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(57) **ABSTRACT**

Disclosed is a liquid crystal display apparatus in which a liquid crystal display module and cases are tightly combined. At least one protuberance formed on a top chassis of the liquid crystal display module combines at least one fixing portion formed on a portion of a rear case corresponding to the at least one protuberance. Also, a fixing protuberance formed on a portion of a front case is inserted into between the liquid crystal display module and the rear case, thereby preventing the liquid crystal display module from being moved. Therefore, the liquid crystal display module and the cases are tightly combined, and productivity of the liquid crystal display apparatus can increase by reducing the number of parts demanded for fabrication of the liquid crystal display module and the cases.

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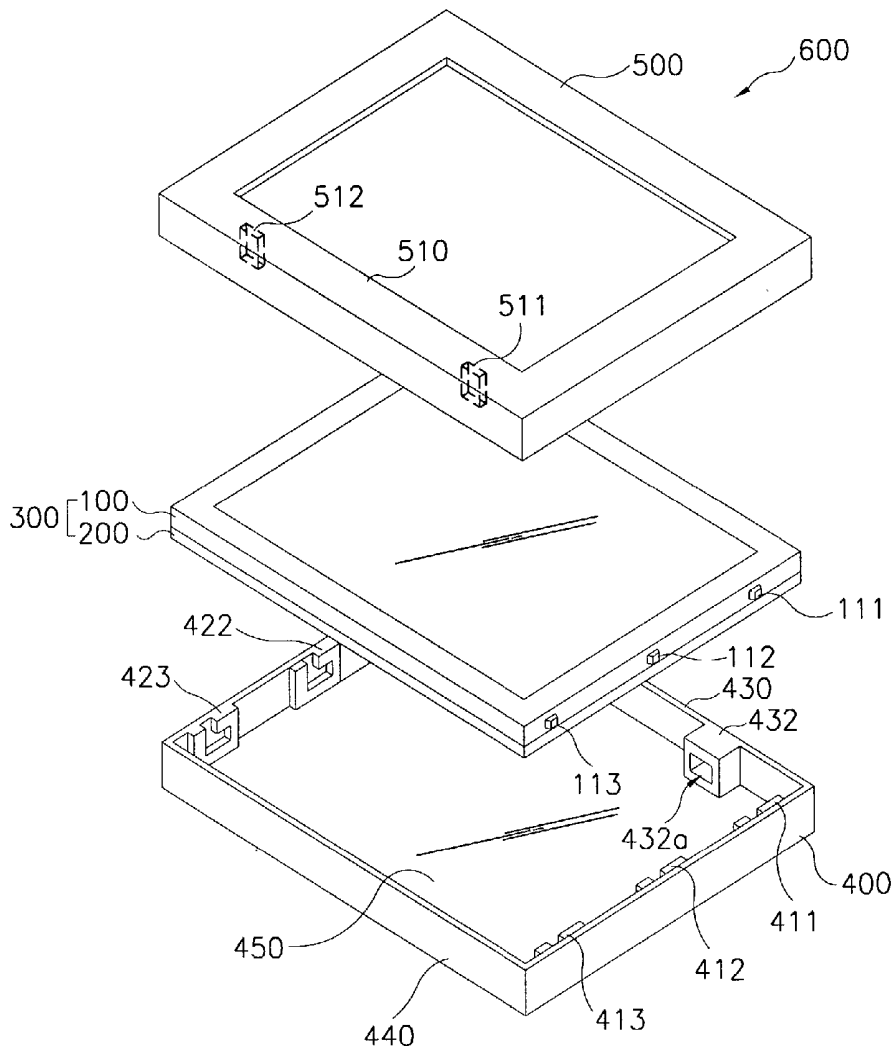


FIG. 1
(PRIOR ART)

