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(54) SUPPORTING UNIT FOR LIQUID CRYSTAL DISPLAY APPARATUS, BACKLIGHT ASSEMBLY AND LIQUID CRYSTAL DISPLAY APPARATUS HAVING THE SAME

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(57) **ABSTRACT**

A supporting unit includes a first support frame, a second support frame and an impurity barrier. The first support frame supports an LCD panel, and includes an opening through which a light is supplied to the LCD panel. The second support frame is protruded from sides of the first support frame to surround sides of the LCD panel. The impurity barrier is disposed on a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel. Therefore, the supporting unit for the LCD panel includes the impurity barrier to prevent the inflow of the impurities that is externally provided into the space between the supporting unit and the LCD panel, thereby improving image display quality.

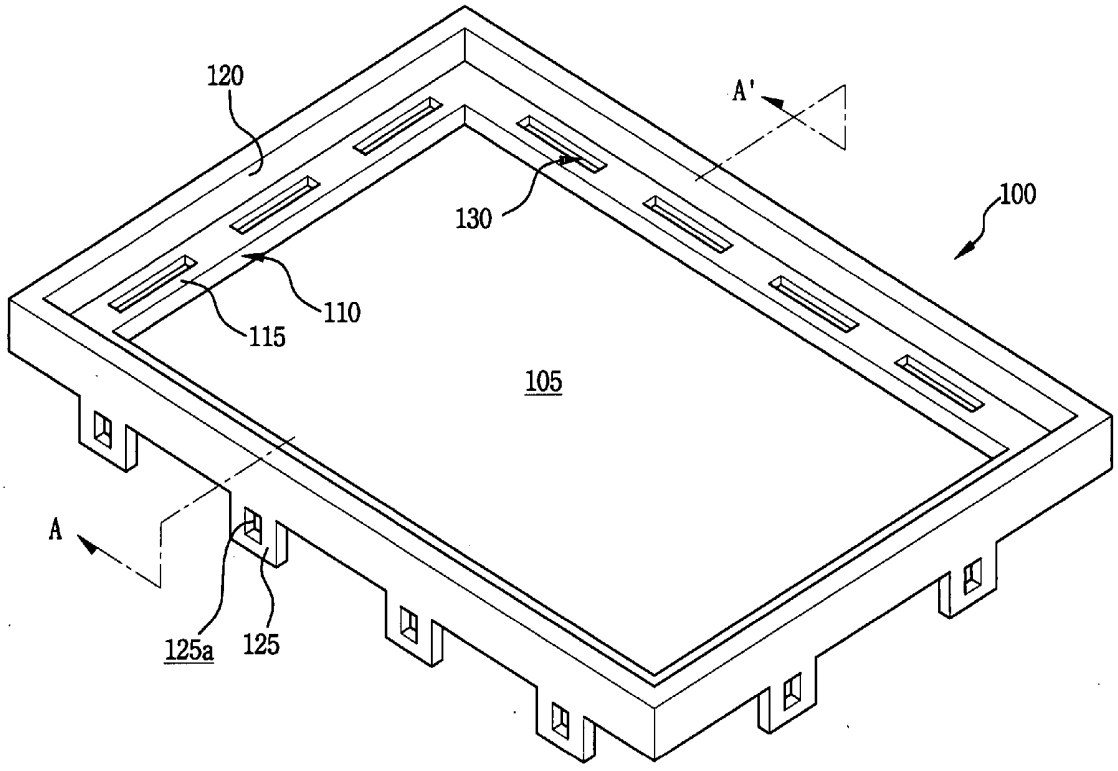


FIG.1

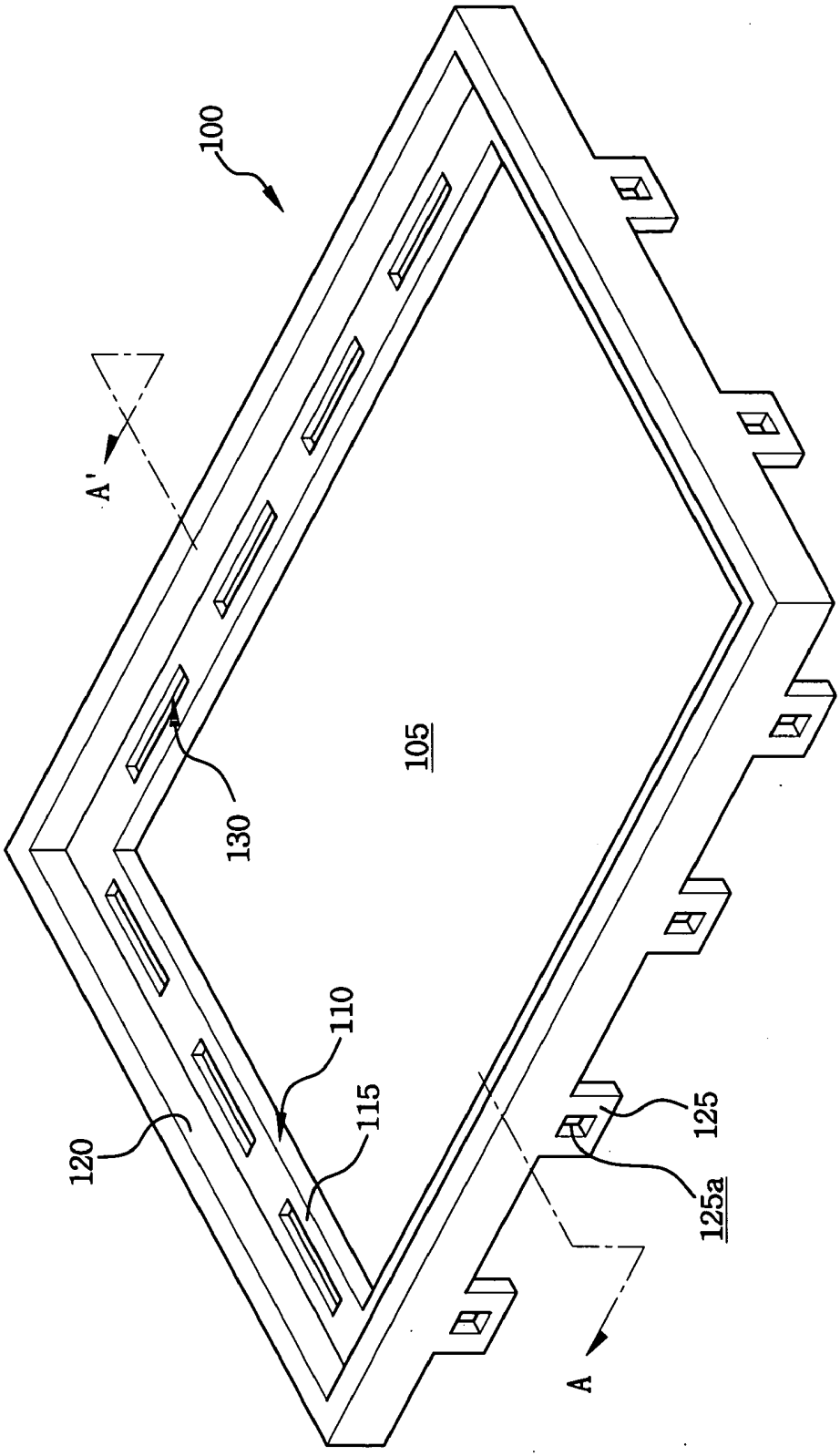


FIG.2

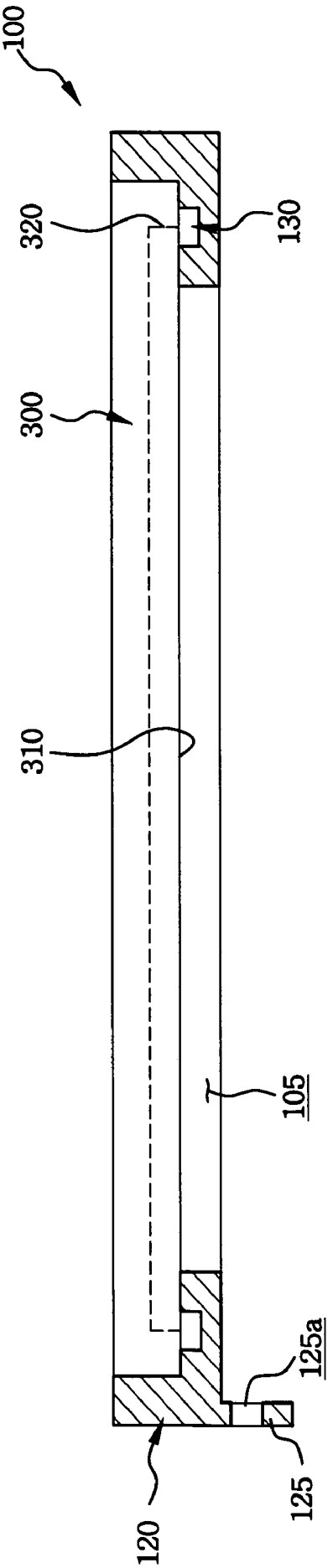


FIG.3

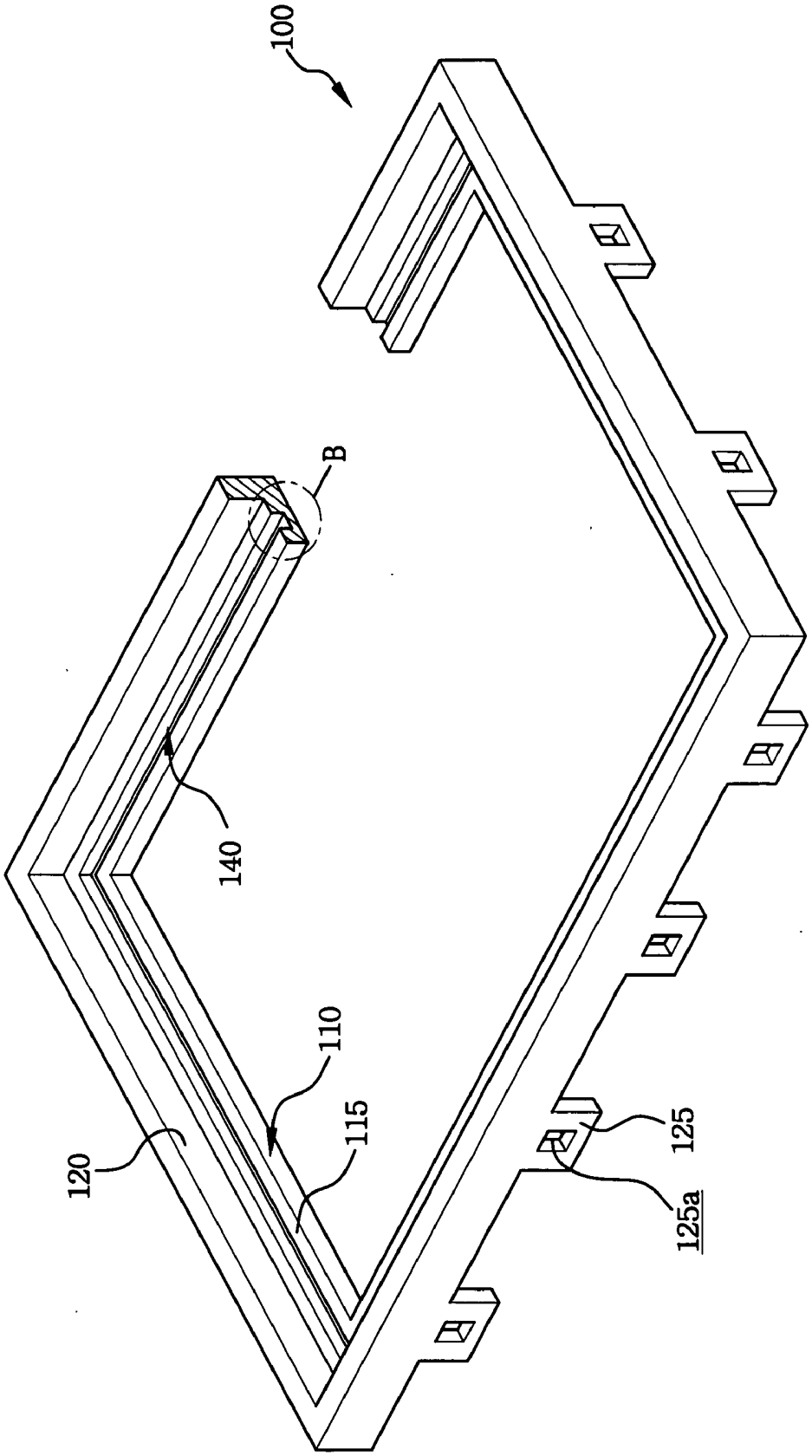


FIG.4

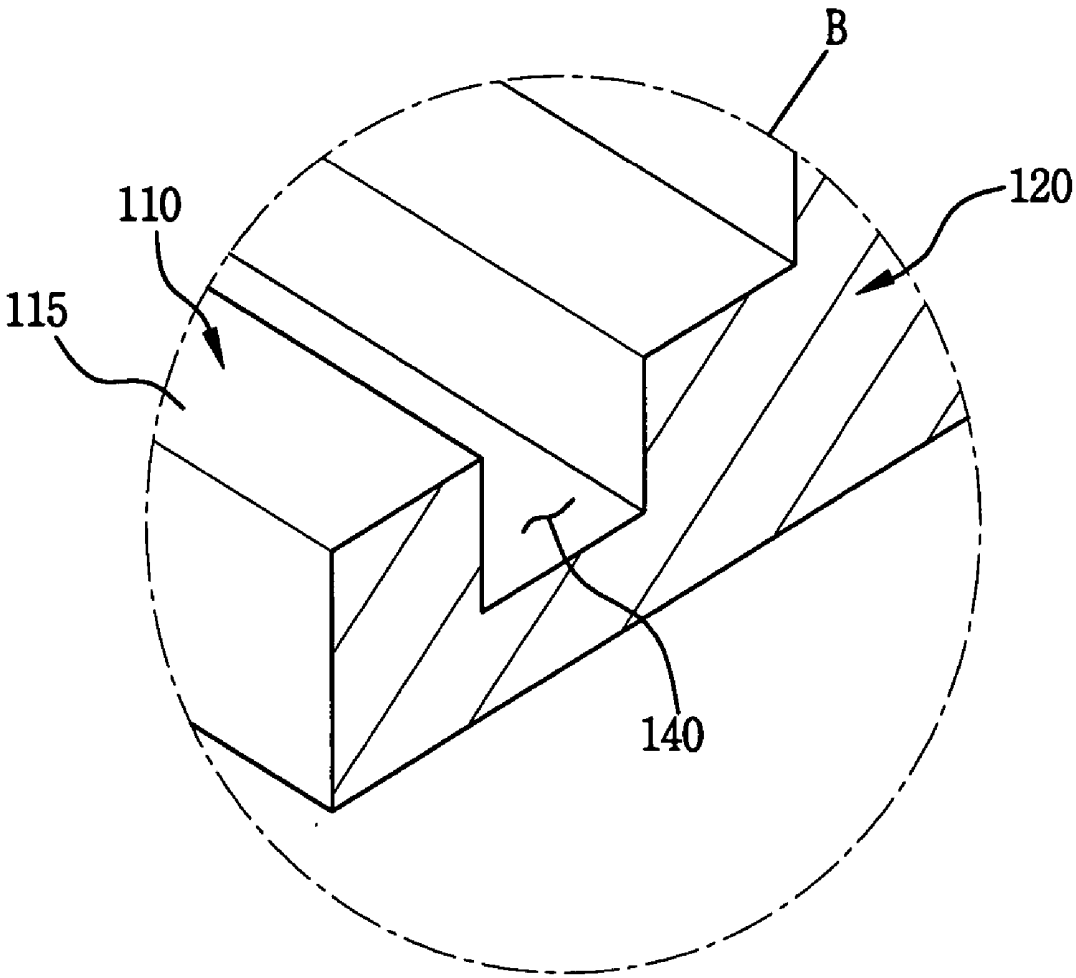


FIG.5

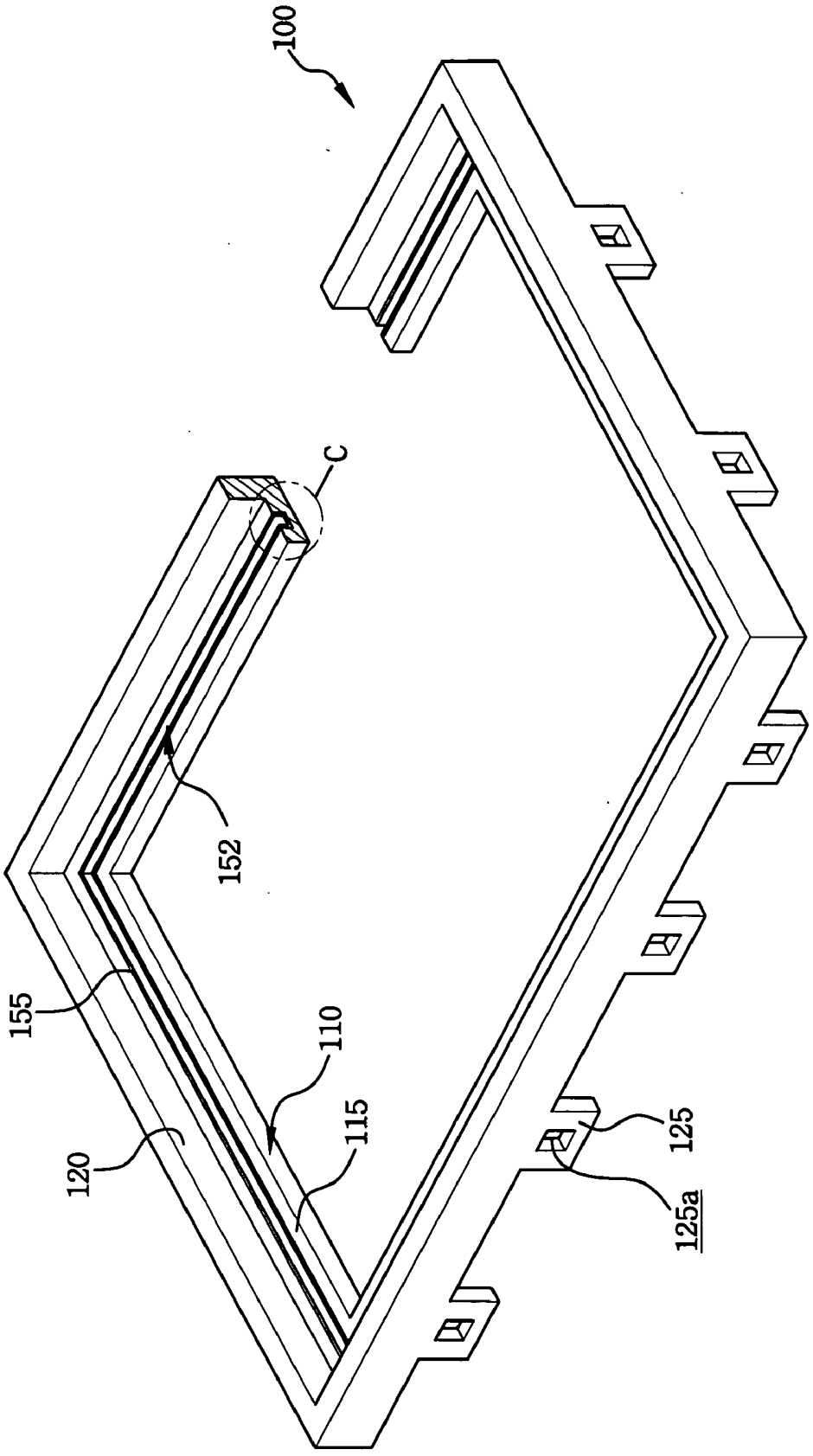


FIG.6

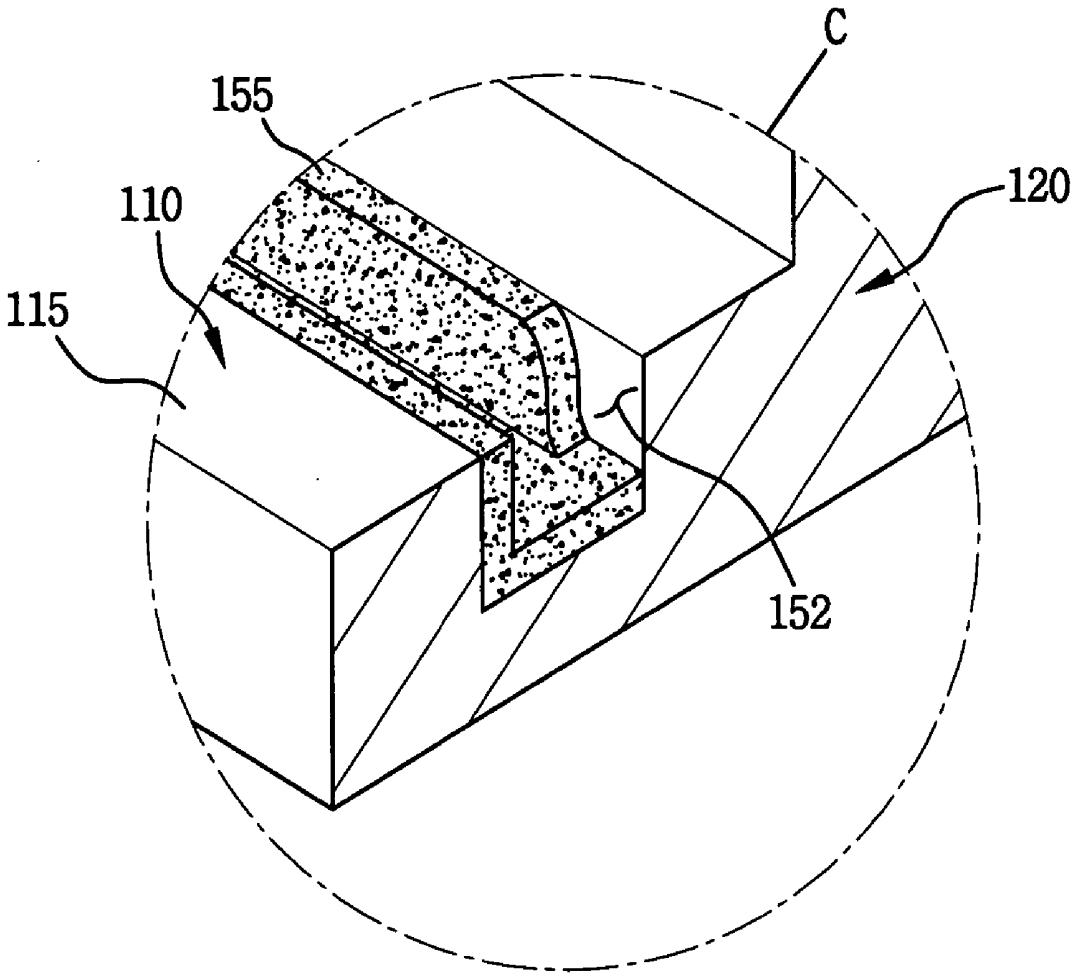


FIG.7

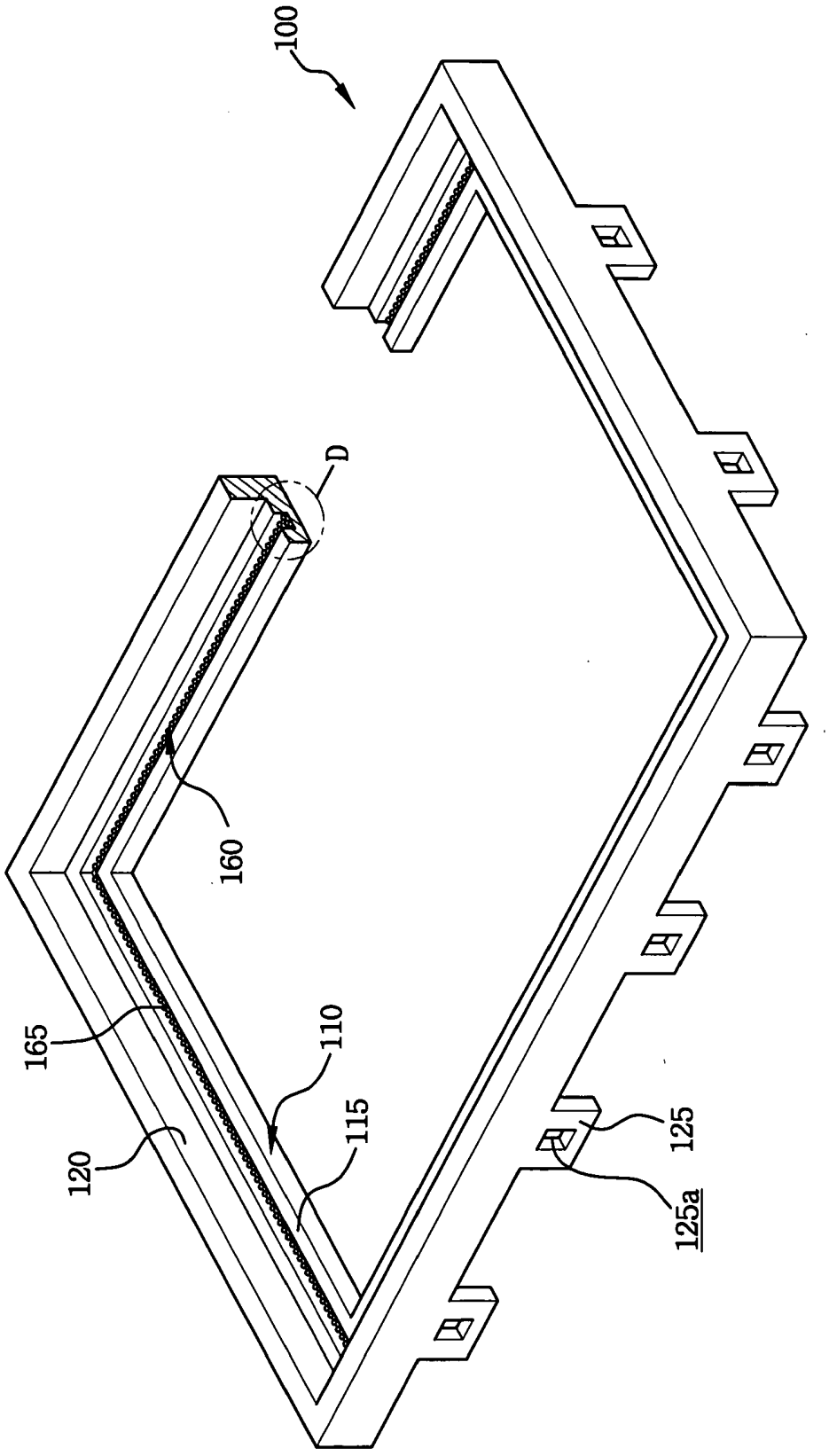


