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(54) **LIQUID CRYSTAL DISPLAY AND SUPPORTING DEVICE THEREOF**

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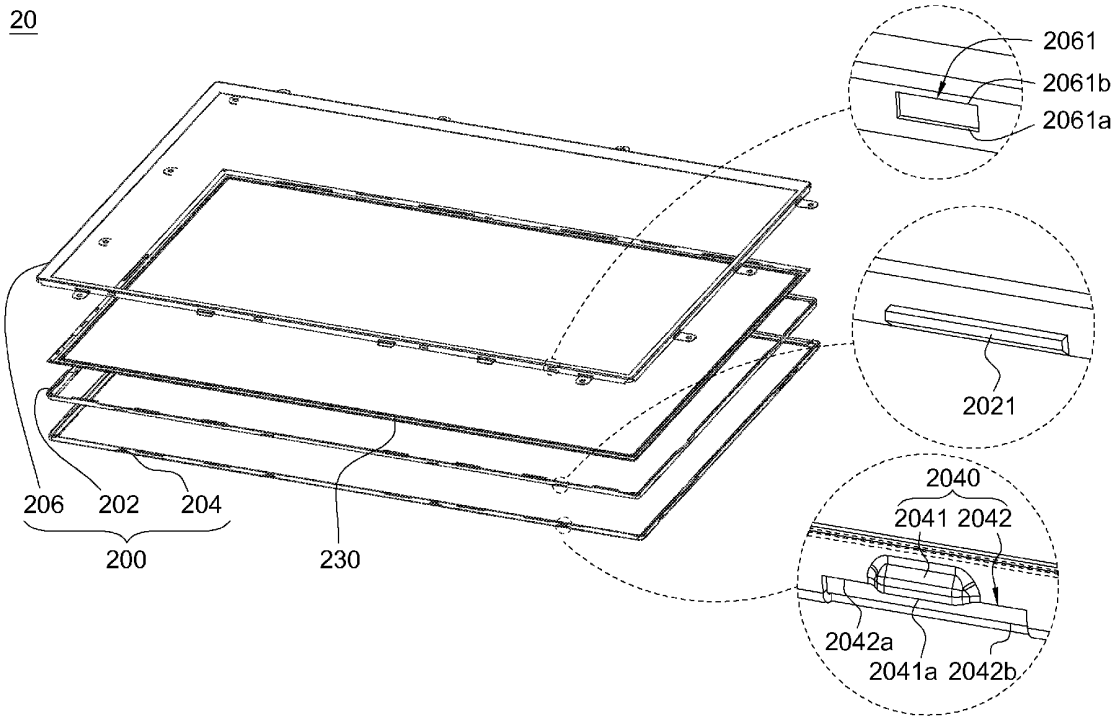
(57) **ABSTRACT**

A supporting device including a first supporting element, a second supporting element and a third supporting element is provided. The first supporting element includes a first wedging member. The second supporting element being disposed adjacent to the first supporting element includes a second wedging member. The third supporting element includes a first opening corresponding to the first wedging member or the second wedging member. The second supporting element and the third supporting element are wedged with the first supporting element by the first wedging member.