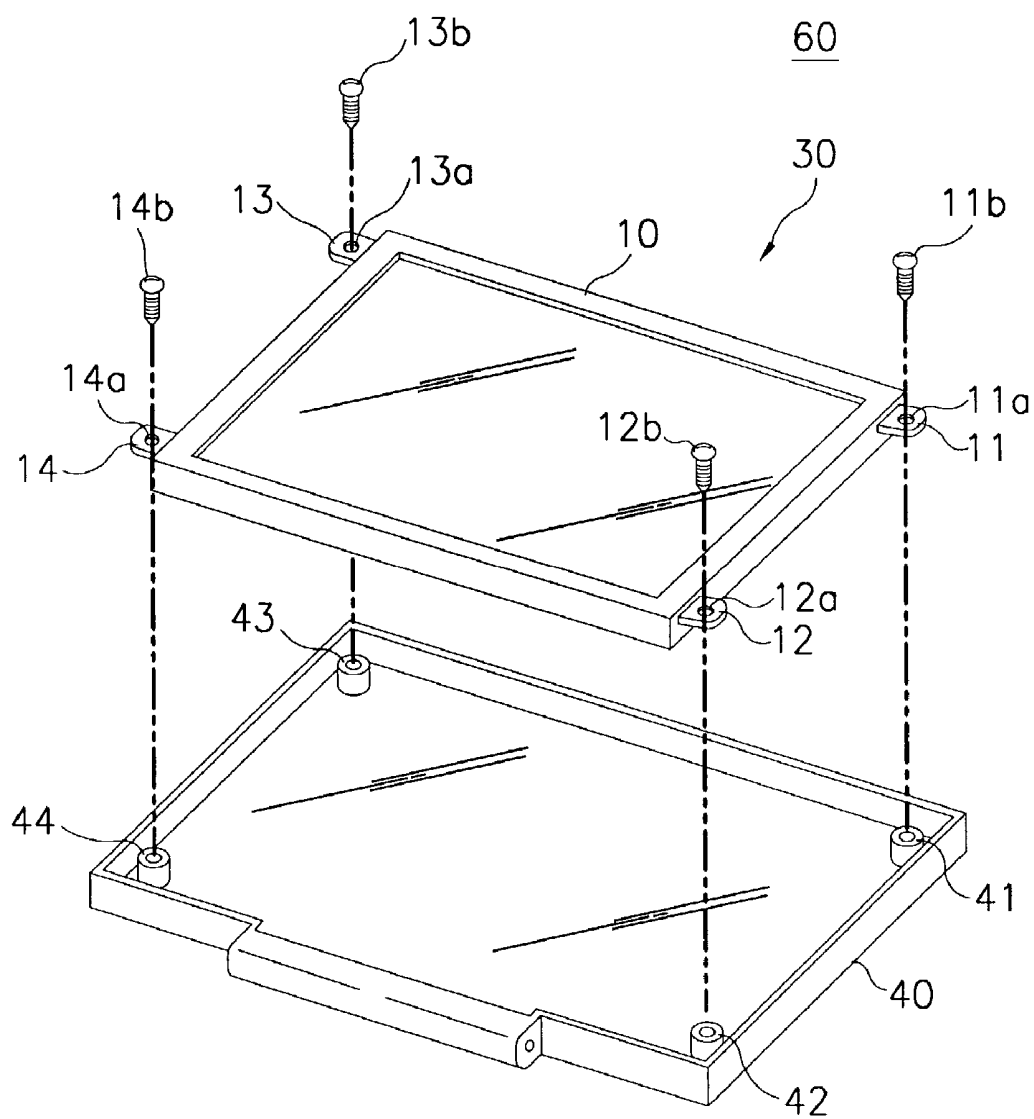


FIG. 2

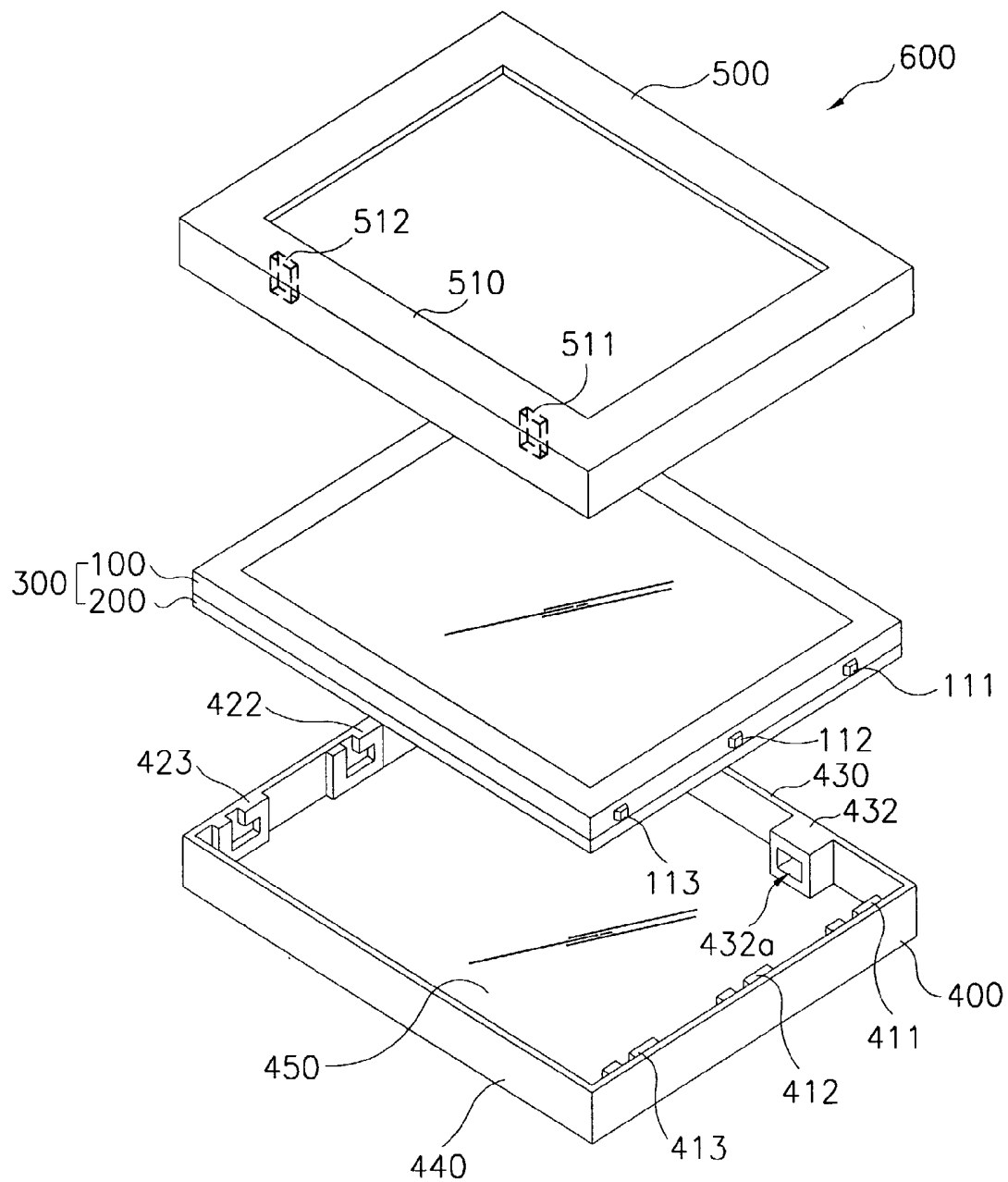