FIG.8

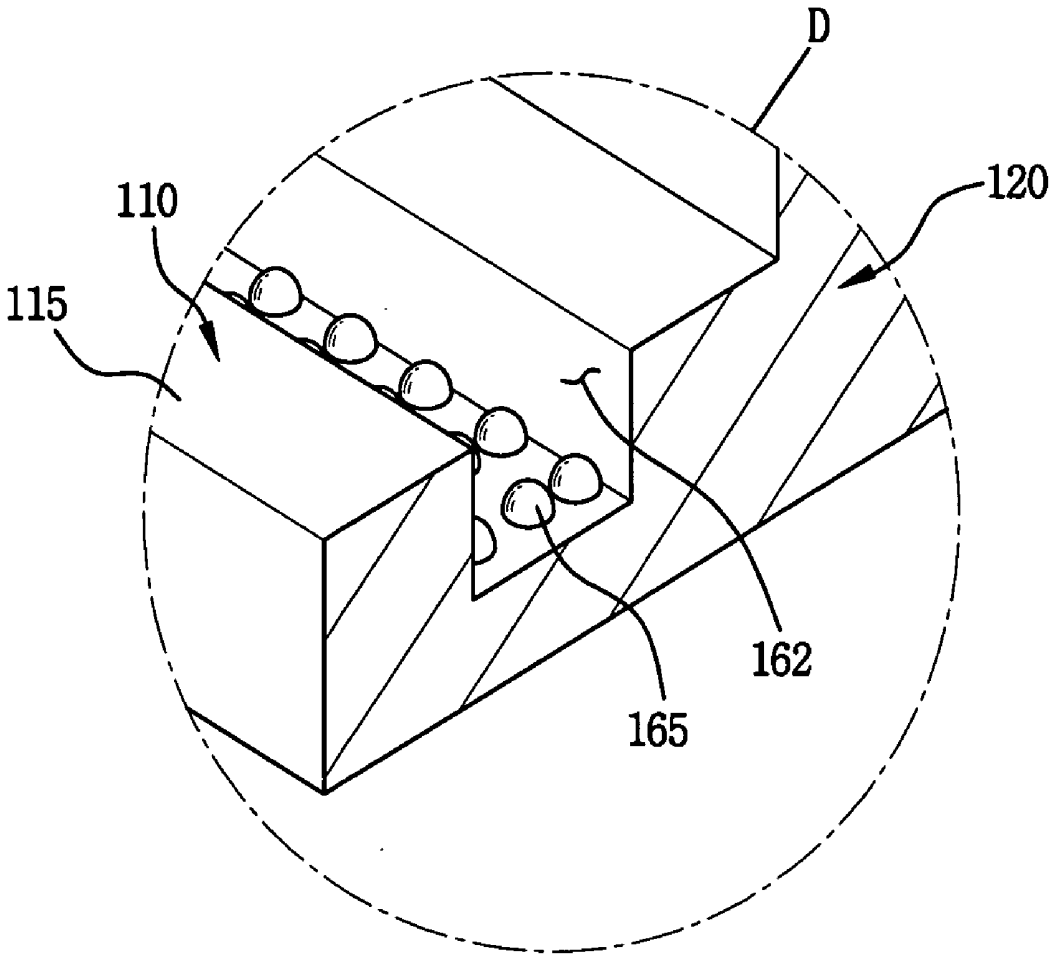


FIG.9

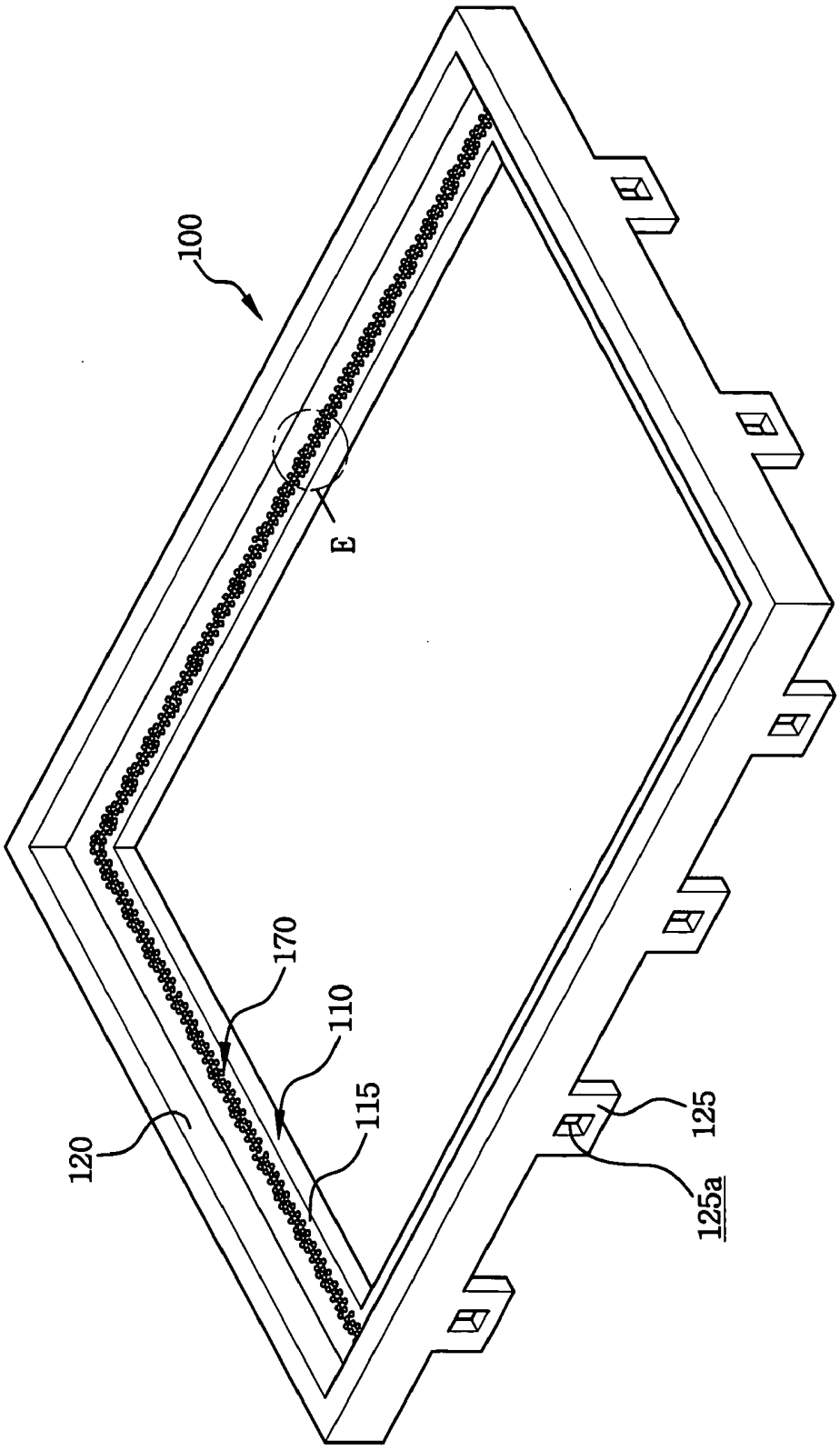


FIG.10

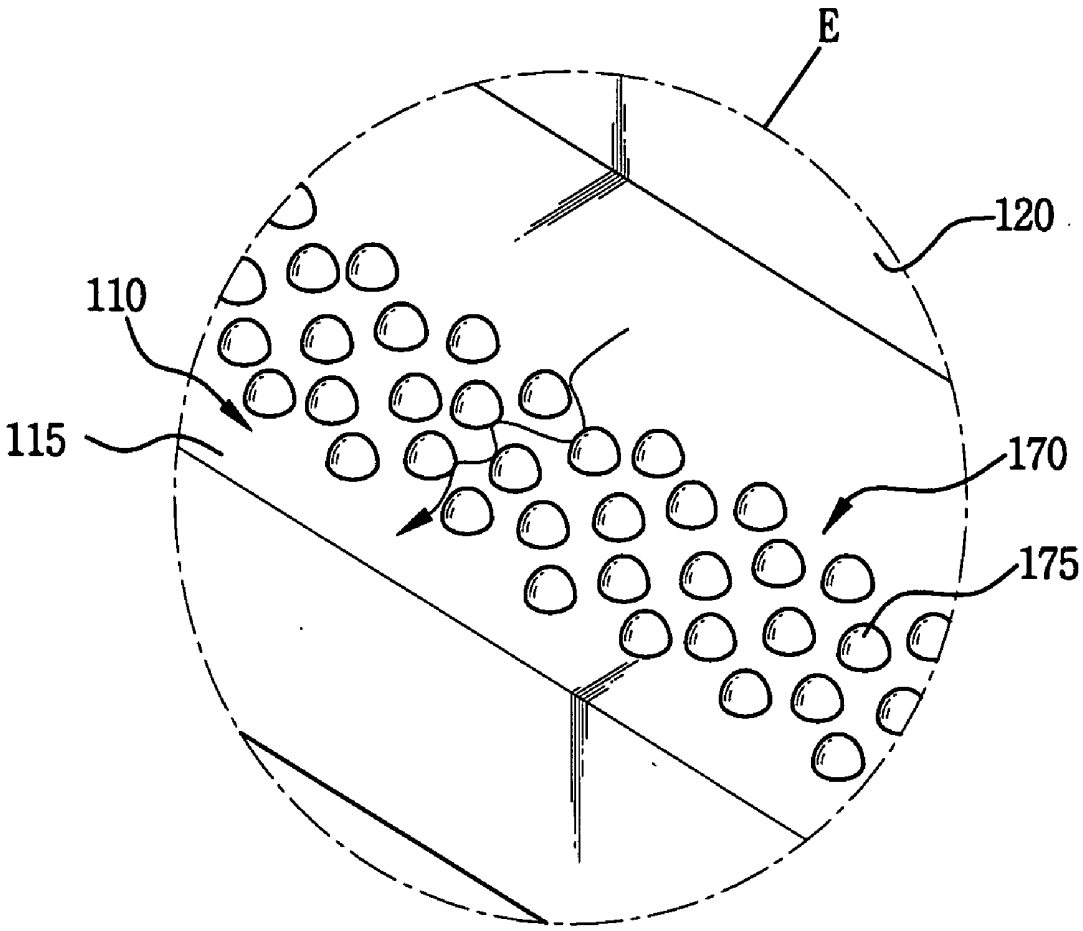


FIG.11

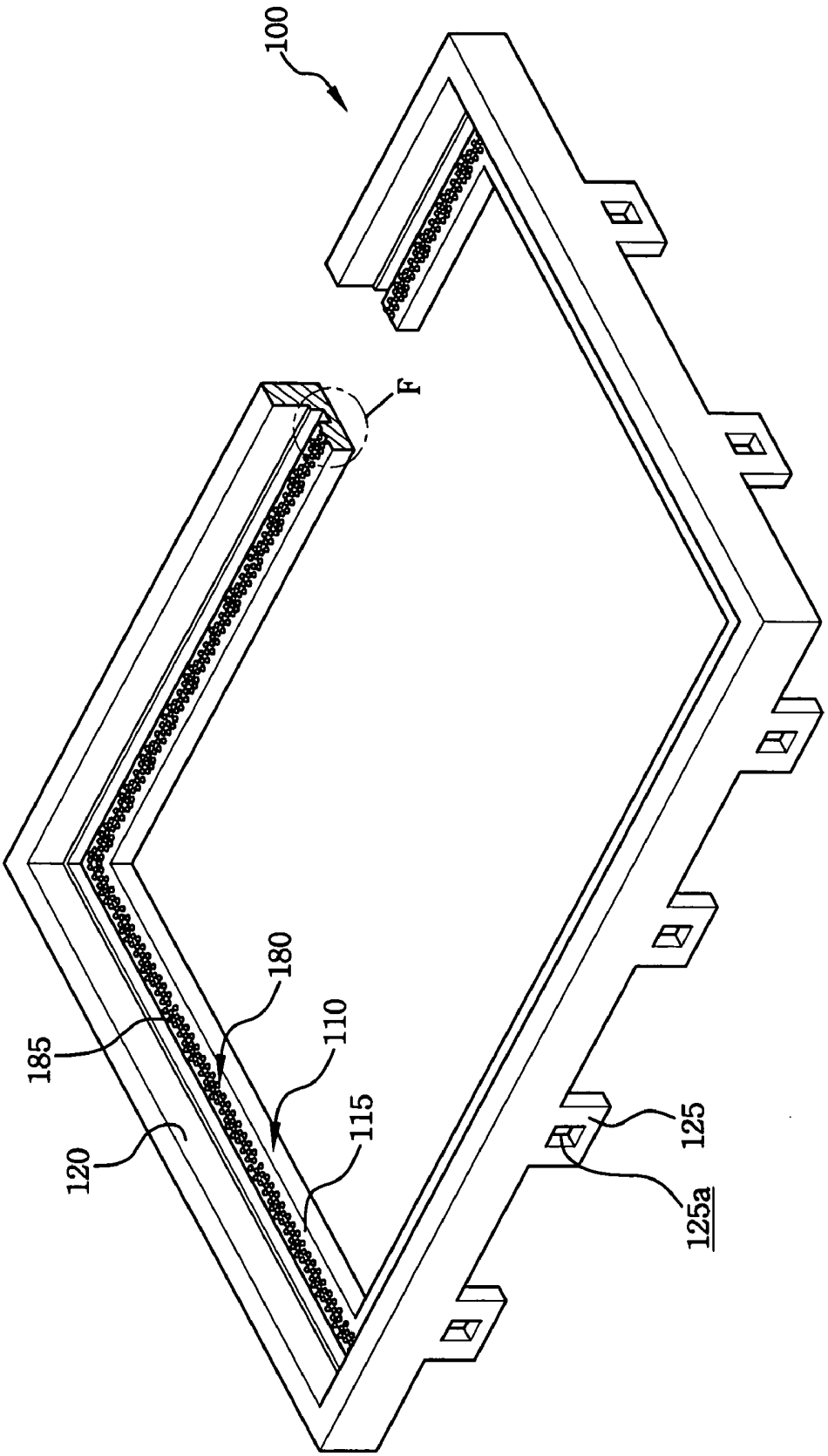


FIG.12

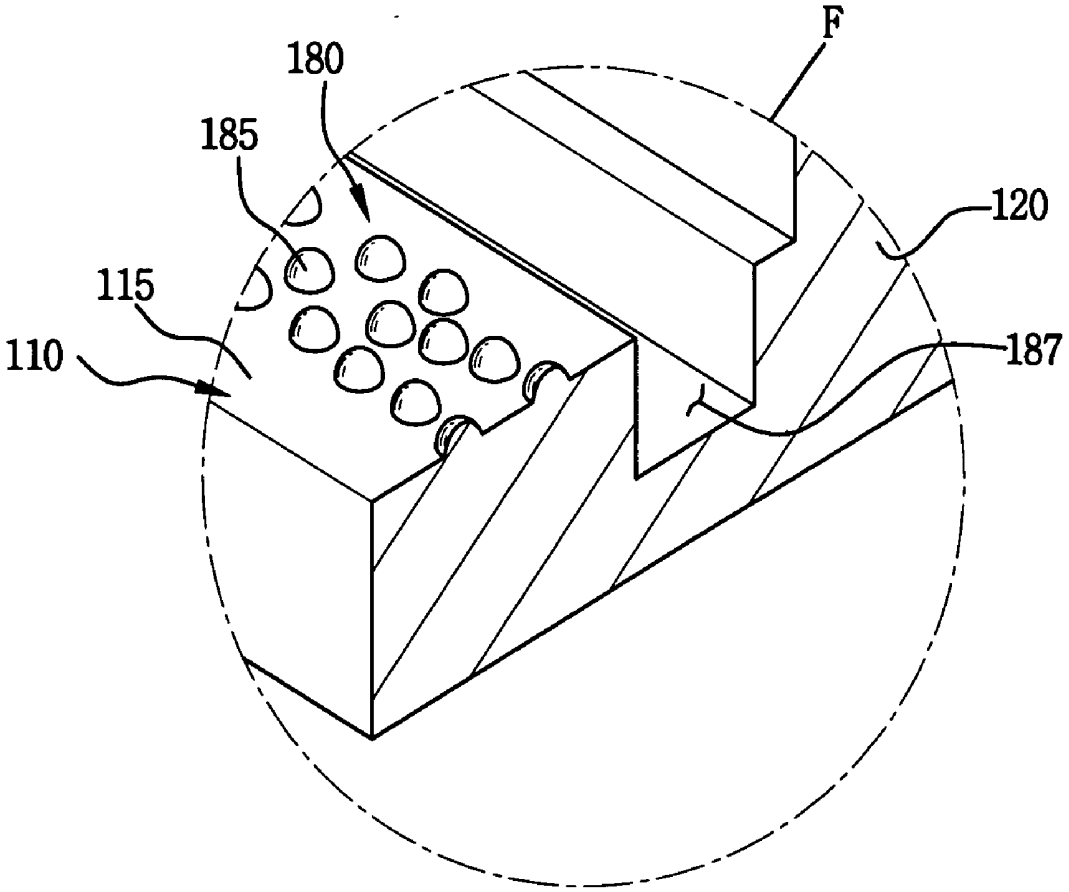


FIG.13

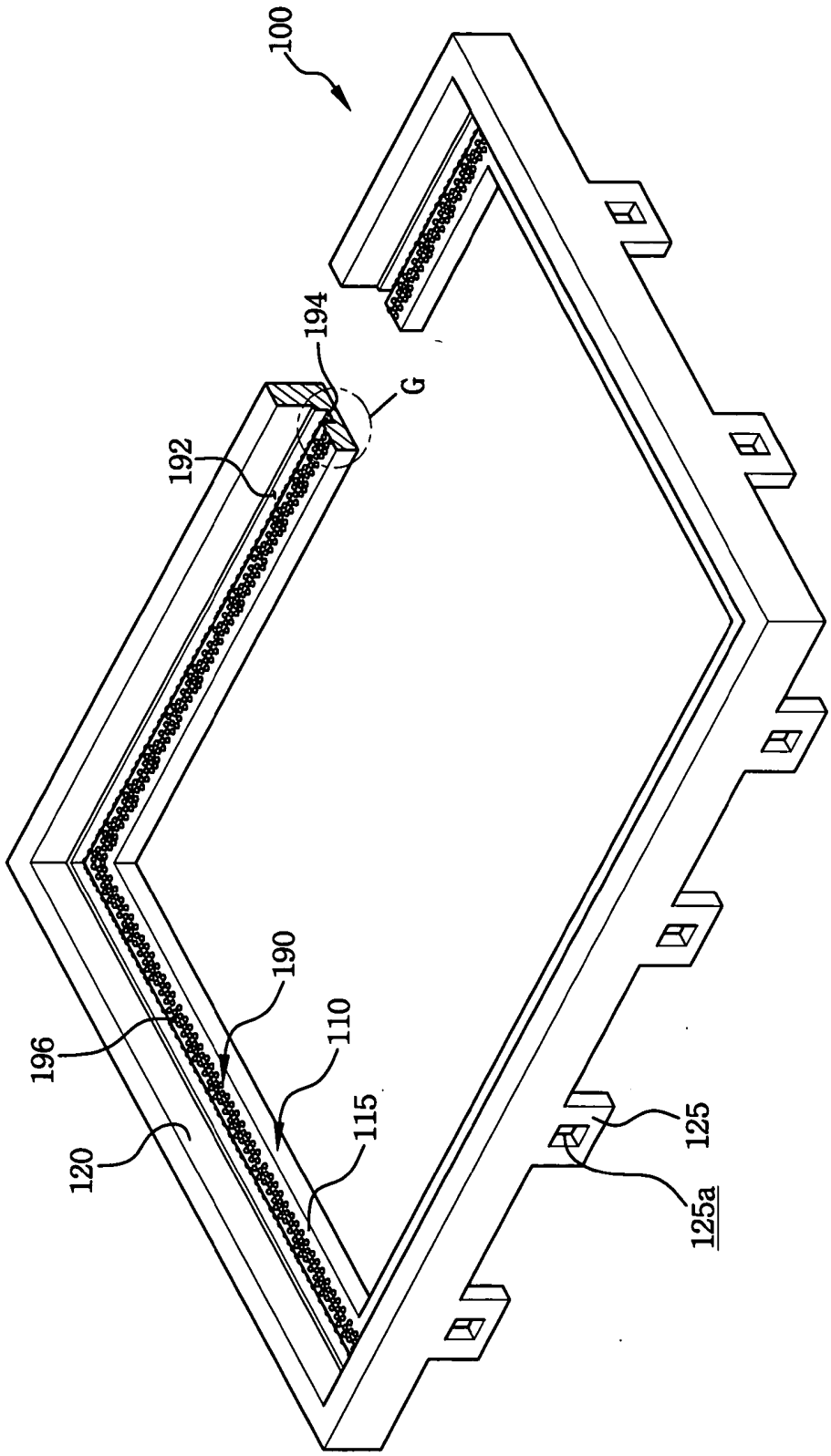


FIG.14

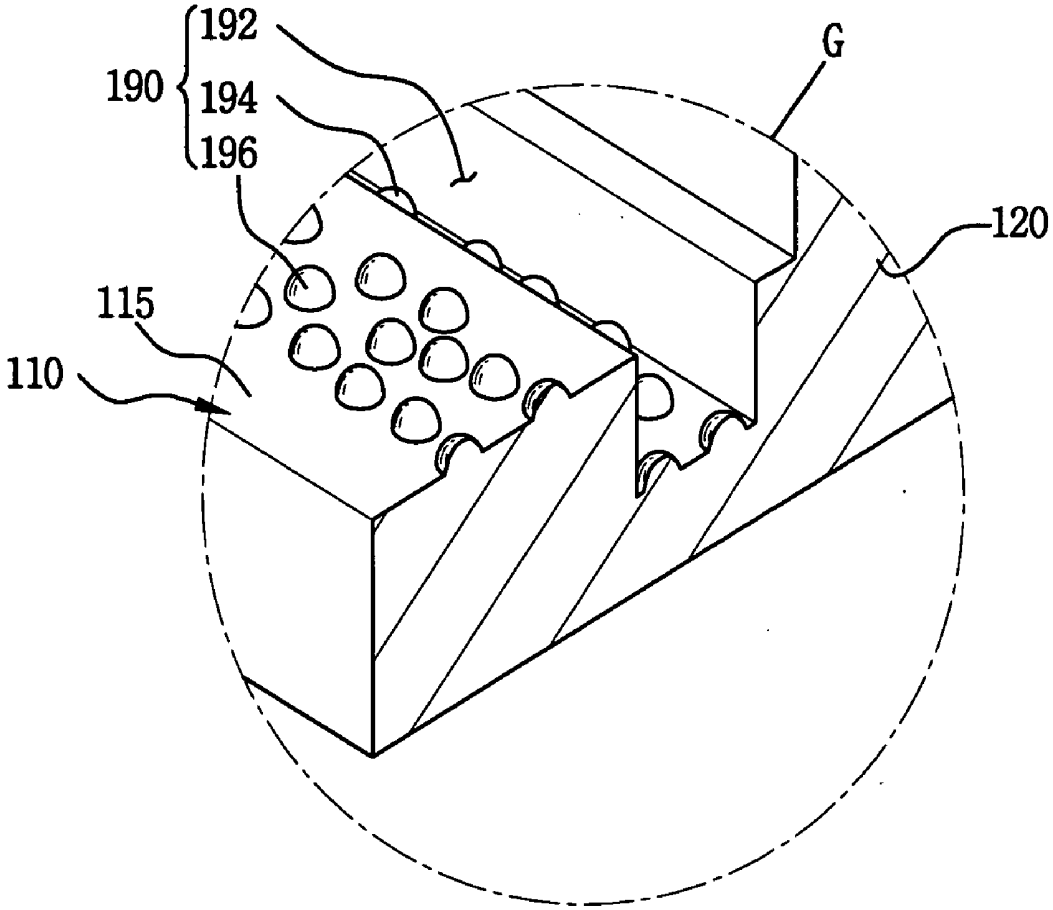


FIG.15

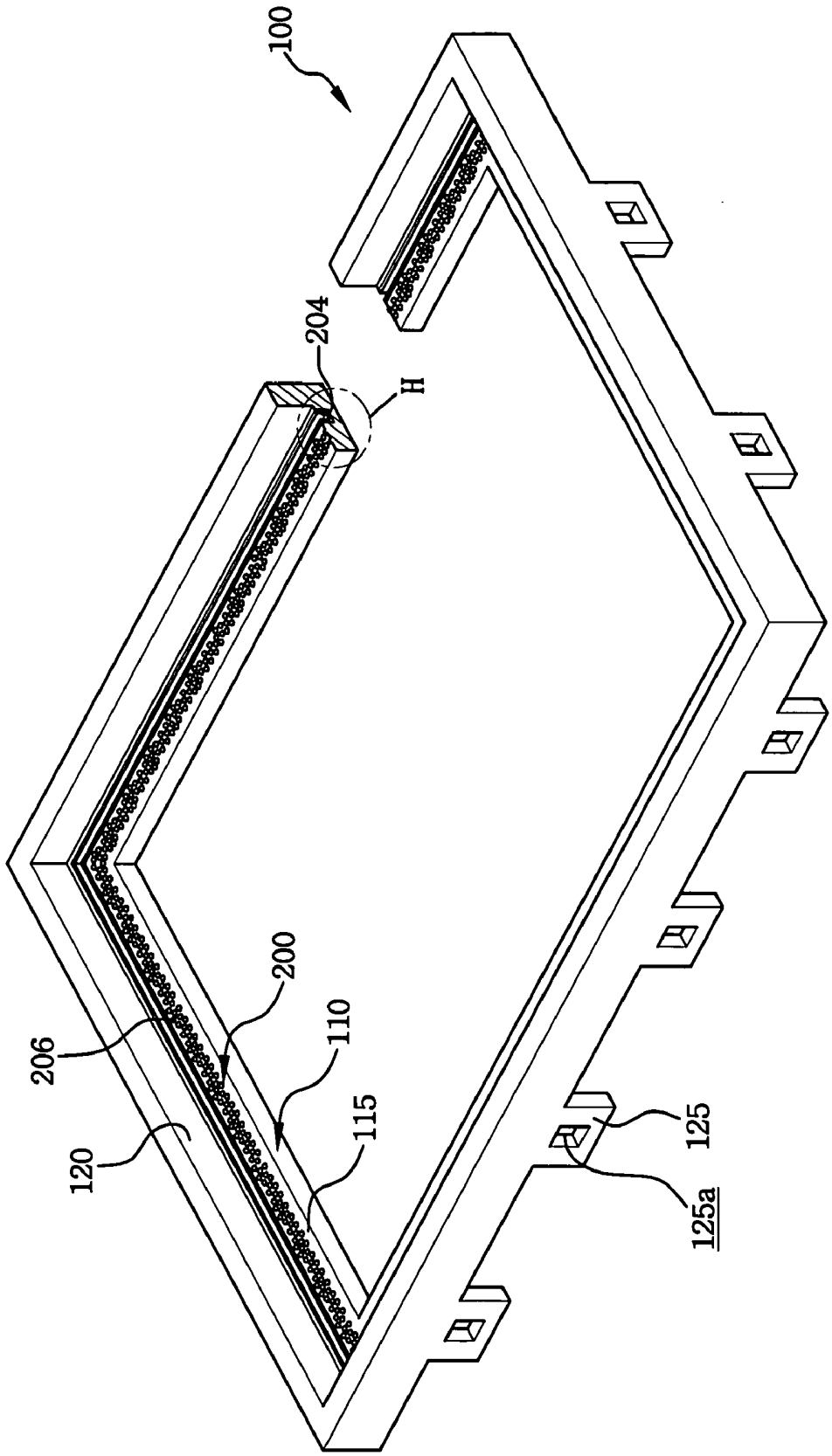


FIG.16

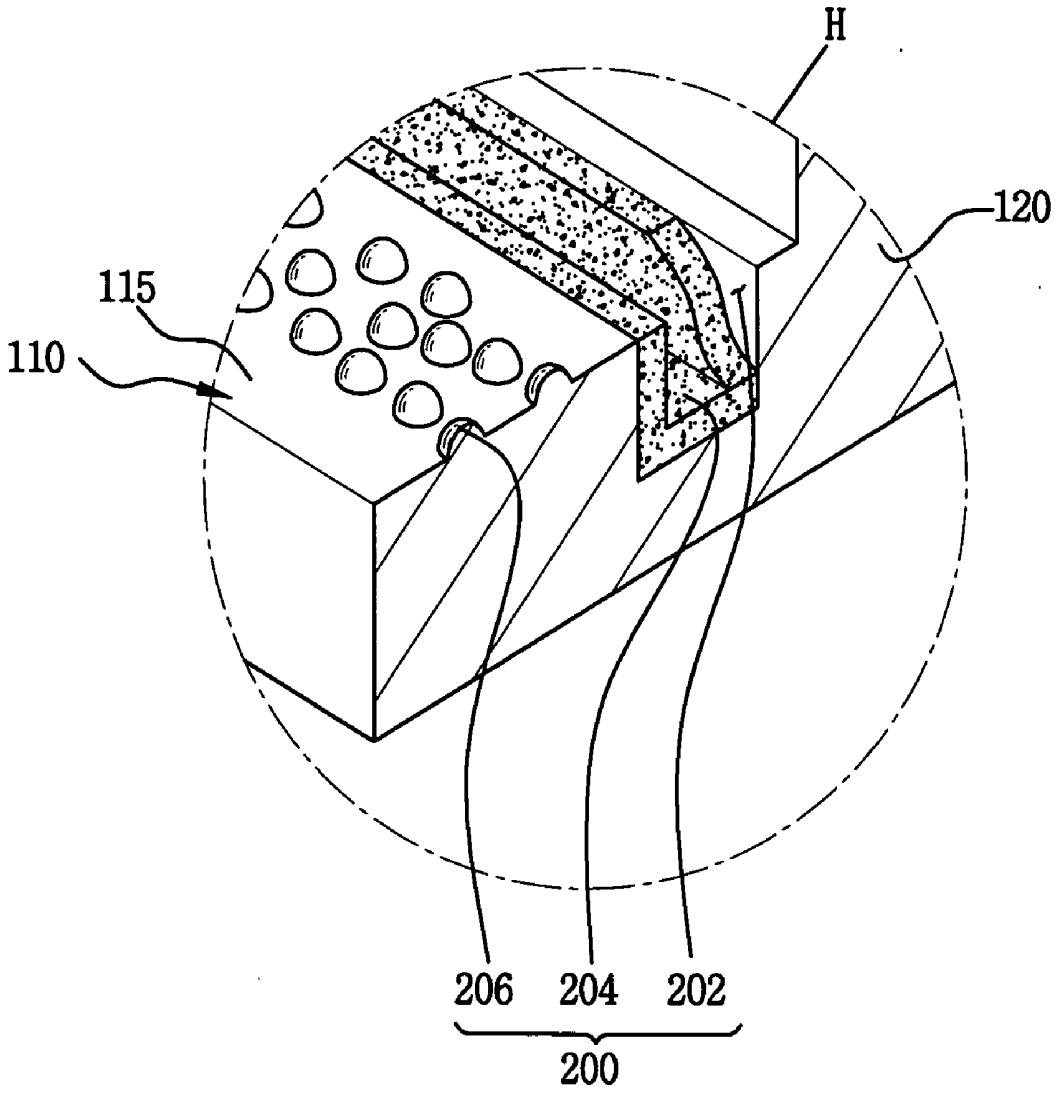