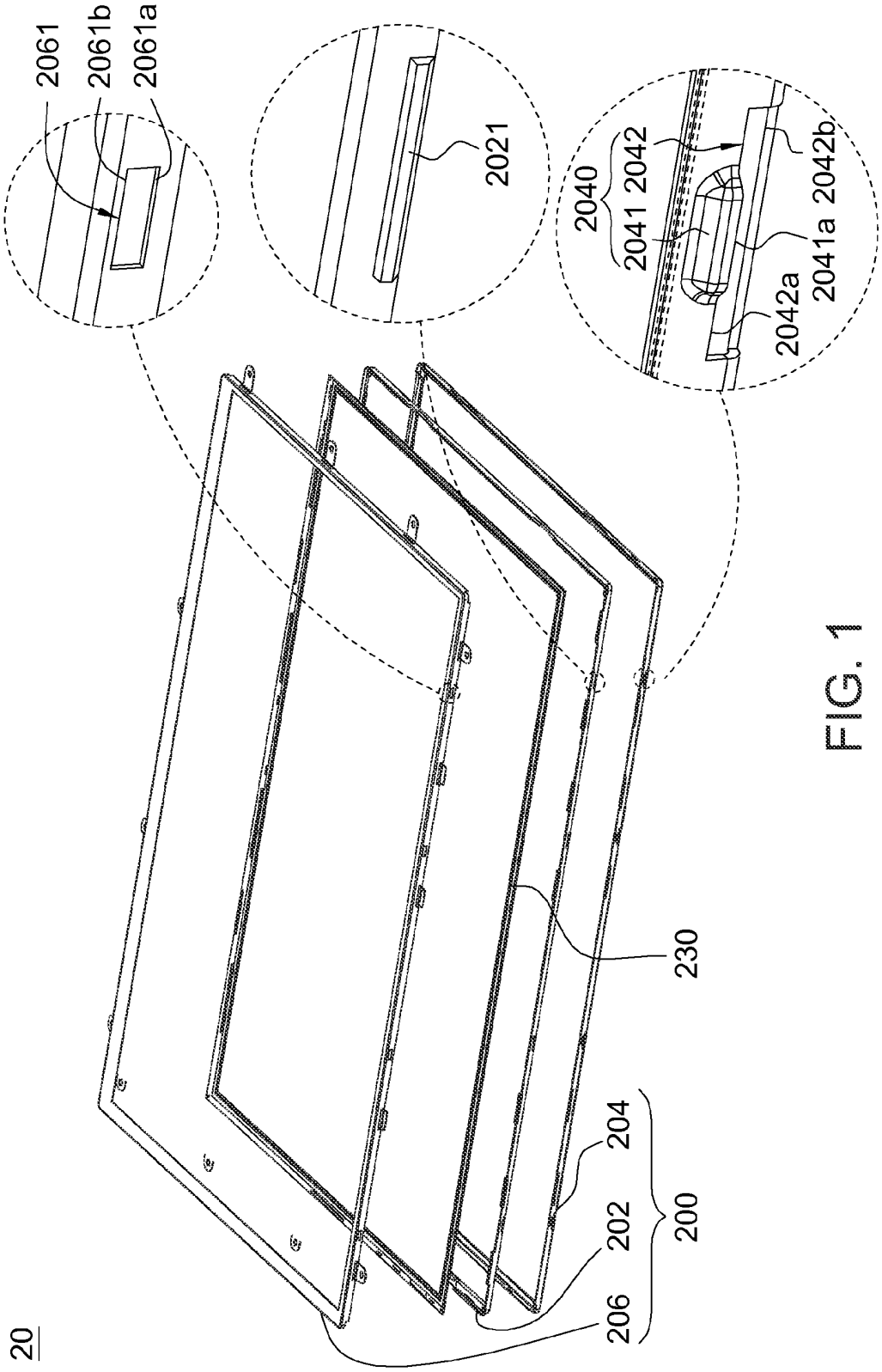

2061
2061b
2061a
2021
2040
2041
2042
2042a
2041a
2042b
230
204
202
206
200
20

FIG. 1

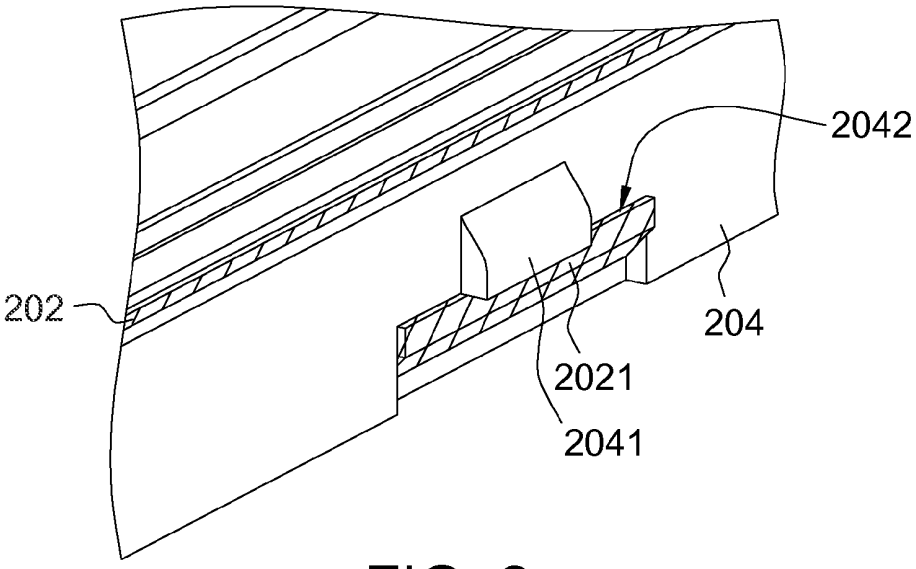


FIG. 2

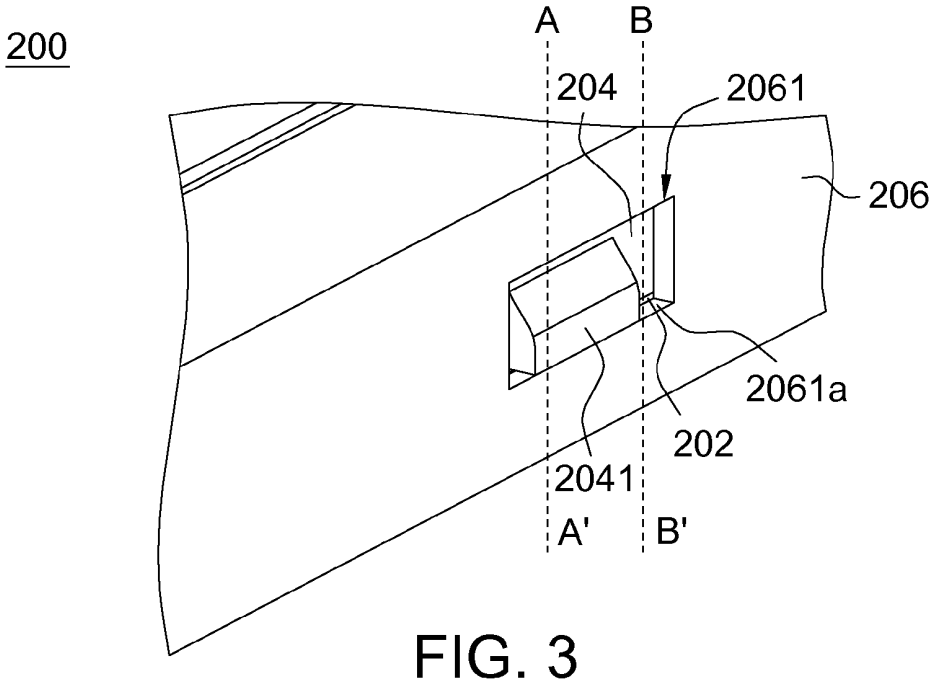


FIG. 3

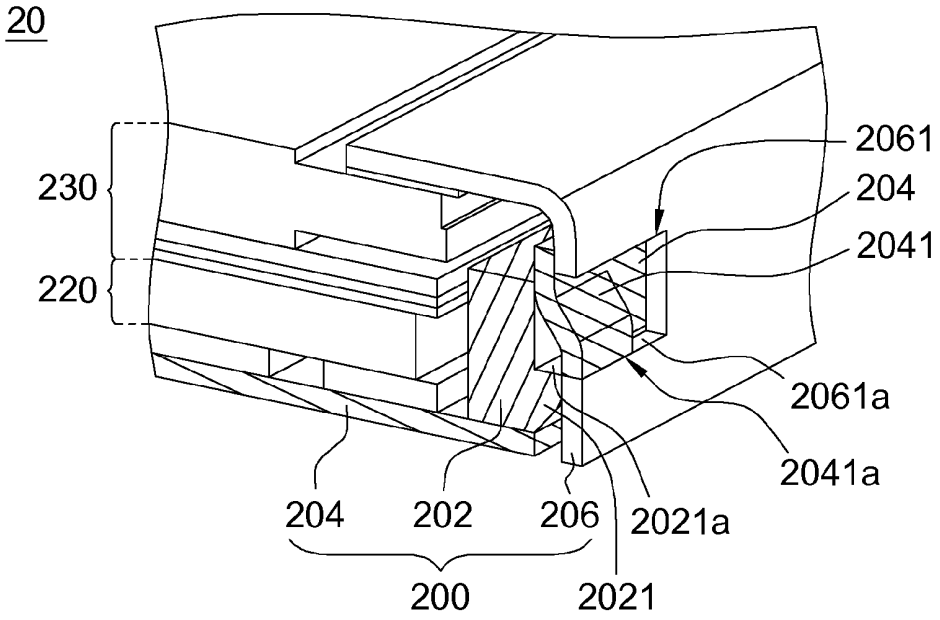

20
230
220
2061
204
2041
2061a
2041a
204
202
206
2021a
200
2021

FIG. 4

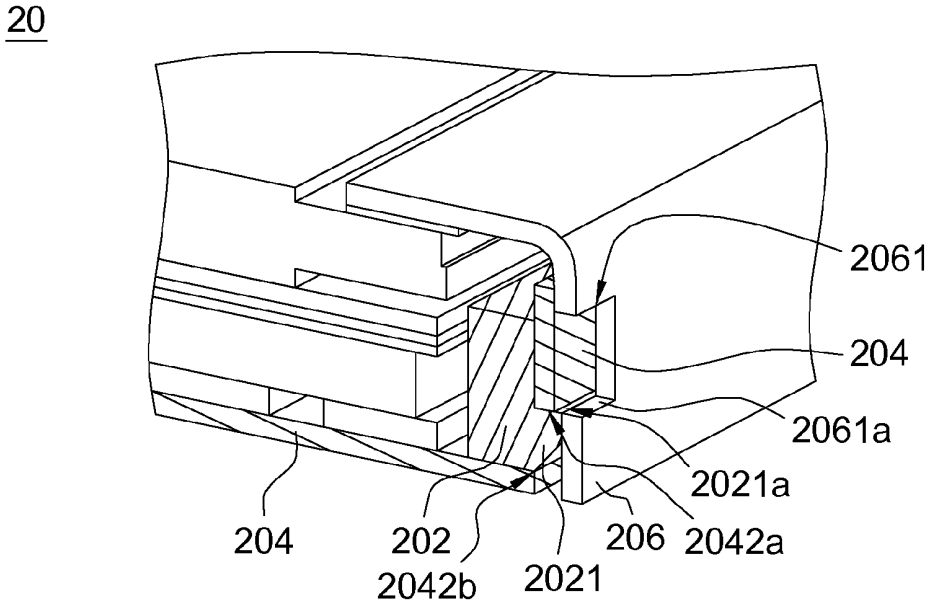

20
2061
204
2061a
2021a
204
202
206
2042a
2042b
2021

FIG. 5

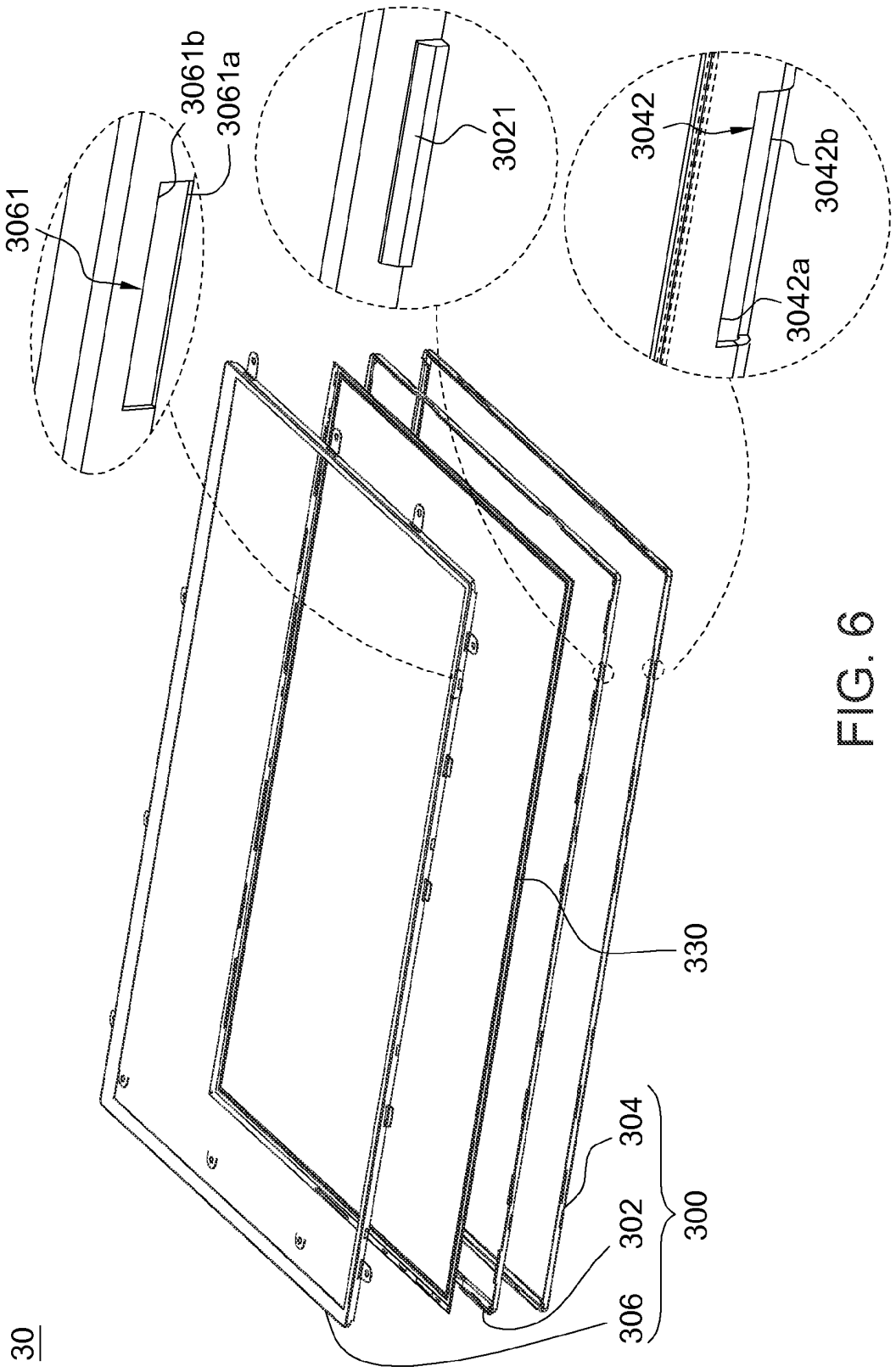


FIG. 6

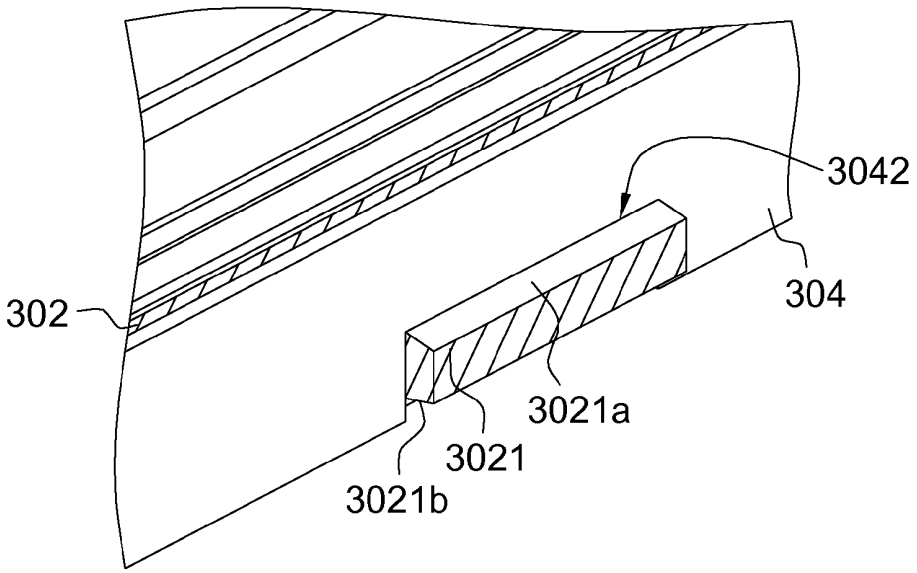


FIG. 7

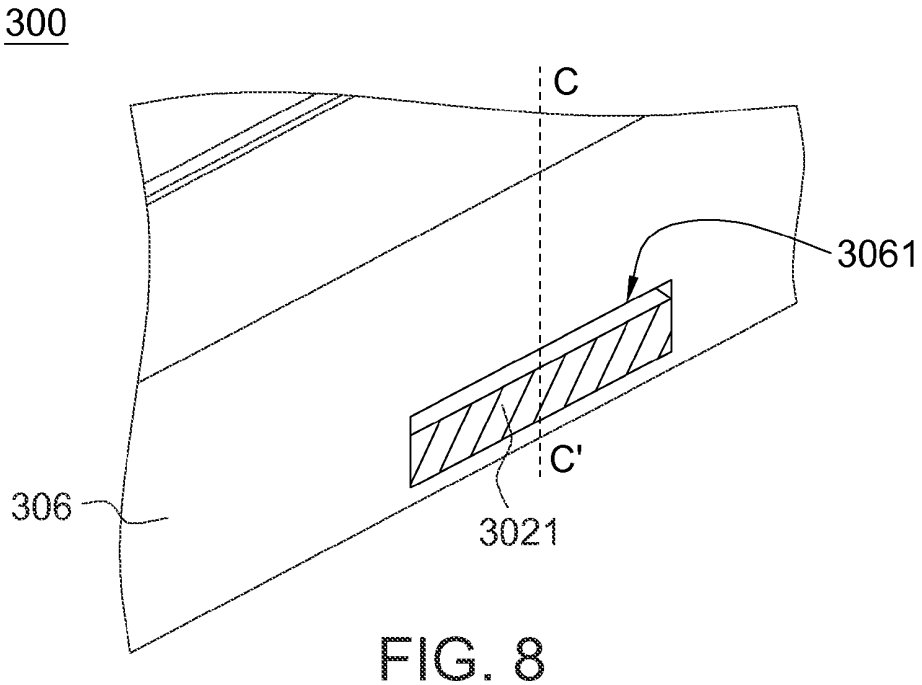


FIG. 8

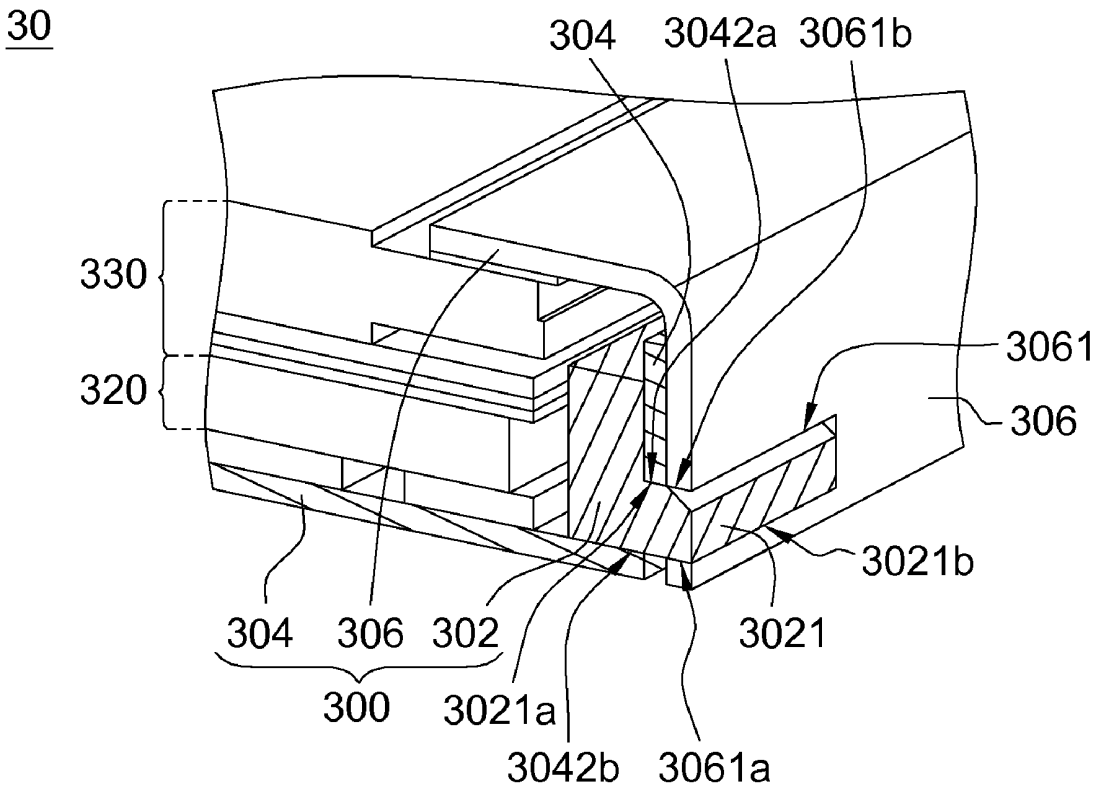

30
304
3042a
3061b
330
320
3061
306
3021b
304
306
302
3021
300
3021a
3042b
3061a

FIG. 9

LIQUID CRYSTAL DISPLAY AND SUPPORTING DEVICE THEREOF

