing from the situation of the prior art, the present invention provides the blocking structure and the first spacer to cooperate with each other to prevent the first substrate sliding opposite to the second substrate. Moreover, by decreasing the layers below the second space, increase the height of the overlapping portion of the blocking structure and the first spacer, and then improve the cooperation of the blocking structure and the first spacer, which significantly prevents the first substrate sliding opposite to the second substrate.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. **1** is a sectional view of the liquid crystal display panel according to the first embodiment of the present invention;

[0025] FIG. **2** is a top view of the liquid crystal display panel according to the first embodiment of the present invention;

[0026] FIG. **3** is a top view of the liquid crystal display panel according to the second embodiment of the present invention;

[0027] FIG. **4** is a top view of the liquid crystal display panel according to the third embodiment of the present invention;

[0028] FIG. **5** is a top view of the liquid crystal display panel according to the fourth embodiment of the present invention;

[0029] FIG. **6** is a sectional view of the liquid crystal display panel according to the fifth embodiment of the present invention;

[0030] FIG. **7** is a sectional view of the liquid crystal display panel according to the sixth embodiment of the present invention;

[0031] FIG. **8** is a sectional view of the liquid crystal display panel according to the seventh embodiment of the present invention; and

[0032] FIG. **9** is a sectional view of the liquid crystal display panel according to the eighth embodiment of the present invention;

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] The detailed descriptions accompanying drawings and the embodiment of the present invention are as follows.

[0034] Referring to FIG. **1**, FIG. **1** is a sectional view of the liquid crystal display panel according to the first embodiment of the present invention. In the present invention, the liquid crystal display panel comprises a first substrate **10** and a second substrate **11** provided oppositely, and a first spacer **12** and a second spacer **16** provided between the first substrate **10** and the second substrate **11**. The bottom of the first spacer **12** is connected with the first substrate **10**, and the top the first spacer **12** extends to the second substrate **11** and is away from the second substrate **11**. The bottom of the second spacer **16** is connected with the first substrate **10**, and the top of the second spacer **16** is connected with the second substrate **11**. Wherein, the second substrate **11** is provided with a blocking structure **13** corresponding to the first spacer **12**. The blocking structure **13** extends to the first substrate **10**. The height of the blocking structure **13** overlaps that of the first spacer **12** in the height direction of the liquid crystal display panel. The overlapping height as shown in FIG. **1** is h. The blocking structure **13** is used to cooperate with the first spacer **12** to prevent the first substrate **10** sliding opposite to the second substrate **11**.

[0035] FIG. **2** is a top view of the liquid crystal display panel according to the first embodiment of the present invention. In order to describe conveniently, the top view mainly shows the portion of the first spacer **12**. Referring to FIG. **2**, the second substrate **11** is provided with a gate line **111** and data lines **112***a*, **112***b* intersecting each other. The first spacer **12** is provided corresponding to the gate line **111**. The blocking structure **13** is located between the two adjacent data lines **112***a*, **112***b*.

[0036] In the present invention, the blocking structure **13** is a convex structure **13** surrounding the first spacer **12**. The blocking structure **13** is used to prevent the first substrate **10** sliding opposite to the second substrate **11** in any direction on the plane of the first substrate **10**. The height of the blocking structure **13** overlaps that of the first spacer **12** in the height direction of the liquid crystal display panel, so the blocking structure **13** can block the first spacer **12** and prevent the first substrate **10** sliding opposite to the second substrate **11**. Moreover, the blocking structure **13** surrounds the first spacer **12**, so the blocking structure **13** can prevent the first substrate **10** sliding opposite to the second substrate **11** in any direction on the plane of the first substrate **10**.