FIG.17

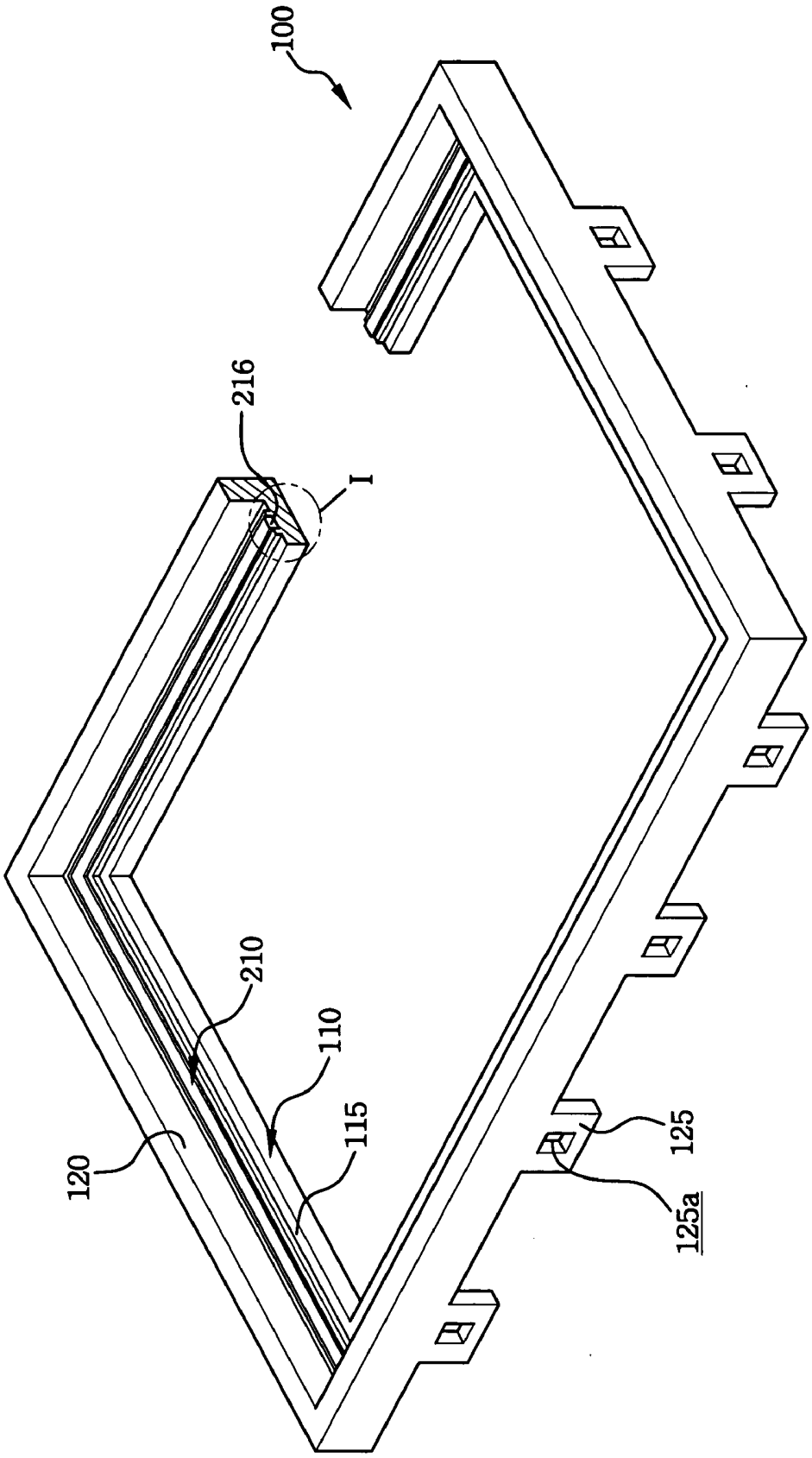


FIG.18

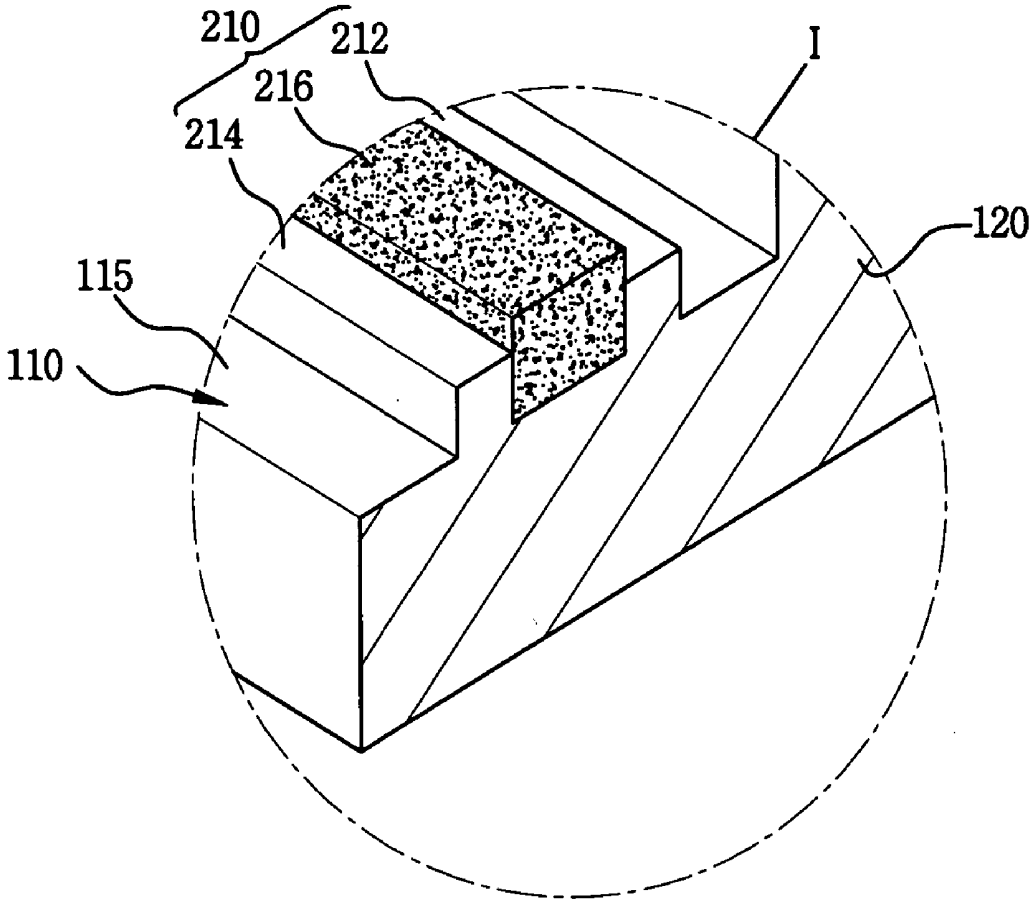


FIG.19

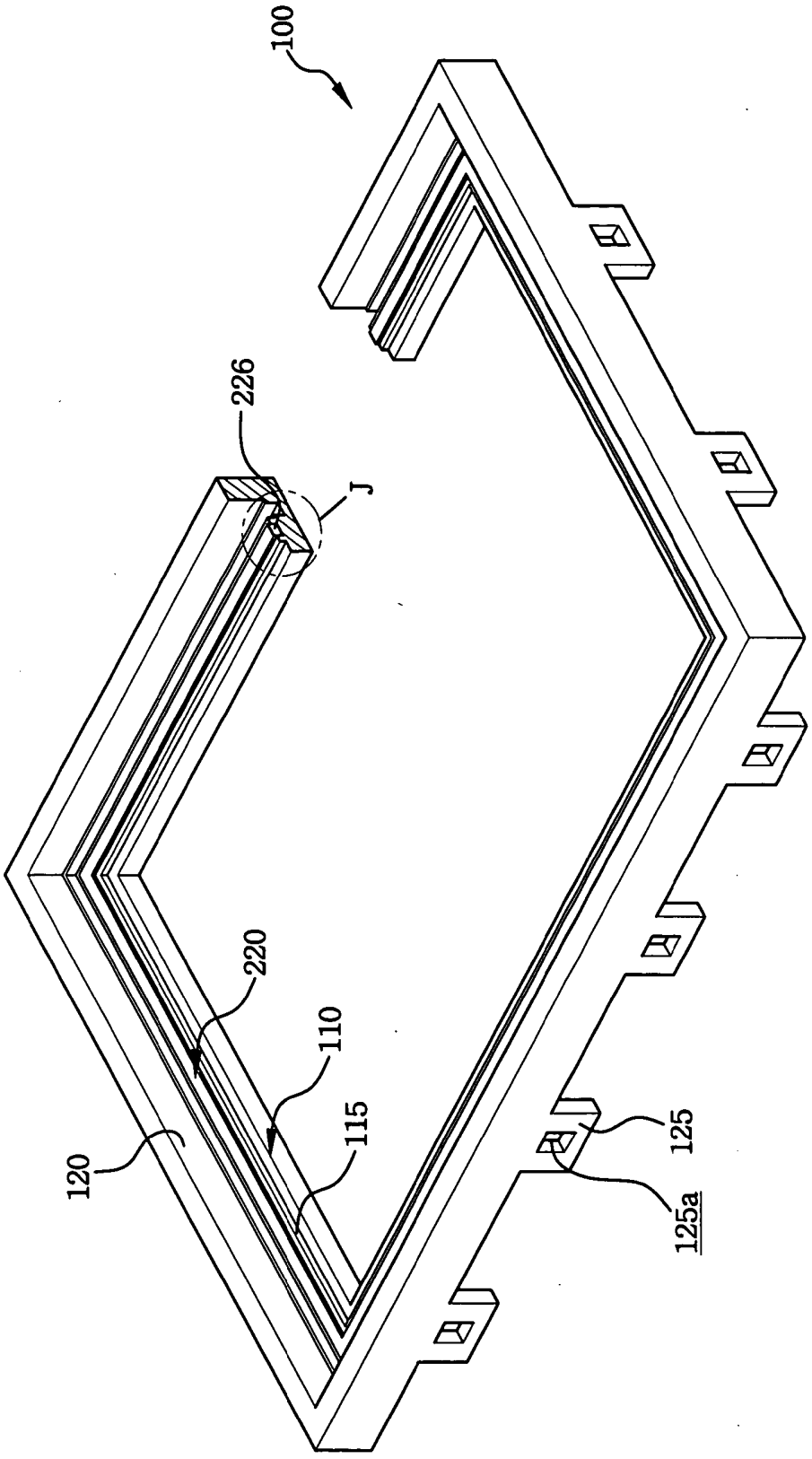


FIG.20

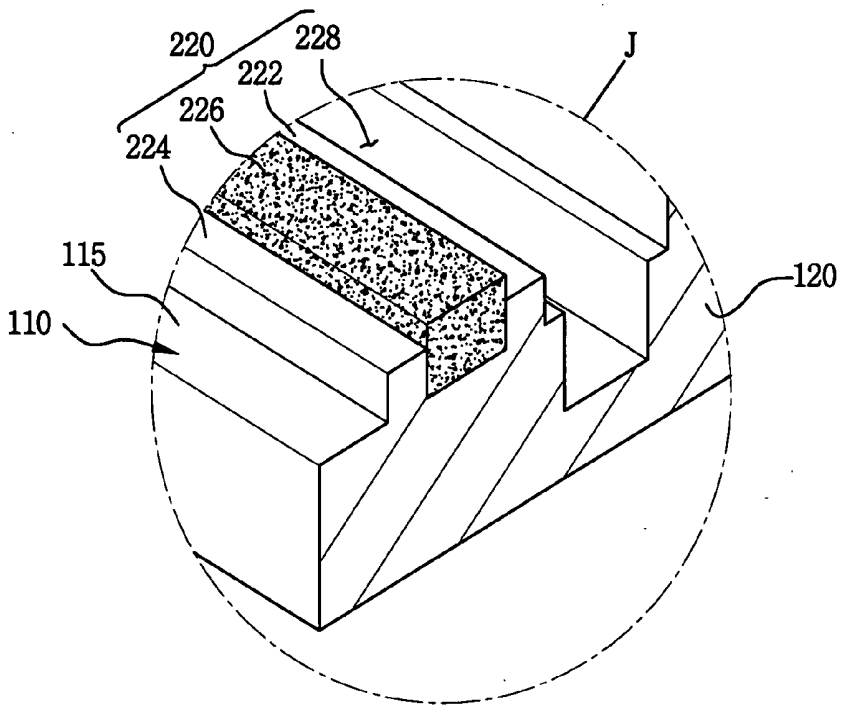
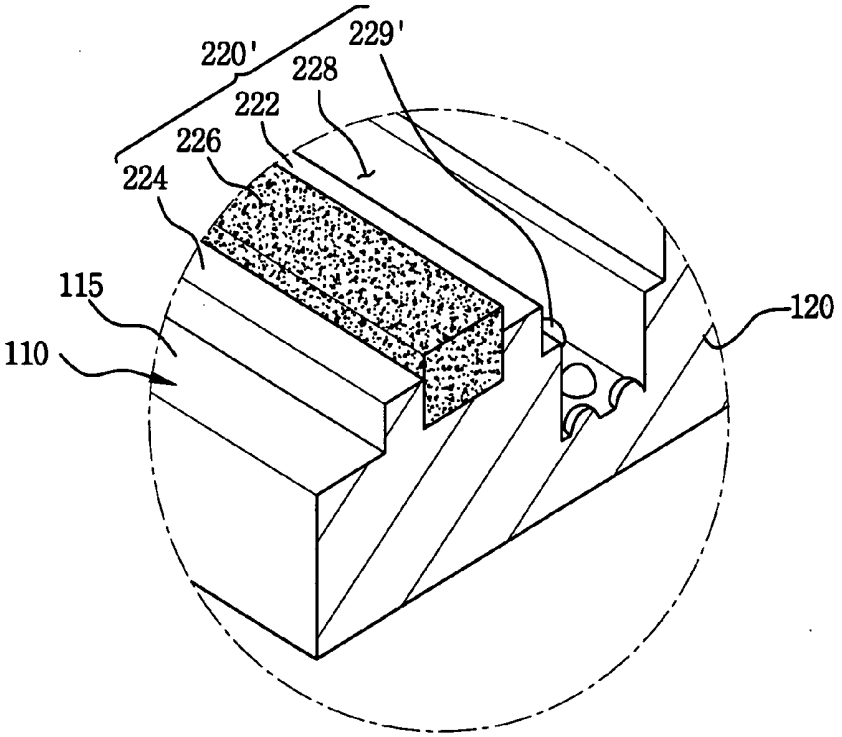

220
228
J
222
226
224
115
120
110

FIG.21


220'
229'
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222
226
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115
120
110