[0001] This application claims the benefit of Taiwan application Serial No. 100120455, filed Jun. 10, 2011, the subject matter of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The invention relates in general to a supporting device of an LCD, and more particularly to a supporting device having superior structural strength and making the LCD thinner and slimmer.

[0004] 2. Description of the Related Art

[0005] Along with the development and advance in consumer electronic products and communication products, liquid crystal display (LCD) has been widely used in liquid crystal TV, notebook computer, desktop computer, smart phone, and so on. As the design of electronic products is directed towards slimness, lightweight and compactness, LCD is also directed towards the same trend, and thinning LCD has become a mainstream product in the market. Therefore, how to provide an even thinner LCD has become a prominent task for the industries.

[0006] The LCD can be thinner through the reduction in the thickness of the components of the LCD. In general, the LCD includes an LCD panel and a backlight module.

[0007] When assembling the glass substrate and the backlight module of an LCD, a bracket is used to support and fix the glass substrate and the backlight module. The structural design of bracket affects the overall thickness of LCD after the assembly is completed. Therefore, how to improve the structural design of the bracket such that the bracket after assembly still has sufficient structural strength and the structure of the bracket is made thinner has become one of the methods for thinning an LCD.

SUMMARY OF THE INVENTION

[0008] The invention is directed to a supporting device of an LCD. The supporting device with sufficient structural strength makes the overall thickness of an assembled LCD reduced and is thus conducive to the thinning of LCD.

[0009] According to a first aspect of the present invention, a supporting device including a first supporting element, a second supporting element and a third supporting element is provided. The first supporting element includes a first wedging member. The second supporting element being disposed adjacent to the first supporting element includes a second wedging member. The third supporting element includes a first opening corresponding to the first wedging member or the second wedging member. The second supporting element and the third supporting element are wedged with the first supporting element by the first wedging member.