[0037] Referring to FIG. **1** again, in the present embodiment, multiple layers **13** is provided on the gate line **111**. The blocking structure **13** is formed by partially etching the multiple layers **13**. The multiple layers comprise sequentially a gate insulating layer **113**, a semiconductor active layer **114**, an ohmic contact layer **115**, a drain-source layer **116** and a passivation layer **117**. The region of the first spacer **12** corresponding to the second substrate is sequentially provided with the gate line **111**, the gate insulating layer **113** and the passivation layer **117**. The region of the second spacer **16** corresponding to the second substrate is sequentially provided with the gate line **111**, the gate insulating layer **113**, the semiconductor active layer **114**, the ohmic contact layer **115**, the drain-source layer **116** and the passivation layer **117**. The top of the second spacer **16** abuts on the passivation layer **117**.

[0038] Referring to FIG. **3**, FIG. **3** is a top view of the liquid crystal display panel according to the second embodiment of the present invention. Comparing with the liquid crystal display panel according to the first embodiment of the present invention, the blocking structure **14** according to the present embodiment is a convex structure **14** provided at two opposite sides of the first spacer **12**. Specifically, the first substrate **10** and the second substrate **11** are preferably rectangular. Multiple first blocking structures **141***a*, **141***b*, **141***c* used to prevent the first substrate **10** sliding opposite to the second substrate **11** in the long-side direction of the first substrate **10** and multiple second blocking structures **142***a*, **142***b*, **142***c* used to prevent the first substrate **10** sliding opposite to the second substrate **11** in the short-side direction of the first substrate **10** are preferably provided on the second substrate **11**. In the present embodiment, the number of the multiple first blocking structures **141***a*, **141***b*, **141***c* is preferably larger than that of the multiple second blocking structures **142***a*, **142***b*, **142***c*. For example, in the liquid crystal display panel according to the present embodiment, the number ratio of the first blocking structures to the second blocking structures is 3:1. In the other embodiments, the number of the multiple first blocking structures **141***a*, **141***b*. **141***c* can be less than or equal to that of the multiple second blocking structures **142***a*, **142***b*, **142***c*, which is not limited in the present invention.

[0039] Referring to FIG. **4**, FIG. **4** is a top view of the liquid crystal display panel according to the third embodiment of the present invention. Comparing with the liquid crystal display panel according to the first embodiment and the second embodiment of the present invention, the blocking structure **15** according to the present embodiment is a convex structure **15** provided at one side of the first spacer **12**. Multiple first blocking structures **151***a*, **151***b*, **151***c* used to prevent the first substrate **10** sliding opposite to the second substrate **11** in the long-side direction of the first substrate **10** and multiple second blocking structures **152***a*, **152***b*, **152***c* used to prevent the first substrate **10** sliding opposite to the second substrate **11** in the short-side direction of the first substrate **10** are preferably provided on the second substrate **11**. In the present embodiment, the number of the multiple first blocking structures **151***a*, **151***b*. **151***c* is preferably larger than that of the multiple second blocking structures **152***a*, **152***b*, **152***c*. For example, in the liquid crystal display panel according to the present embodiment, the number ratio of the first blocking structures to the second blocking structures is 3:1. In the other embodiments, the number of the multiple first blocking structures **151***a*, **151***b*, **151***c* can be less than or equal to that of the multiple second blocking structures **152***a*, **152***b*, **152***c*, which is not limited in the present invention.

[0040] Referring to FIG. **5**, FIG. **5** is a top view of the liquid crystal display panel according to the fourth embodiment of the present invention. In the present embodiment, the liquid crystal display panel comprises the blocking structure **13** according to the first embodiment, the blocking structure **14** according to the second embodiment and the blocking structure **15** according to the third embodiment at the same time. It should be understood that the liquid crystal display panel according to the other embodiment can only comprises any two among three.

[0041] Referring to FIG. **6**, FIG. **6** is a sectional view of the liquid crystal display panel according to the fifth embodiment of the present invention. Comparing with the liquid crystal display panel according to the first embodiment of the present invention, in the present embodiment, the region of the second spacer **16** corresponding to the second substrate is sequentially provided with the gate line **111**, the gate insulating layer **113**, the semiconductor active layer **114**, the ohmic contact layer **115** and the drain-source layer **116**. The top of the second spacer **16** abuts on the drain-source layer **116**. Comparing with the first embodiment of the present invention, the present embodiment makes the overlapping height hi of the blocking structure **13** and the first spacer **12** in the height direction of the liquid crystal display panel larger (h**1**>h), so that the blocking is more reliable.