FIG.22

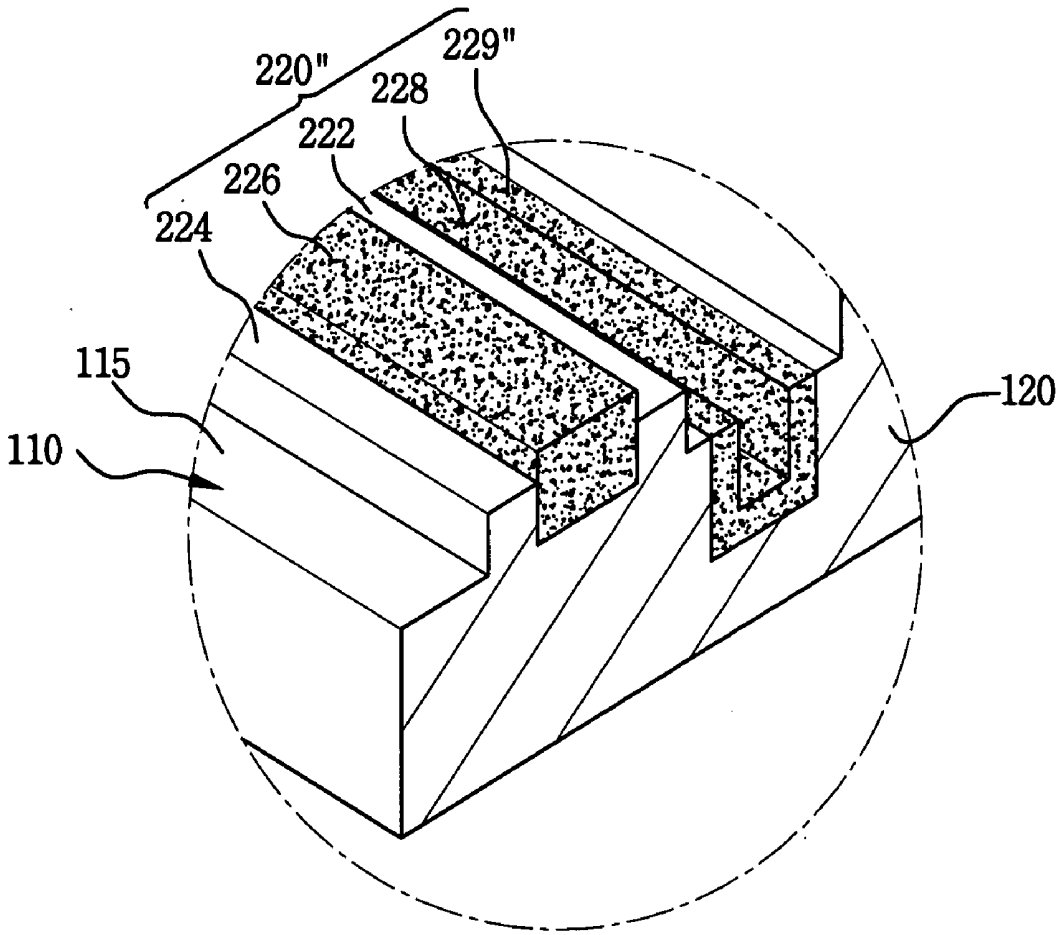


FIG.23

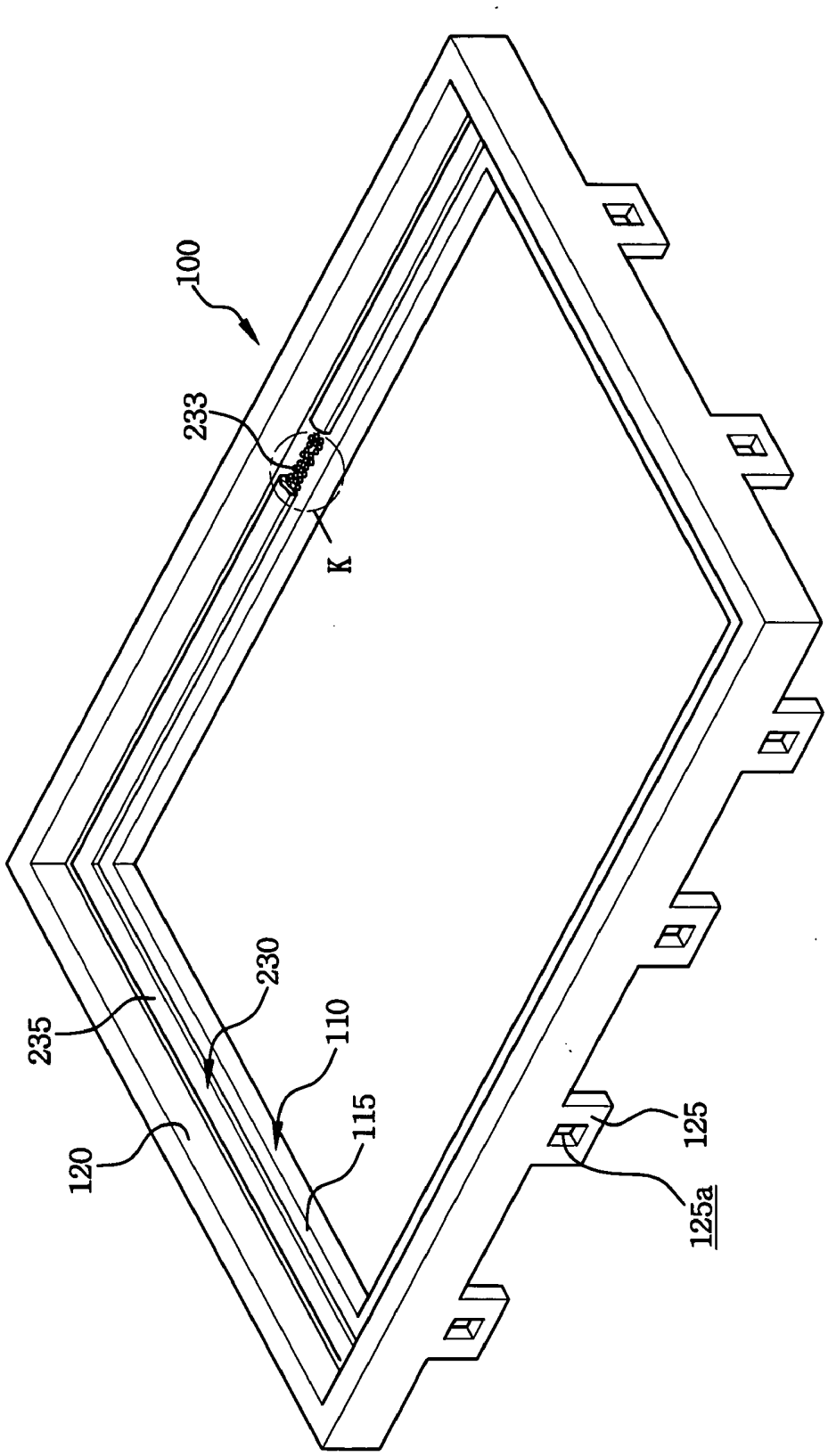


FIG.24

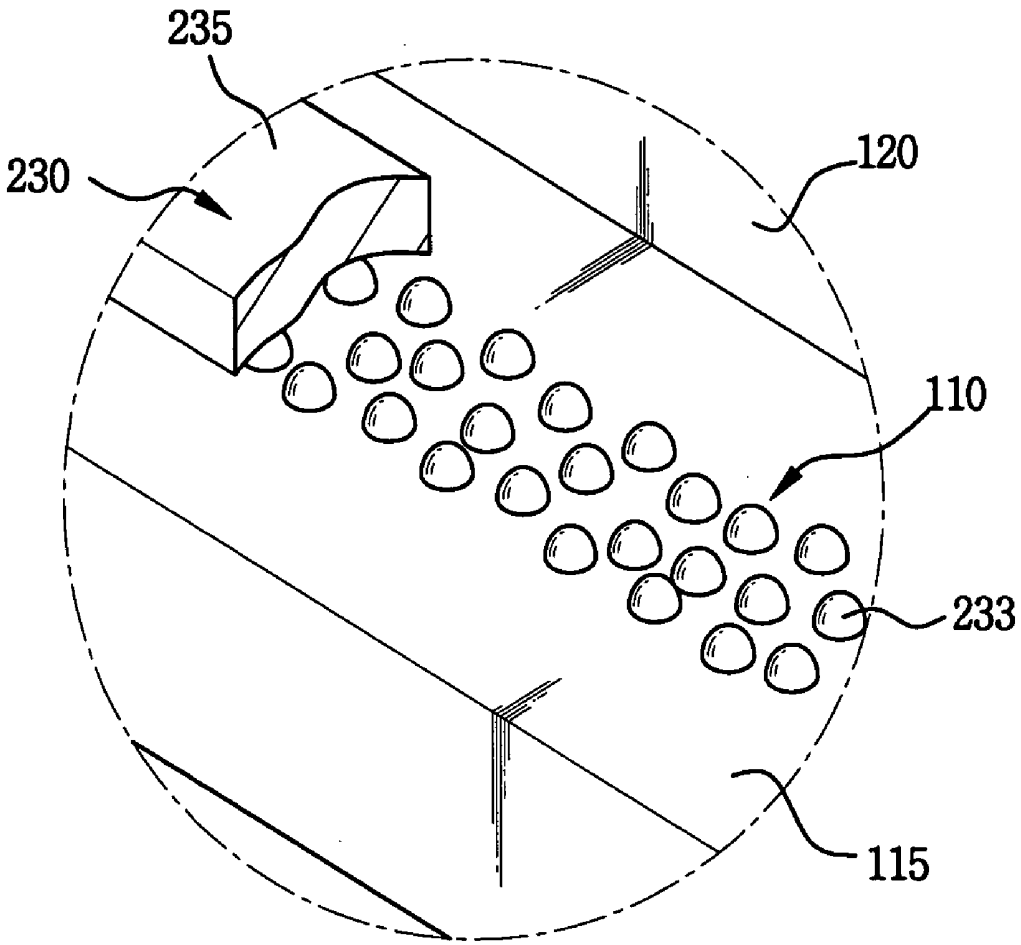
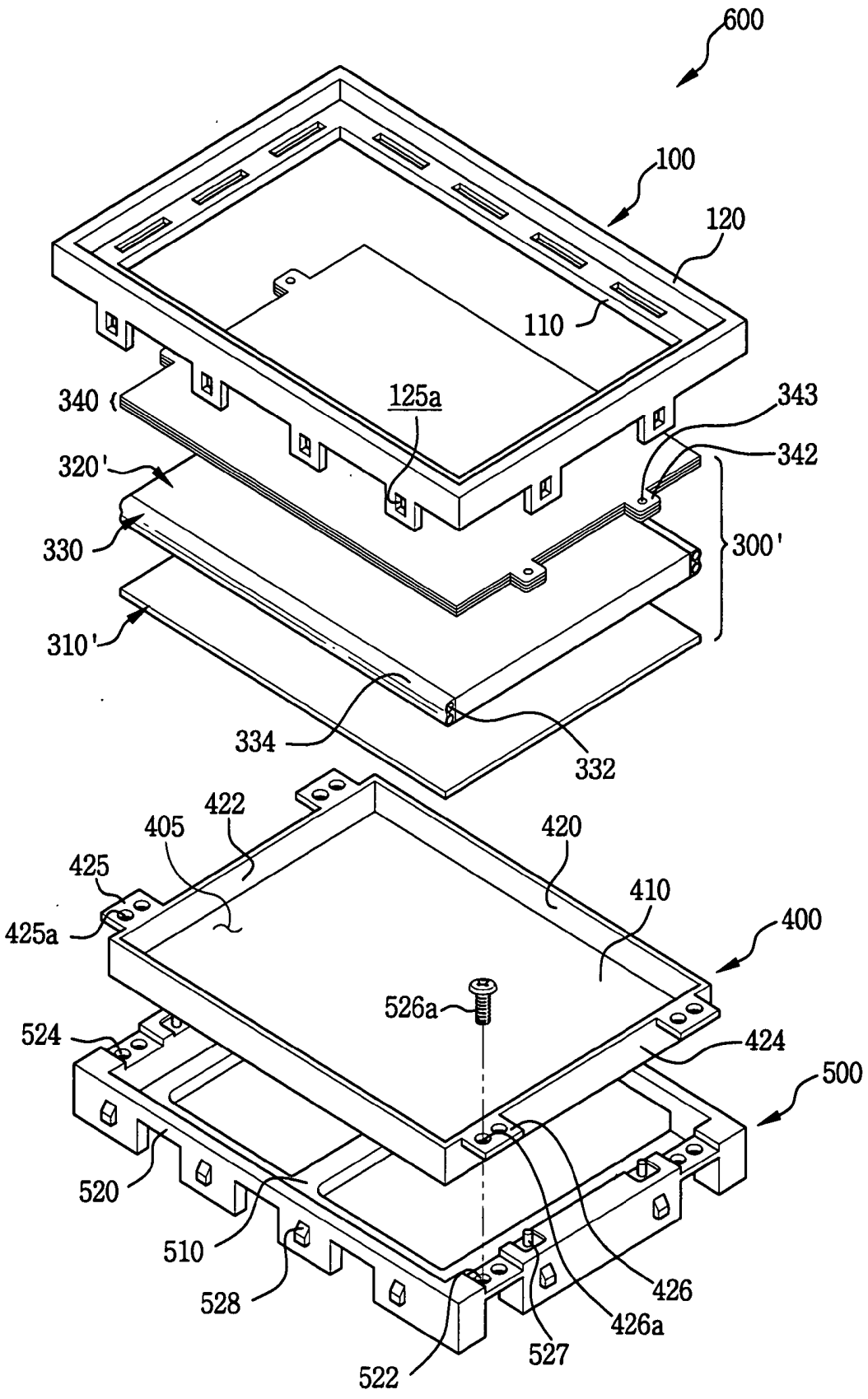


FIG.25


600
100
120
110
340
125a
343
342
320'
330
300'
310'
334
332
422
405
420
425
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425a
400
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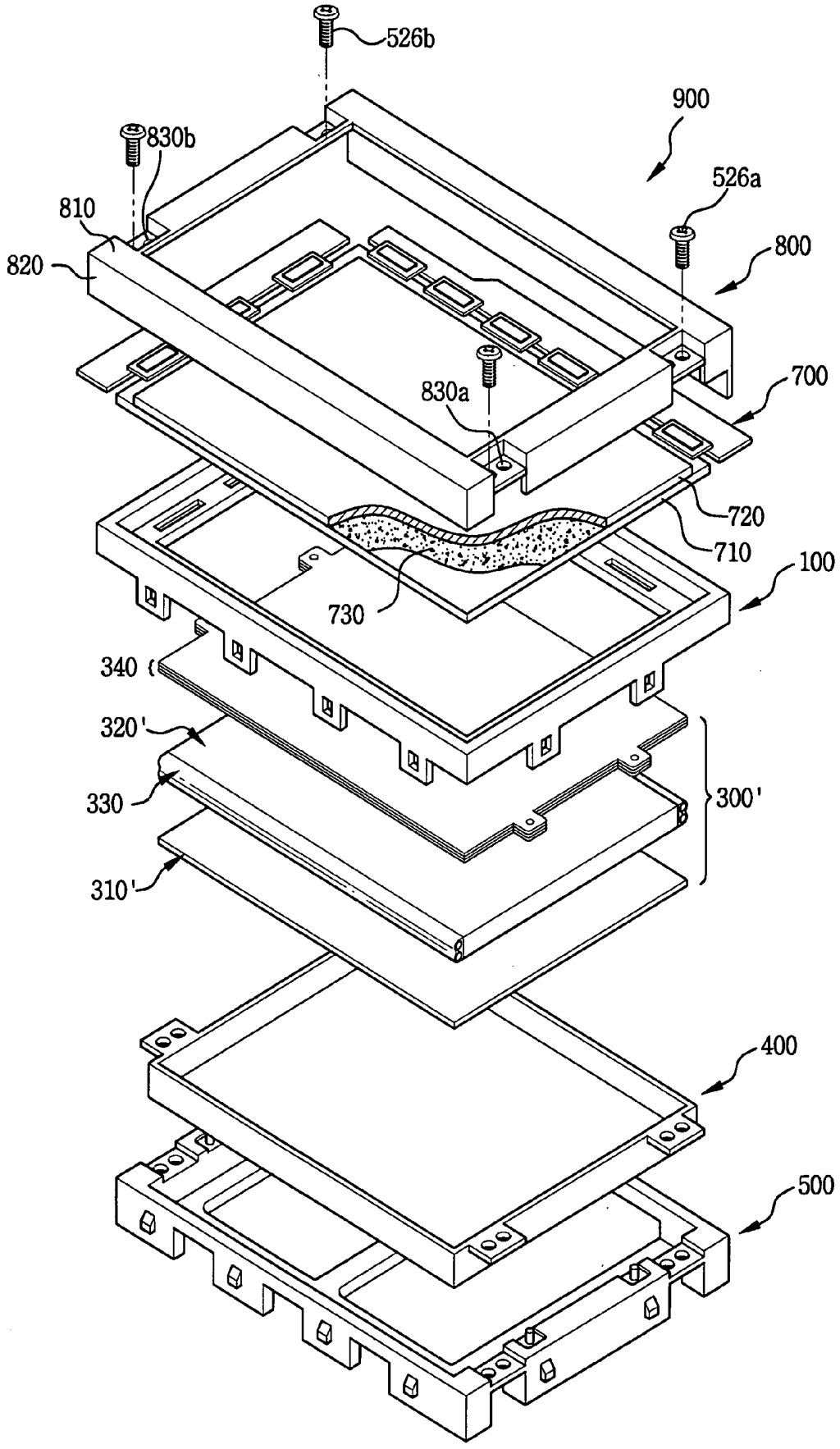
500
520
510
528
426
426a
527
522

FIG.26


526b
900
830b
526a
810
800
820
700
830a
720
710
730
100
340
320'
300'
330
310'
400
500

SUPPORTING UNIT FOR LIQUID CRYSTAL DISPLAY APPARATUS, BACKLIGHT ASSEMBLY AND LIQUID CRYSTAL DISPLAY APPARATUS HAVING THE SAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a supporting unit for a liquid crystal display (LCD) panel, a backlight assembly having the supporting unit and an LCD apparatus having the supporting unit. More particularly, the present invention relates to a supporting unit for an LCD panel, which is capable of preventing pollution of a display region, a backlight assembly having the supporting unit and an LCD apparatus having the supporting unit.

[0003] 2. Description of the Related Art

[0004] A liquid crystal display (LCD) apparatus displays an image using a liquid crystal.

[0005] The LCD apparatus includes a light generating unit and a liquid crystal controlling unit. A receiving container receives the light generating unit and the liquid crystal controlling unit.

[0006] Impurities disposed between the light generating unit and the liquid crystal controlling unit block a light to deteriorate display quality of an image.

[0007] In order to prevent the pollution of the LCD apparatus, the light generating unit and the liquid crystal controlling unit are manufactured and received in the receiving container in a clean room.

[0008] The LCD apparatus, however, is operated in an atmosphere that is exposed by the impurities such as dusts, particles, liquid pollutants, etc., so that the LCD apparatus may be polluted, thereby deteriorating image display quality.

BRIEF SUMMARY OF THE INVENTION

[0009] The present invention provides a supporting unit for an LCD panel, which is capable of preventing pollution of a display region, a backlight assembly having the supporting unit and an LCD apparatus having the supporting unit.

[0010] The present invention also provides a backlight assembly having the supporting unit.

[0011] The present invention also provides an LCD apparatus having the supporting unit.

[0012] The supporting unit in accordance with an exemplary embodiment of the present invention includes a first support frame, a second support frame and an impurity barrier. The first support frame supports a liquid crystal display panel, and includes an opening through which a light is supplied to the liquid crystal display panel. The second support frame is protruded from sides of the first support frame to surround sides of the liquid crystal display panel. The impurity barrier is disposed on a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel.

[0013] The backlight assembly in accordance with an exemplary embodiment of the present invention includes a first receiving container, a lamp unit, a supporting unit and a second receiving container.

[0014] The first receiving container includes a first bottom surface and a plurality of first sidewalls disposed on sides of the first bottom surface to form a receiving space. The lamp unit is disposed in the receiving space to generate a light. The supporting unit includes a first support frame, a second support frame and an impurity barrier. The first support frame has an opening through which the light is supplied to a liquid crystal display panel, and supports the liquid crystal display panel. The second support frame is protruded from sides of the first support frame to surround sides of the liquid crystal display panel. The impurity barrier is disposed on a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel. The second receiving container includes a second bottom surface and a plurality of second sidewalls disposed on sides of the second bottom surface to surround the first sidewalls of the first receiving container.

[0015] The liquid crystal display apparatus in accordance with an exemplary embodiment of the present invention includes a first receiving container, a lamp unit, a liquid crystal display panel, a supporting unit, a second receiving container and a chassis. The first receiving container includes a first bottom surface and a plurality of first sidewalls disposed on sides of the first bottom surface to form a receiving space. The lamp unit is disposed in the receiving space to generate a light. The liquid crystal display panel transforms the light into an image light. The supporting unit includes a first support frame, a second support frame and an impurity barrier. The first support frame has an opening through which the light is supplied to the liquid crystal display panel, and supports the liquid crystal display panel. The second support frame is protruded from sides of the first support frame to surround sides of the liquid crystal display panel. The impurity barrier is disposed on a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel. The second receiving container includes a second bottom surface and a plurality of second sidewalls disposed on sides of the second bottom surface to surround the first sidewalls of the first receiving container. The chassis includes a top chassis wall and a plurality of side chassis walls that surrounds the liquid crystal display panel. A central portion of the top chassis wall is opened to expose a central portion of the liquid crystal display panel.

[0016] The impurities may include dusts, particles, liquid pollutants, etc.