[0010] According to a second aspect of the present invention, a liquid crystal display (LCD) module including a backlight module, a liquid crystal panel and a supporting device is provided. The supporting device supports the backlight module and the liquid crystal panel. The supporting device includes a first supporting element, a second supporting element and a third supporting element. The first supporting element includes a first wedging member. The second supporting element being disposed adjacent to the first supporting element includes a second wedging member. The third supporting element includes a first opening corresponding to the first wedging member or the second wedging member. The second supporting element and the third supporting element are wedged with the first supporting element by the first wedging member.

[0011] The above and other aspects of the invention will become better understood with regard to the following detailed description of the preferred but non-limiting embodiment(s). The following description is made with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** shows an explosion diagram of an LCD module according to a first embodiment of the invention;

[0013] FIG. **2** shows a wedging structure of a first supporting element and a second supporting element according to a first embodiment of the invention;

[0014] FIG. **3** shows a wedging structure of a second supporting element and a third supporting element according to a first embodiment of the invention;

[0015] FIG. **4** shows a cross-sectional view along the A-A' direction of a wedging structure according to a first embodiment of the invention;

[0016] FIG. **5** shows a cross-sectional view along the B-B' direction of a wedging structure according to a first embodiment of the invention;

[0017] FIG. **6** shows an explosion diagram of an LCD module according to a second embodiment of the invention;

[0018] FIG. **7** shows a wedging structure of a first supporting element and a second supporting element according to a second embodiment of the invention;

[0019] FIG. **8** shows a wedging structure of a second supporting element and a third supporting element according to a second embodiment of the invention; and

[0020] FIG. **9** shows a cross-sectional view along the C-C' direction of a wedging structure according to a second embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] During the assembly of a liquid crystal display (LCD) module, more than one bracket is used for supporting and fixing a substrate and a backlight module. In order to fix the supporting brackets together, the fixing portion of the bracket is designed as a lump or a hole, such that the lump and the hole can be wedged with each other. For three brackets to be wedged together, the middle bracket needs to have two holes, and each of the two outer brackets has a lump for wedging with one of the two holes of the middle bracket respectively. Since the lumps of the two outer brackets are fixed in the two holes of the middle bracket, the force applied on the middle bracket is large. Normally, the supporting device used for supporting the LCD module is thicker and more complicated in order to provide the assembled supporting device with sufficient structural strength to bear the force applied on the supporting device. Consequently, the assembled LCD module is also thicker and more complicated. To resolve the aforementioned problem, the invention provides a supporting device having at least three supporting elements. For the three supporting elements to be wedged together, the middle bracket can be wedged with two outer supporting elements with only one wedging member.

[0022] Referring to FIG. **1**, an explosion diagram of an LCD module **20** according to a first embodiment of the invention is shown. As indicated in FIG. **1**, the LCD module **20** has a supporting device **200** and a liquid crystal panel **230**. The supporting device **200** includes a supporting element **202**, a supporting element **204** and a supporting element **206**. The supporting element **202** has a lump **2021**. The supporting element **204** has a wedging member **2040** including a protrusion **2041** and an opening **2042**, wherein the protrusion **2041** and the opening **2042** can be integrally formed in one piece. The protrusion **2041** has a lateral surface **2041***a*. The opening **2042** has a sidewall **2042***a* and a sidewall **2042***b* opposite to the sidewall **2042***a*. The lateral surface **2041***a* is substantially coplanar with the sidewall **2042***a* of the opening **2042**, and is protruded outwardly for a suitable distance. The supporting element **206** has an opening **2061** having a sidewall **2061***a* and a sidewall **2061***b* opposite to the sidewall **2061***a*.

[0023] Referring to FIG. **2** and FIG. **3**. FIG. **2** shows a wedging structure of a supporting element **202** and a supporting element **204** of the supporting device **200** according to a first embodiment of the invention. As indicated in FIG. **2**, the opening **2042** of the supporting element **204** corresponds to the lump **2021** of the supporting element **202** for wedging with the lump **2021**. Since the supporting element **202** is covered by the supporting element **204**, only the lump **2021** and a portion of the lateral surface of the supporting element **202** are exposed.

[0024] FIG. **3** shows a wedging structure of a supporting element **204** and a supporting element **206** of the supporting device **200** according to a first embodiment of the invention. As indicated in FIG. **3**, the opening **2061** of the supporting element **206** corresponds to the protrusion **2041** of the supporting element **204** for wedging with the protrusion **2041**. Since the supporting elements **202** and **204** are covered by the supporting element **206**, only a portion of the lateral surface of the supporting element **202** as well as the protrusion **2041** and a portion of the lateral surface of the supporting elements **204** are exposed.

[0025] Referring to FIG. **4** and FIG. **5**. FIG. **4** shows a cross-sectional view along the A-A' direction of a wedging structure of the supporting device **200** of FIG. **3**. As indicated in FIG. **4**, the LCD module **20** includes a supporting device **200**, a backlight module **220** and a liquid crystal panel **230**. The opening **2061** of the supporting element **206** has a sidewall **2061***a*. When the protrusion **2041** of the supporting element **204** is wedged with the opening **2061**, the lateral surface **2041***a* of the protrusion **2041** contacts the sidewall **2061***a* of the opening **2061** by a surface, such that the movement of the supporting element **204** along the direction perpendicular to the sidewall **2061***a* is restricted.