[0042] Referring to FIG. **7**, FIG. **7** is a sectional view of the liquid crystal display panel according to the sixth embodiment of the present invention. Comparing with the fifth embodiment of the present invention, in the present embodiment, the region of the second spacer **16** corresponding to the second substrate is sequentially provided with the gate line **111**, the gate insulating layer **113**, the drain-source layer **116** and the passivation layer **117**. The top of the second spacer **16** abuts on the passivation layer **117**. Comparing with the fifth embodiment of the present invention, the present embodiment makes the overlapping height h**2** of the blocking structure **13** and the first spacer **12** in the height direction of the liquid crystal display panel larger (h**2**>h), so that the blocking is more reliable.

[0043] Referring to FIG. **8**, FIG. **8** is a sectional view of the liquid crystal display panel according to the seventh embodiment of the present invention. Comparing with the sixth embodiment of the present invention, in the present embodiment, the region of the second spacer **16** corresponding to the second substrate is sequentially provided with the gate line **111**, the gate insulating layer **113** and the drain-source layer **116**. The top of the second spacer **16** abuts on the drain-source layer **116**. Comparing with the sixth embodiment of the present invention, the present embodiment makes the overlapping height h**3** of the blocking structure **13** and the first spacer **12** in the height direction of the liquid crystal display panel larger (h**3**>h), so that the blocking is more reliable.

[0044] Referring to FIG. **9**, FIG. **9** is a sectional view of the liquid crystal display panel according to the eighth embodiment of the present invention. Comparing with the first, fifth, sixth, and seventh embodiments of the present invention, the region of the first spacer **12** corresponding to the second substrate is sequentially provided with the gate line **111** and the gate insulating layer **113**. This way can prevent the first spacer **12** contacting the second substrate **11** when increasing the overlapping height of the blocking structure **13** and the first spacer **12** in the height direction of the liquid crystal display panel.

[0045] It should be understood that a new embodiment can be formed by combining the above embodiments, which is not repeated here.

[0046] The present invention provides the blocking structure and the first spacer to cooperate with each other to prevent the first substrate sliding opposite to the second substrate. Moreover, by decreasing the layers below the second space, increase the height of the overlapping portion of the blocking structure and the first spacer, and then improve the cooperation of the blocking structure and the first spacer, which significantly prevents the first substrate sliding opposite to the second substrate.

[0047] The preferred embodiments according to the present invention are mentioned above, which cannot be used to define the scope of the right of the present invention. Those modifications and variations are considered encompassed in the scope of protection defined by the dams of the present invention.

What is claimed is:

1. A liquid crystal display panel, wherein the liquid crystal display panel comprises: a first substrate and a second substrate provided oppositely, and at least one first spacer and a second spacer provided between the first substrate and the second substrate; the second substrate being provided with a gate line and a data line intersecting each other, multiple layers being provided on the gate line, the multiple layers comprising sequentially a gate insulating layer, a semiconductor active layer, an ohmic contact layer, a drain-source layer and a passivation layer, the first spacer being provided corresponding to the gate line, the bottom of the first spacer being connected with the first substrate, the top the first spacer extending to the second substrate and being away from the second substrate, the bottom of the second spacer being connected with the first substrate, the top of the second spacer being connected with the second substrate;

wherein, the second substrate is provided with a blocking structure corresponding to the first spacer, the blocking structure is located between the two adjacent data lines and extends to the first substrate, the height of the blocking structure overlaps that of the first spacer in the height

direction of the liquid crystal display panel, which is used to cooperate with the first spacer to prevent the first substrate sliding opposite to the second substrate, the blocking structure is a convex structure surrounding the first spacer, the blocking structure is formed by partially etching the multiple layers.