[0017] Therefore, the supporting unit for the LCD panel includes the impurity barrier to prevent the inflow of the impurities that is externally provided into the space between the supporting unit and the LCD panel, thereby improving image display quality.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The above and other advantages of the present invention will become more apparent by describing in detail

exemplary embodiments thereof with reference to the accompanying drawings, in which:

[0019] **FIG. 1** is a perspective view showing a supporting unit for an LCD panel according to an exemplary embodiment;

[0020] **FIG. 2** is a cross-sectional view taken along a line A-A' shown in **FIG. 1**;

[0021] **FIG. 3** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0022] **FIG. 4** is an enlarged view showing a portion 'B' shown in **FIG. 3**;

[0023] **FIG. 5** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0024] **FIG. 6** is an enlarged view showing a portion 'C' shown in **FIG. 5**;

[0025] **FIG. 7** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0026] **FIG. 8** is an enlarged view showing a portion 'D' shown in **FIG. 7**;

[0027] **FIG. 9** is a perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0028] **FIG. 10** is an enlarged view showing a portion 'E' shown in **FIG. 9**;

[0029] **FIG. 11** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0030] **FIG. 12** is an enlarged view showing a portion 'F' shown in **FIG. 11**;

[0031] **FIG. 13** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0032] **FIG. 14** is an enlarged view showing a portion 'G' shown in **FIG. 13**;

[0033] **FIG. 15** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0034] **FIG. 16** is an enlarged view showing a portion 'H' shown in **FIG. 15**;

[0035] **FIG. 17** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0036] **FIG. 18** is an enlarged view showing a portion 'I' shown in **FIG. 17**;

[0037] **FIG. 19** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0038] **FIG. 20** is an enlarged view showing a portion 'J' shown in **FIG. 19**;

[0039] **FIG. 21** is an enlarged partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0040] **FIG. 22** is an enlarged partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0041] **FIG. 23** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment;

[0042] **FIG. 24** is an enlarged view showing a portion 'K' shown in **FIG. 23**;

[0043] **FIG. 25** is an exploded perspective view showing a backlight assembly according to an exemplary embodiment; and

[0044] **FIG. 26** is an exploded perspective view showing an LCD apparatus according to an exemplary embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0045] Hereinafter, the present invention will be described in detail with reference to the accompanying drawings.

[0046] **FIG. 1** is a perspective view showing a supporting unit for an LCD panel according to an exemplary embodiment. **FIG. 2** is a cross-sectional view taken along a line A-A' shown in **FIG. 1**.

[0047] Referring to **FIGS. 1 and 2**, the supporting unit **100** for the liquid crystal display (LCD) panel **300** supports the LCD panel **300**. The supporting unit **100** has a rectangular shape including an opening **105** formed on a central portion of the supporting unit **100**.

[0048] The supporting unit **100** includes a first support frame **110**, a second support frame **120** and an impurity barrier **130**.

[0049] The first support frame **110** supports a bottom surface **310** of the LCD panel **300**. A first surface **115** of the first support frame **110** makes contact with sides of the bottom surface **310** of the LCD panel **300**. The bottom surface **310** of the LCD panel **300** has a rectangular shape, and the first support frame **110** also has a rectangular shape.

[0050] The second support frame **120** is extended along sidewalls **320** of the LCD panel **300** to surround the LCD panel **300**. The first and second support frames **110** and **120** may be formed by an injection molding method, or the second support frame **120** may also be attached to the first support frame **110** to form the supporting unit **100**.

[0051] The second support frame **120** includes a securing portion **125** that is protruded outside the second support frame **120**. The securing portion **125** includes a securing hole **125***a*.

[0052] The impurity barrier **130** prevents an inflow of the impurities into a space between the first support frame **110** and the bottom surface **310** of the LCD panel **300**.

[0053] The impurity barrier **130** is formed at the first surface **115** of the first support frame **110**. The first surface **115** faces the bottom surface **310** of the LCD panel **300**. The

impurity barrier **130** includes a recess formed at the first surface **115**. The impurity barrier **130** may include a plurality of the recesses.

[**0054**] The impurities, which are externally provided to the space between the bottom surface **310** of the LCD panel **300** and the first supporting frame **110**, are captured in the impurity barrier **130** by a gravitational force to prevent the inflow of the impurities into the space.

[**0055**] According to the exemplary embodiment, the impurity barrier **130** of the first support frame **110** includes the recess formed at the first surface **115** to capture the impurities, thereby improving display quality.

[**0056**] **FIG. 3** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 4** is an enlarged view showing a portion 'B' shown in **FIG. 3**.

[**0057**] The supporting unit for the LCD panel of **FIGS. 3 and 4** is same as in FIGS. **1** and **2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0058**] Referring to **FIGS. 3 and 4**, the impurity barrier **140** includes a groove formed along a first surface **115** of a first support frame **110**. The impurity barrier **140** includes a first depth. Preferably, the impurity barrier **140** has a closed loop shape that surrounds an opening **105** that is formed on a central portion of the supporting unit **100**.

[**0059**] According to the exemplary embodiment, the impurity barrier **140** includes the groove to capture the impurities by a gravitational force. The impurity barrier **140** may include a plurality of the grooves.

[**0060**] **FIG. 5** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 6** is an enlarged view showing a portion 'C' shown in **FIG. 5**.

[**0061**] The supporting unit for the LCD panel in **FIGS. 5 and 6** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0062**] Referring to **FIGS. 5 and 6**, an impurity barrier **150** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **150** includes a groove **152** formed along a first surface **115** of a first support frame **110** and a double-sided tape **155** disposed in the groove **152**.

[**0063**] Impurities, which are externally provided to a space between a bottom surface of the LCD panel and the first supporting frame **110**, are captured in the impurity barrier **150** by a gravitational force. The double-sided tape **155** is disposed in the groove **152** to attach the captured impurities on an exposed surface of the double-sided tape **155**. Therefore, the attached impurities may not be separated from the impurity barrier **150** although an LCD apparatus is impacted by an external force.

[**0064**] According to the present invention, the impurity barrier **150** includes the groove **152** and the double-sided tape **155** to prevent the separation of the impurities from the impurity barrier **150**.

[**0065**] **FIG. 7** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 8** is an enlarged view showing a portion 'D' shown in **FIG. 7**.

[**0066**] The supporting unit for the LCD panel in **FIGS. 7 and 8** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0067**] Referring to **FIGS. 7 and 8**, an impurity barrier **160** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **160** includes a groove **162** and a plurality of protrusions **165** disposed in the groove **162**.

[**0068**] Impurities, which are externally provided to a space between a bottom surface of the LCD panel and the first supporting frame **110**, are captured in the impurity barrier **160** by a gravitational force. The protrusions **165** are disposed in the groove **162** so that the captured impurities are disposed between the protrusions **165**. Therefore, the captured impurities may not be separated easily from the impurity barrier **160** although an LCD apparatus is impacted by an external force.

[**0069**] The groove **162** and the protrusions **165** may be formed together with the first support frame **110** by an injection molding method.

[**0070**] According to the exemplary embodiment, the impurity barrier **160** includes the groove **162** and the protrusions **165** to simplify the manufacturing process of the supporting unit **100**.

[**0071**] **FIG. 9** is a perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 10** is an enlarged view showing a portion 'E' shown in **FIG. 9**.

[**0072**] The supporting unit for the LCD panel in **FIGS. 9 and 10** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0073**] Referring to **FIGS. 9 and 10**, an impurity barrier **170** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **170** includes a plurality of protrusions **175** formed on the first surface **115** of the first support frame **110**. The size of the protrusions **175** and the interval between the protrusions **175** are adjusted so as to increase a path length of impurities so that the impurities may not pass through the impurity barrier **170**. Therefore, the impurity barrier **170** prevents an inflow of the impurities into a space between the first surface **115** of the first support frame **110** and the bottom surface of the LCD panel. Preferably, the protrusions **175** are arranged in a band shape having a closed loop that surrounds an opening of the supporting unit **100**.

[**0074**] According to the exemplary embodiment, the protrusions **175** disposed on the first surface **115** are arranged in the band shape having the closed loop to prevent the inflow of the impurities into a space between the first support frame **110** and the bottom surface of the LCD panel.

[**0075**] **FIG. 11** is a partially cut out perspective view showing a supporting unit for an LCD panel according to

another exemplary embodiment. **FIG. 12** is an enlarged view showing a portion 'F' shown in **FIG. 11**.

[**0076**] The supporting unit for the LCD panel in **FIGS. 11 and 12** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0077**] Referring to **FIGS. 11 and 12**, an impurity barrier **180** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **180** includes a plurality of protrusions **185** disposed on the first surface **115** and a groove **187** formed at the first surface **115**.

[**0078**] The groove **187** is formed between the protrusions **185** and a second support frame **120** so that a portion of impurities, which are externally provided to a space between a bottom surface of the LCD panel and the first support frame **110**, are captured in the groove **187** by a gravitational force, thereby decreasing the amount of an inflow of the impurities into the space.

[**0079**] The protrusions **185** disposed on the first surface **115** are arranged in a band shape to increase a path length of impurities so that a remaining portion of the impurities may not pass through the impurity barrier **180**. Therefore, the impurity barrier **180** prevents the inflow of the impurities into a space between the first surface **115** of the first support frame **110** and the bottom surface of the LCD panel.

[**0080**] According to the exemplary embodiment, the impurity barrier **180** includes the protrusions **195** and the groove **187** disposed between the protrusions **185** and the second support frame **120** so as to prevent the inflow of the impurities into the space.

[**0081**] **FIG. 13** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 14** is an enlarged view showing a portion 'G' shown in **FIG. 13**.

[**0082**] The supporting unit for the LCD panel in **FIGS. 13 and 14** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0083**] Referring to **FIGS. 13 and 14**, an impurity barrier **190** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **190** includes a groove **192**, a plurality of first protrusions **194** disposed in the groove **192** and a plurality of second protrusions **196** disposed on the first surface **115**.

[**0084**] The groove **192** has a band shape. A portion of impurities, which are externally provided to a space between the bottom surface of the LCD panel and the first supporting frame **110**, are captured in the impurity barrier **190** by a gravitational force. The first protrusions **194** are formed in the groove **192** so that the captured impurities are disposed between the first protrusions **194**. Therefore, the captured impurities may not be separated from the groove **192** although an LCD apparatus is impacted by an external force.

[**0085**] The second protrusions **196** disposed on the first surface **115** of the first support frame **110** are arranged in a band shape to increase a path length of a remaining impurities, thereby preventing an inflow of the remaining impurities into the space.

[**0086**] According to the exemplary embodiment, the impurity barrier **190** includes the groove **192**, the first protrusions **194** disposed in the groove **192** and the second protrusions **196** disposed on the first surface **115** so that the impurities may not pass through the impurity barrier **190**.

[**0087**] **FIG. 15** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 16** is an enlarged view showing a portion 'H' shown in **FIG. 15**.

[**0088**] The supporting unit for the LCD panel in **FIGS. 15 and 16** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0089**] Referring to **FIGS. 15 and 16**, an impurity barrier **200** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **200** includes a groove **202**, a double-sided tape **204** disposed in the groove **202** and a plurality of protrusions **206** disposed on the first surface **115**.

[**0090**] The groove **202** disposed between the protrusions **206** and a second support frame **120** has a band shape. A portion of impurities, which are externally provided to a space between a bottom surface of an LCD panel and the first supporting frame **110**, are captured in the impurity barrier **200** by a gravitational force. The first double-sided tape **204** is disposed in the groove **202** so that the captured impurities are attached on the double-sided tape **204**. Therefore, the captured impurities may not be separated from the groove **202** although an LCD apparatus is impacted by an external force.

[**0091**] The protrusions **206** disposed on the first surface **115** of the first support frame **110** are arranged in a band shape to increase a path length of remaining impurities, thereby preventing an inflow of the remaining impurities into the space.

[**0092**] According to the exemplary embodiment, the impurity barrier **200** includes the groove **202**, the double-sided tape **204** disposed in the groove **202** and the protrusions **206** disposed on the first surface **115** so that the impurities may not pass through the impurity barrier **200**.

[**0093**] **FIG. 17** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 18** is an enlarged view showing a portion 'I' shown in **FIG. 17**.

[**0094**] The supporting unit for the LCD panel in **FIGS. 17 and 18** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[**0095**] Referring to **FIGS. 17 and 18**, an impurity barrier **210** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **210** includes a first wall **212**, a second wall **214** and a buffer **216**.

[**0096**] The first and second walls **212** and **214** have closed loop shapes that surround an opening formed at a central portion of the supporting unit **100**. The first wall **212** is disposed between the second wall **214** and a second support frame **120**.

[0097] The buffer **216** is disposed between the first and second walls **212** and **214**, and has a rectangular cross-section. The buffer **216** includes an elastic material such as a rubber, a silicon compound, etc. The buffer **216** may also include a chemical filter having activated carbon, cotton, microfiber, etc.

[0098] The height of the buffer **216** may be adjusted so that a bottom surface of an LCD panel may not make contact with the upper surfaces of the first and second walls **212** and **214**. The buffer **216** may be disposed between the first and second walls **212** and **214** through an automated manufacturing system. The buffer **216** absorbs an externally provided impact so as to protect the LCD panel, and the first surface **115** of the first support frame **110** is spaced apart from the bottom surface of the LCD panel by the buffer **216**.

[0099] According to the exemplary embodiment, the impurity barrier **210** includes the first wall **212**, the second wall **214** and the buffer **216** so that the impurities may not pass through the impurity barrier **210**, and the LCD panel may be protected from the externally provided impact.

[0100] **FIG. 19** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 20** is an enlarged view showing a portion 'J' shown in **FIG. 19**.

[0101] The supporting unit for the LCD panel of **FIGS. 19 and 20** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[0102] Referring to **FIGS. 19 and 20**, an impurity barrier **220** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **220** includes a first wall **222**, a second wall **224**, a buffer **226** and a groove **228**.

[0103] The groove **228** is formed between the first wall **222** and a second support frame **120** so that a portion of impurities, which are externally provided to a space between a bottom surface of the LCD panel and the first supporting frame **110**, are captured in the groove **228** by a gravitational force.

[0104] The first and second walls **222** and **224** have closed loop shapes that surround an opening formed at a central portion of the supporting unit **100**. The first wall **222** is disposed between the second wall **224** and a second support frame **120**.

[0105] The buffer **226** disposed between the first and second walls **222** and **224** has a rectangular cross-section. The buffer **226** includes an elastic material such as a rubber, a silicon compound etc. The buffer **226** may also include a chemical filter having activated carbon, cotton, microfiber, etc.

[0106] The height of the buffer **226** may be adjusted so that a bottom surface of an LCD panel may not make contact with the upper surfaces of the first and second walls **222** and **224**. The buffer **226** may be disposed between the first and second walls **222** and **224** through an automated manufacturing system. The buffer **226** absorbs an externally provided impact so as to protect the LCD panel, and the first surface **115** of the first support frame **110** is spaced apart from the bottom surface of the LCD panel by the buffer **226**. In addition, remaining impurities may not pass through the buffer **226**.

[0107] According to the exemplary embodiment, the impurity barrier **220** includes the first wall **222**, the second wall **224**, the buffer **226** and the groove **228** so that the impurities may not pass through the impurity barrier **220**, and the LCD panel may be protected from the externally provided impact.

[0108] **FIG. 21** is an enlarged partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment.

[0109] The supporting unit for the LCD panel in **FIG. 21** is same as in **FIGS. 19 and 20** except protrusions disposed in a groove. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 19 and 20** and any further explanation will be omitted.

[0110] Referring to **FIG. 21**, a plurality of protrusions **229'** is disposed in a groove **228** so that impurities captured in the groove **228** are disposed between the protrusions **229'**.

[0111] According to the exemplary embodiment, an impurity barrier **220'** further includes the protrusions **229'** disposed in the groove **228** so that the captured impurities may not be separated from the groove **228** although an LCD apparatus is impacted by an external force.

[0112] **FIG. 22** is an enlarged partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment.

[0113] The supporting unit for the LCD panel in **FIG. 22** is same as in **FIGS. 19 and 20** except a double-sided tape disposed in a groove. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 19 and 20** and any further explanation will be omitted.

[0114] Referring to **FIG. 22**, a double-sided tape **229"** is disposed in a groove **228** so that impurities captured in the groove **228** are attached on the double-sided tape **229"**.

[0115] According to the exemplary embodiment, an impurity barrier **220"** further includes the double-sided tape **229"** disposed in the groove **228** so that the attached impurities may not be separated from the groove **228** although an LCD apparatus is impacted by an external force.

[0116] **FIG. 23** is a partially cut out perspective view showing a supporting unit for an LCD panel according to another exemplary embodiment. **FIG. 24** is an enlarged view showing a portion 'K' shown in **FIG. 23**.