[0026] In the present embodiment, the protrusion **2041** being streamline-shaped is protruded from the supporting element **204** without contacting the sidewall **2061***b* (illustrated in FIG. **1**). The protrusion **2041** can also be in the shape of a square, a rectangle, a trapezoid or a plate, and any shape would do as long as such shape allows the lateral surface **2041***a* of the protrusion **2041** to contact the sidewall **2061***a* of the opening **2061** when the protrusion **2041** of the supporting element **204** is wedged with the opening **2061** of the supporting element **206**. In addition, as long as the position of the protrusion **2041** allows the protrusion **2041** corresponding to the opening **2061** and allows the protrusion **2041** be able to be wedged with the opening **2061**, the position of the protrusion **2041** does not necessarily correspond to the center of the opening **2061**.

[0027] FIG. **5** shows a cross-sectional view along the B-B' direction of a wedging structure of the supporting device **200** of FIG. **3**. As indicated in FIG. **5**, when the lump **2021** of the supporting element **202** is wedged with the opening **2042** (illustrated in FIG. **1**) of the supporting element **204**, the lateral surface **2021***a* of the lump **2021** contacts the sidewall **2042***a* of the opening **2042**, such that the movement of the supporting element **202** along the direction perpendicular to the sidewall **2042***a* is restricted.

[0028] In the present embodiment, the lump **2021** being trapezoid-shaped is protruded from the supporting element **202**. The lump **2021** can also be in the shape of a square, a rectangle, a streamline or a plate, and any shape would do as long as such shape allows the lateral surface **2021***a* of the lump **2021** to contact the sidewall **2042***a* of the opening **2042** when the lump **2021** of the supporting element **202** is wedged with the opening **2042** of the supporting element **204**.

[0029] In the present embodiment, the supporting elements **202**, **204** and **206** can be formed by a plastic material or a metal material, and no specific restriction is applied. The plastic material is such as polycarbonate (PC), and the metal material is such as aluminum, galvanized steel plate or stainless steel.

[0030] Referring to FIG. **6**, an explosion diagram of an LCD module **300** according to a second embodiment of the invention is shown. As indicated in FIG. **6**, LCD module **30** has a supporting device **300** and a liquid crystal panel **330**. The supporting device **300** includes a supporting element **302**, a supporting element **304** and a supporting element **306**. The supporting element **302** has a lump **3021**. The supporting element **304** has an opening **3042** having a sidewall **3042***a* and a sidewall **3042***b* opposite to the sidewall **3042***a*. The supporting element **306** has an opening **3061** having a sidewall **3061***a* and a sidewall **3061***b* opposite to the sidewall **3061***a*.

[0031] Referring to FIG. **7**, a wedging structure of a supporting element **302** and a supporting element **304** according to a second embodiment of the invention is shown. As indicated in FIG. **7**, the wedging arrangements of the supporting elements **302** and **304** are similar to that of the supporting elements **202** and **204** of the first embodiment, and the similarities are not repeated here. In the present embodiment, after the lump **3021** of the supporting element **302** is wedged with the opening **3042** of the supporting element **304**, the lump **3021** is still protruded from the outer lateral surface of the supporting element **304**. Also, the surface of the supporting element **304** does not need to have any lumps or protrusions disposed thereon. As indicated in FIG. **7**, since the supporting element **302** is covered by the supporting element **304**, only the lump **3021** and a portion of the lateral surface of the supporting element **302** are exposed.

[0032] Referring to FIG. **8**, a wedging structure of a supporting element **302**, a supporting element **304** and a supporting element **306** according to a second embodiment of the invention is shown. Since the supporting element **302** and the supporting element **304** are covered by the supporting element **306**, only the lump **3021** of the supporting element **302** is exposed.

[0033] Referring to FIG. **9**, a cross-sectional view along the C-C' direction of the wedging structure of FIG. **8** is shown. As indicated in FIG. **9**, the lump **3021** of the supporting element

302 is wedged with the opening **3042** (illustrated in FIG. **6**) of the supporting element **304**. The opening **3061** of the supporting element **306** is disposed adjacent to the opening **3042** and corresponds to the lump **3021** for wedging with the lump **3021**. The opening **3042** has a sidewall **3042***a*. The opening **3061** has a sidewall **3061***a*. The lump **3021** has a lateral surface **3021***a* and a lateral surface **3021***b* opposite to the lateral surface **3021***a*. The lateral surface **3021***a* contacts the sidewall **3042***a*, and the lateral surface **3021***b* contacts the sidewall **3061***a* by a surface substantially coplanar with the sidewall **3042***b*, such that the movement of the supporting element **302** along the direction perpendicular to the sidewall **3042***a*, and the movement of the supporting element **304** along the direction perpendicular to the sidewall **3042***a* or the sidewall **3061***a* are both restricted.

[0034] As indicated in FIG. **9**, the lateral surface **3021***a* of the lump **3021** is inclined downwardly at the position corresponding to the sidewall **3061***b* of the opening **3061**. That is, the lateral surface **3021***a* does not need to contact the sidewall **3061***b*. In the present embodiment, the lump **3021** being polygonal-shaped is protruded from the supporting element **302**. The lump **3021** can also be in the shape of a square, a rectangle, a streamline or a plate, as long as such shape allows the lateral surface **3021***a* to contact the sidewall **3042***a* of the opening **3042** when the lump **3021** of the supporting element **302** is wedged with the opening **3042** of the supporting element **304**, and allows the lateral surface **3021***b* to contact the sidewall **3061***a* of the opening **3061** when the lump **3021** of the supporting element **302** is wedged with the opening **3061** of the supporting element **306**, wherein the lump **3021** has a lateral surface **3021***a* and a lateral surface **3021***b* opposite to the lateral surface **3021***a*.

[0035] In the present embodiment, the supporting elements **302**, **304** and **306** can be formed by a plastic material or a metal material, and no specific restriction is applied. The plastic material is such as polycarbonate (PC), and the metal material is such as aluminum, galvanized steel plate or stainless steel.