2. The liquid crystal display panel as claimed in claim **1**, wherein the region of the first spacer corresponding to the second substrate is sequentially provided with the gate line and the gate insulating layer.

3. A liquid crystal display panel, wherein the liquid crystal display panel comprises: a first substrate and a second substrate provided oppositely, and at least one first spacer provided between the first substrate and the second substrate; the second substrate being provided with a gate line and a data line intersecting each other, the first spacer being provided corresponding to the gate line, the bottom of the first spacer being connected with the first substrate, the top the first spacer extending to the second substrate and being away from the second substrate;

wherein, the second substrate is provided with a blocking structure corresponding to the first spacer, the blocking structure is located between the two adjacent data lines and extends to the first substrate, the height of the blocking structure overlaps that of the first spacer in the height direction of the liquid crystal display panel, which is used to cooperate with the first spacer to prevent the first substrate sliding opposite to the second substrate.

4. The liquid crystal display panel as claimed in claim **3**, wherein the blocking structure is a convex structure surrounding the first spacer.

5. The liquid crystal display panel as claimed in claim **3**, wherein the blocking structure is a convex structure provided at two opposite sides of the first spacer, or the blocking structure is a convex structure provided at one side of the first spacer.

6. The liquid crystal display panel as claimed in claim **3**, wherein multiple layers is provided on the gate line, the blocking structure is formed by partially etching the multiple layers, the multiple layers comprises sequentially a gate insulating layer, a semiconductor active layer, an ohmic contact layer, a drain-source layer and a passivation layer.

7. The liquid crystal display panel as claimed in claim **6**, wherein the liquid crystal display panel further comprises a second spacer provided between the first substrate and the second substrate, the bottom of the second spacer is connected with the first substrate, the top of the second spacer is connected with the second substrate

8. The liquid crystal display panel as claimed in claim **7**, wherein the region of the first spacer corresponding to the second substrate is sequentially provided with the gate line and the gate insulating layer.

9. The liquid crystal display panel as claimed in claim **8** wherein the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the semiconductor active layer, the ohmic contact layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

10. The liquid crystal display panel as claimed in claim **8**, wherein the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the drain-source layer and the passivation layer, the top of the second spacer abuts on the passivation layer.

11. The liquid crystal display panel as claimed in claim **8**, wherein the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

12. The liquid crystal display panel as claimed in claim **7**, wherein the region of the first spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer and the passivation layer.

13. The liquid crystal display panel as claimed in claim **12**, wherein the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the semiconductor active layer, the ohmic contact layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

14. The liquid crystal display panel as claimed in claim **12**, wherein the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer, the drain-source layer and the passivation layer, the top of the second spacer abuts on the passivation layer.

15. The liquid crystal display panel as claimed in claim **12**, wherein the region of the second spacer corresponding to the second substrate is sequentially provided with the gate line, the gate insulating layer and the drain-source layer, the top of the second spacer abuts on the drain-source layer.

* * * * *

专利名称(译)	液晶显示面板		
公开(公告)号	US20150002772A1	公开(公告)日	2015-01-01
申请号	US13/985287	申请日	2013-07-03
[标]申请(专利权)人(译)	深圳市华星光电技术有限公司		
申请(专利权)人(译)	深圳市中国星光电科技有限公司.		
当前申请(专利权)人(译)	深圳市中国星光电科技有限公司.		
[标]发明人	DU PENG		
发明人	DU, PENG		
IPC分类号	G02F1/1339		
CPC分类号	G02F1/13394 G02F2201/503		
优先权	201310270298.3 2013-06-28 CN		
外部链接	Espacenet USPTO		

摘要(译)

本发明公开了一种液晶显示面板。液晶显示面板包括设置在第一和第二基板之间的至少一个第一间隔物。第一间隔物的底部与第一基板连接，并且其顶部延伸至第二基板并远离第二基板。其中，第二基板设置有与第一间隔物对应的阻挡结构，用于与对应的第一间隔物配合，以防止第一基板与第二基板相对滑动。本发明可以防止液晶显示面板的第一基板与第二基板相对地滑动。