[0117] The supporting unit for the LCD panel in **FIGS. 23 and 24** is same as in **FIGS. 1 and 2** except an impurity barrier. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIGS. 1 and 2** and any further explanation will be omitted.

[0118] Referring to **FIGS. 23 and 24**, an impurity barrier **230** is formed on a first surface **115** of a first support frame **110**. The impurity barrier **230** includes a buffer **235** and a plurality of protrusions **233**.

[0119] The protrusions **233** disposed on the first surface **115** surround an opening formed at a central portion of the supporting unit **100**. The protrusions **233** increase the friction between the first surface **115** and the buffer **235** disposed on the protrusions **233** to prevent the drifting of the buffer **235**. In addition, the protrusions **233** also increase a

path length of impurities that are externally provided into a space between a bottom surface of an LCD panel and the first surface **115** so that the impurities may not pass through the impurity barrier **230**.

[**0120**] The buffer **235** disposed on the protrusions **233** has a rectangular cross-section. The buffer **235** includes an elastic material such as a rubber, a silicon compound etc. The buffer **235** may also include a chemical filter having activated carbon, cotton, microfiber, etc.

[**0121**] Alternatively, a groove (not shown) may be formed between the protrusions **233** and a second support frame **120**. In addition, a double-sided tape or a plurality of auxiliary protrusions may be disposed in the groove (not shown).

[**0122**] According to the exemplary embodiment, the impurity barrier **230** includes the protrusions **233** and the buffer **235** disposed on the protrusions **233** to prevent an inflow of the impurities into a space between the bottom surface of the LCD panel and the first surface **115**.

[**0123**] **FIG. 25** is an exploded perspective view showing a backlight assembly according to an exemplary embodiment.

[**0124**] Referring to **FIG. 25**, the backlight assembly **600** includes a supporting unit **100** for an LCD panel, a lamp unit **300'**, a first receiving container **400** and a second receiving container **500**.

[**0125**] The first receiving container **400** includes a first bottom surface **410** and a plurality of first sidewalls **420**. The first receiving container **400** may include a metal, a plastic, etc.

[**0126**] The first bottom surface **410** has a rectangular shape. The sidewalls **420** are disposed on sides of the first bottom surface **410** to form a receiving space **405**. The sidewalls **420** include a first side face **422** and a second side face **424** corresponding to the first side face **422**. A first bracket **425** and a second bracket **426** are protruded from the first and second side faces **422** and **424**, respectively. A plurality of the first brackets and a plurality of the second brackets may be protruded from the first and second side faces **422** and **424**, respectively. In this exemplary embodiment, two first brackets **425** and two second brackets **426** are protruded from the first and second side faces **422** and **424**, respectively. Each of the first brackets **425** includes two first screw holes **425***a*, and each of the second brackets **426** includes two second screw holes **426***a*.

[**0127**] The lamp unit **300'** is disposed in the receiving space **405** of the first receiving container **400**. The lamp unit **300'** includes a reflecting plate **310'**, a light guide plate **320'**, a lamp assembly **330** and optical sheets **340**.

[**0128**] The reflecting plate **310'** is disposed on the first bottom surface **410** of the first receiving container **400**. The reflecting plate **310'** includes a material having high reflectivity. The light guide plate **320'** disposed on the reflecting plate **310'** has a rectangular shape or a wedge shape.

[**0129**] The lamp assembly **330** disposed on a side surface of the light guide plate **320'** includes a lamp **332** and a lamp cover **334**.

[**0130**] The lamp **332** is disposed at a position facing the side surface of the light guide plate **320'**. The lamp includes a cold cathode fluorescent lamp (CCFL). The lamp cover **334** covers the lamp **332** to secure the lamp **332** to the side surface of the light guide plate **320'**.

[**0131**] The optical sheets **340** are disposed on the light guide plate **320'**. The optical sheets **340** uniformize luminance of a light exited from the light guide plate **320'**. The optical sheets **340** include a diffusion sheet, a prism sheet, etc. A fixing portion **342** is protruded from the optical sheets **340**. The fixing portion **342** includes a fixing hole **343**. The optical sheets **340** may include a plurality of the fixing portions **342**. In this exemplary embodiment, the optical sheets **340** include two fixing portions **342**.

[**0132**] The supporting unit **100** is combined with the first receiving container **400**. The supporting unit **100** prevents the separation of the lamp unit **300'** from the first receiving container **400**, and receives the LCD panel.

[**0133**] The supporting unit **100** includes a first support frame **110**, a second support frame **120** and an impurity barrier.

[**0134**] The second receiving container **500** receives the first receiving container **400**. The second receiving container **500** has a rectangular parallelepiped shape, and an upper surface of the second receiving container **500** is opened. The second receiving container **500** includes a second bottom surface **510** and a plurality of second sidewalls **520**. Third screw holes **522** are formed at an upper surface of one of the second sidewalls **520**, and the third screw holes **522** are disposed at a position corresponding to the second screw holes **426***a* of the second brackets **426** of the first receiving container **400**, respectively. Fourth screw holes **524** are formed at an upper surface of one of the second sidewalls **520**, and the fourth screw holes **524** are disposed at a position corresponding to the first screw holes **425***a* of the first brackets **425** of the first receiving container **400**, respectively. First screws **526** are secured with the first and fourth screw holes **425***a* and **524**, and second screws (not shown) are secured with the second and third screw holes **426***a* and **522**, respectively.

[**0135**] A securing pin **527** is disposed on the upper surface of the second sidewalls **520** of the second receiving container **500** to be secured with the fixing hole **343** formed in the fixing portion **342** of the optical sheets **340**. A plurality of the securing pins may be disposed on the upper surface of the second sidewalls **520** of the second receiving container **500**.

[**0136**] A plurality of securing projections **528** is formed on outer surfaces of the second sidewalls **520** of the second receiving container **500**. The securing projections **528** are hooked on a securing hole **125***a* of the supporting unit **100**.

[**0137**] **FIG. 26** is an exploded perspective view showing an LCD apparatus according to an exemplary embodiment.

[**0138**] The backlight assembly in **FIG. 26** is same as in **FIG. 25**. Thus, the same reference numerals will be used to refer to the same or like parts as those described in **FIG. 25** and any further explanation will be omitted.

[**0139**] Referring to **FIG. 25**, the LCD apparatus **900** includes an LCD panel **700**, a supporting unit **100** for an LCD panel **700**, a lamp unit **300'**, a first receiving container **400**, a second receiving container **500** and a chassis **800**.

[0140] The LCD panel **700** is disposed on a first support frame **110** of the supporting unit **100**. A second support frame **120** prevents the drifting of the LCD panel **700**.

[0141] The LCD panel **700** includes a thin film transistor (TFT) substrate **710**, a color filter substrate **720** and a liquid crystal layer **730**. The TFT substrate **710** is combined with the color filter substrate **720**, and disposed at a position corresponding to the color filter substrate **720**. The liquid crystal layer **730** is interposed between the TFT substrate **710** and the color filter substrate **720**.

[0142] The chassis **800** prevents the separation of the LCD panel **700**, and protects the LCD panel **700** from an impact that is externally provided to the LCD panel **700**.

[0143] The chassis **800** includes a top chassis wall **810** and a plurality of side chassis walls **820**.

[0144] A central portion of the top chassis wall **810** is opened so that a central portion of the color filter **720** of the LCD panel **700** is exposed. The top chassis wall **810** has a rectangular shape.

[0145] The side chassis walls **820** are disposed on sides of the top chassis wall **810** to surround the LCD panel **700**.

[0146] A first auxiliary securing hole **830***a* and a second auxiliary securing hole **830***b* are formed at the top chassis wall **810**. Alternatively, a plurality of the first auxiliary securing holes and a plurality of the second auxiliary securing holes may also be formed at the top chassis wall **810**. In this exemplary embodiment, four first auxiliary securing holes **830***a* and four second auxiliary securing holes **830***b* are formed at the top chassis wall **810**. The first and second auxiliary securing holes **830***a* and **830***b* are disposed at a position corresponding to the third and fourth screw holes **522** and **524**, respectively. The third securing holes **522** and the first auxiliary securing holes **830***a* are combined with first securing screws **526***a*. The fourth securing holes **524** and the second auxiliary securing holes **830***b* are combined with second securing screws **526***b*.

[0147] According to the present invention, the supporting unit for the LCD panel includes the impurity barrier to prevent the inflow of the impurities that is externally provided into the space between the supporting unit and the LCD panel, thereby improving image display quality.

[0148] This invention has been described with reference to the exemplary embodiments. It is evident, however, that many alternative modifications and variations will be apparent to those having skill in the art in light of the foregoing description. Accordingly, the present invention embraces all such alternative modifications and variations as fall within the spirit and scope of the appended claims.

What is claimed is:

1. A supporting unit for a liquid crystal display apparatus, the supporting unit comprising:

a first support frame that supports a liquid crystal display panel, and includes an opening through which a light is supplied to the liquid crystal display panel;

a second support frame protruded from sides of the first support frame to surround sides of the liquid crystal display panel; and

an impurity barrier disposed at a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel.

2. The supporting unit of claim 1, wherein the impurity barrier comprises a recess disposed at the surface of the first support frame corresponding to the liquid crystal display panel.

3. The supporting unit of claim 1, wherein the impurity barrier comprises a groove disposed at the surface of the first support frame corresponding to the liquid crystal display panel to surround the opening of the first support frame.

4. The supporting unit of claim 3, wherein the impurity barrier further comprises a double-sided tape disposed in the groove to attach the impurities to the double-sided tape.

5. The supporting unit of claim 3, wherein the impurity barrier further comprises a plurality of protrusions disposed in the groove.

6. The supporting unit of claim 1, wherein the impurity barrier comprises a plurality of first protrusions formed on the surface of the first support frame corresponding to the liquid crystal display panel.

7. The supporting unit of claim 6, wherein the first protrusions are arranged in a band shape that surrounds the opening of the first support frame.

8. The supporting unit of claim 6, wherein the impurity barrier further comprises a groove disposed between the first protrusions and the second support frame.

9. The supporting unit of claim 8, wherein the impurity barrier further comprises a plurality of second protrusions disposed in the groove.

10. The supporting unit of claim 8, wherein the impurity barrier further comprises a double-sided tape disposed in the groove.

11. The supporting unit of claim 1, wherein the impurity barrier comprises a plurality of walls disposed on the surface of the first support frame corresponding to the liquid crystal display panel to surround the opening of the first support frame and spaced apart from one another, and a buffer disposed between the walls to absorb an externally provided impact so as to protect the liquid crystal display panel.

12. The supporting unit of claim 11, wherein the buffer comprises a rubber, a silicon compound, activated carbon, cotton, microfiber or a mixture thereof.

13. The supporting unit of claim 11, wherein the impurity barrier further comprises a groove disposed between the second support frame and one of the walls adjacent to the second support frame.

14. The supporting unit of claim 13, wherein the impurity barrier further comprises a double-sided tape disposed in the groove.

15. The supporting unit of claim 13, wherein the impurity barrier further comprises a plurality of protrusions disposed in the groove.

16. The supporting unit of claim 1, wherein the impurity barrier comprises a plurality of protrusions disposed on the surface of the first support frame corresponding to the liquid crystal display panel to surround the opening of the first support frame, and a buffer disposed on the protrusions to absorb an impact that is provided from an exterior to the supporting unit.

17. The supporting unit of claim 16, wherein the buffer comprises a rubber, a silicon compound, activated carbon, cotton, microfiber or a mixture thereof.

18. The supporting unit of claim 16, wherein the buffer further comprises a groove disposed between the protrusions and the second support frame.

19. The supporting unit of claim 18, wherein the impurity barrier further comprises a double-sided tape disposed in the groove.

20. A backlight assembly comprising:

a first receiving container including a first bottom surface and a plurality of first sidewalls disposed on sides of the first bottom surface to form a receiving space;

a lamp unit disposed in the receiving space to generate a light;

a supporting unit including a first support frame that supports a liquid crystal display panel and has an opening through which the light is supplied to the liquid crystal display panel, a second support frame protruded from sides of the first support frame to surround sides of the liquid crystal display panel, and an impurity barrier disposed on a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel; and

a second receiving container including a second bottom surface and a plurality of second sidewalls disposed on sides of the second bottom surface to surround the first sidewalls of the first receiving container.

21. The backlight assembly of claim 20, wherein the impurity barrier comprises a recess disposed at the surface of the first support frame corresponding to the liquid crystal display panel.

22. The backlight assembly of claim 21, wherein the impurity barrier comprises a groove disposed at the surface of the first support frame corresponding to the liquid crystal display panel so as to surround the opening of the first support frame.

23. The backlight assembly of claim 22, wherein the impurity barrier further comprises a double-sided tape disposed in the groove.

24. The backlight assembly of claim 20, wherein the impurity barrier comprises a plurality of walls disposed on the surface of the first support frame corresponding to the liquid crystal display panel to surround the opening of the first support frame and spaced apart from one another, and a buffer disposed between the walls to absorb an impact that is provided from an exterior to the backlight assembly.

25. The backlight assembly of claim 24, wherein the buffer comprises a rubber, a silicon compound, activated carbon, cotton, microfiber or a mixture thereof.

26. The backlight assembly of claim 20, wherein the impurity barrier comprises a plurality of protrusions disposed on the surface of the first support frame corresponding to the liquid crystal display panel to surround the opening of the first support frame, and a buffer disposed on the protrusions to absorb an impact that is provided from an exterior to the backlight assembly.

27. The backlight assembly of claim 26, wherein the buffer comprises a rubber, a silicon compound, activated carbon, cotton, microfiber or a mixture thereof.

28. A liquid crystal display apparatus comprising:

a first receiving container including a first bottom surface and a plurality of first sidewalls disposed on sides of the first bottom surface to form a receiving space;

a lamp unit disposed in the receiving space to generate a light;

a liquid crystal display panel that transforms the light into an image light;

a supporting unit including a first support frame that supports the liquid crystal display panel and that has an opening through which the light is supplied to the liquid crystal display panel, a second support frame protruded from sides of the first support frame to surround sides of the liquid crystal display panel, and an impurity barrier disposed on a surface of the first support frame corresponding to the liquid crystal display panel to prevent an inflow of impurities into a space between the first support frame and the liquid crystal display panel;

a second receiving container including a second bottom surface and a plurality of second sidewalls disposed on sides of the second bottom surface to surround the first sidewalls of the first receiving container; and

a chassis including a top chassis wall and a plurality of side chassis walls that surrounds the liquid crystal display panel, a central portion of the top chassis wall being opened to expose a central portion of the liquid crystal display panel.

29. The liquid crystal display apparatus of claim 28, wherein the lamp unit comprises a lamp assembly that generates the light and a light guide plate combined with the lamp assembly to guide the light into the liquid crystal display panel.

* * * * *

专利名称(译)	用于液晶显示装置的支撑单元，背光组件和具有该支撑单元的液晶显示装置		
公开(公告)号	US20050259191A1	公开(公告)日	2005-11-24
申请号	US10/850602	申请日	2004-05-20
[标]申请(专利权)人(译)	朴钟DAE LEE SEOK WON 李泰金		
申请(专利权)人(译)	朴钟DAE LEE SEOK-WON 李泰金		
当前申请(专利权)人(译)	SAMSUNG ELECTRONICS CO.，LTD.		
[标]发明人	PARK JONG DAE LEE SEOK WON LEE TAE JIN		
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摘要(译)

支撑单元包括第一支撑框架，第二支撑框架和杂质屏障。第一支撑框架支撑LCD面板，并包括开口，通过该开口将光提供给LCD面板。第二支撑框架从第一支撑框架的侧面突出以围绕LCD面板的侧面。杂质屏障设置在第一支撑框架的与液晶显示面板对应的表面上，以防止杂质流入第一支撑框架和液晶显示面板之间的空间。因此，LCD面板的支撑单元包括杂质屏障，以防止外部提供的杂质流入支撑单元和LCD面板之间的空间，从而提高图像显示质量。