[0036] According to the supporting device disclosed in above embodiments of the invention, since the wedging part of each supporting element requires only one hole, superior structural strength is thus achieved. Moreover, the mold complexity is reduced with the reduction in the number of holes of the supporting element. Also, due to the special design in the relative position between the hole and its corresponding lump or protrusion, the supporting device of the invention has superior structural strength and the overall thickness of the liquid crystal panel is reduced.

[0037] While the invention has been described by way of example and in terms of the preferred embodiment(s), it is to be understood that the invention is not limited thereto. On the contrary, it is intended to cover various modifications and similar arrangements and procedures, and the scope of the appended claims therefore should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements and procedures.

What is claimed is:

1. A supporting device, comprising:

a first supporting element comprising a first wedging member;

a second supporting element disposed adjacent to the first supporting element, wherein the second supporting element comprises a second wedging member; and

a third supporting element comprising a first opening corresponding to the first wedging member or the second wedging member, wherein the second supporting element and the third supporting element are wedged with the first supporting element by the first wedging member.

2. The supporting device according to claim **1**, wherein the first wedging member comprises a second opening which corresponds to the second wedging member for being wedged with the second wedging member.

3. The supporting device according to claim **2**, wherein the second wedging member is a lump having a first lateral surface, the second opening has a first sidewall contacting the first lateral surface for restricting the second supporting element to move in a direction perpendicular to the first sidewall.

4. The supporting device according to claim **3**, wherein the first wedging member further comprises a protrusion, the protrusion has a second lateral surface, and the first opening of the third supporting element has a second sidewall contacting the second lateral surface for restricting the first supporting element to move in a direction perpendicular to the second sidewall.

5. The supporting device according to claim **1**, wherein the first wedging member is a lump, the second wedging member comprises a second opening which corresponds to the lump for being wedged with the lump, and the first opening of the third supporting element corresponds to the lump for being wedged with the lump.

6. The supporting device according to claim **5**, wherein the lump has a first lateral surface and a third lateral surface opposite to the first lateral surface, the second opening of the second supporting element has a first sidewall, the first opening of the third supporting element has a second sidewall, the first sidewall of the second opening and the second sidewall of the first opening respectively contact a portion of the first lateral surface and a portion of the third lateral surface of the lump for restricting the second supporting element to move in a direction perpendicular to the second sidewall and restricting the first supporting element to move in a direction perpendicular to the first sidewall.

7. A liquid crystal display (LCD) module, comprising:

a backlight module;

a liquid crystal panel;

a supporting device for supporting the backlight module and the liquid crystal panel, wherein the supporting device comprises:

a first supporting element comprising a first wedging member;

a second supporting element disposed adjacent to the first supporting element, wherein the second supporting element comprises a second wedging member;

a third supporting element comprising a first opening corresponding to the first wedging member or the second wedging member, wherein the second supporting element and the third supporting element are wedged with the first supporting element by the first wedging member.

8. The LCD module according to claim **7**, wherein the first wedging member comprises a second opening, the second opening corresponds to the second wedging member for being wedged with the second wedging member.

9. The LCD module according to claim **8**, wherein the second wedging member is a lump having a first lateral surface, the second opening has a first sidewall contacting the

first lateral surface for restricting the second supporting element to move in a direction perpendicular to the first sidewall.

10. The LCD module according to claim **9**, wherein the first wedging member further comprises a protrusion, the protrusion has a second lateral surface, the first opening of the third supporting element has a second sidewall contacting the second lateral surface for restricting the first supporting element to move in a direction perpendicular to the second sidewall.

11. The LCD module according to claim **7**, wherein the first wedging member is a lump, the second wedging member comprises a second opening, the second opening corresponds to the lump for being wedged with the lump, and the first opening of the third supporting element corresponds to the lump for being wedged with the lump.

12. The LCD module according to claim **11**, wherein the lump has a first lateral surface and a third lateral surface opposite to the first lateral surface, the second opening of the second supporting element has a first sidewall, the first opening of the third supporting element has a second sidewall, the first sidewall of the second opening and the second sidewall of the first opening respectively contact a portion of the first lateral surface and a portion of the third lateral surface of the lump for restricting the second supporting element to move in a direction perpendicular to the second sidewall and restricting the first supporting element to move in a direction perpendicular to the first sidewall.

* * * * *

专利名称(译)	液晶显示器及其支撑装置		
公开(公告)号	US20120314155A1	公开(公告)日	2012-12-13
申请号	US13/469726	申请日	2012-05-11
[标]申请(专利权)人(译)	群创光电股份有限公司 群康科技(深圳)有限公司		
申请(专利权)人(译)	奇美群创光电 INNOCOM科技（深圳）有限公司.		
当前申请(专利权)人(译)	群创光电 INNOCOM科技（深圳）有限公司.		
[标]发明人	LO CHING I		
发明人	LO, CHING-I		
IPC分类号	G02F1/1333 H05K7/18		
CPC分类号	G06F1/1637 G02F1/133308 G02F2201/465 G02F2001/133317 G02F2001/13332 G02F2001/133314		
优先权	100120455 2011-06-10 TW		
其他公开文献	US8736783		
外部链接	Espacenet USPTO		

摘要(译)

提供一种支撑装置，包括第一支撑元件，第二支撑元件和第三支撑元件。第一支撑元件包括第一楔合构件。邻近第一支撑元件设置的第二支撑元件包括第二楔形构件。第三支撑元件包括对应于第一楔合构件或第二楔合构件的第一开口。第二支撑元件和第三支撑元件通过第一楔合构件与第一支撑元件楔入。