FIG. 3

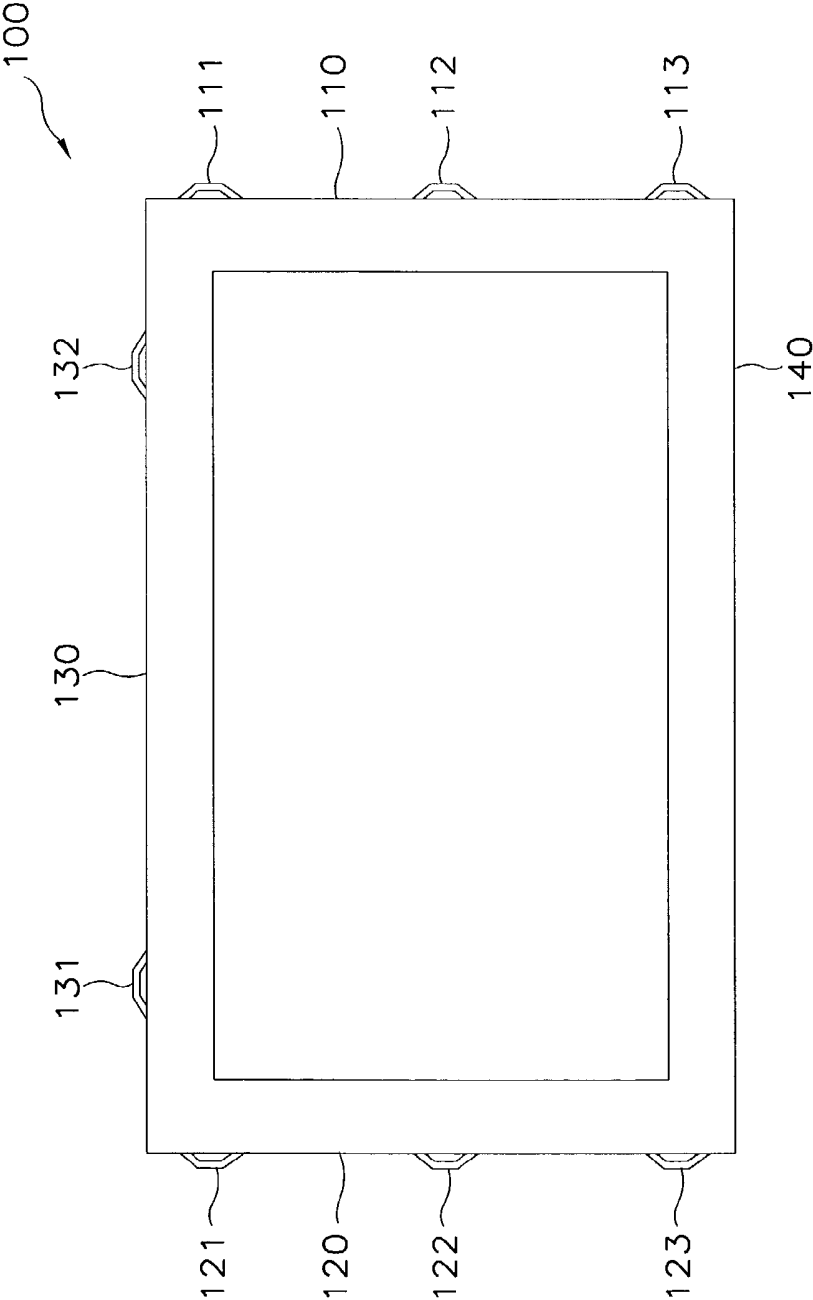


FIG. 4

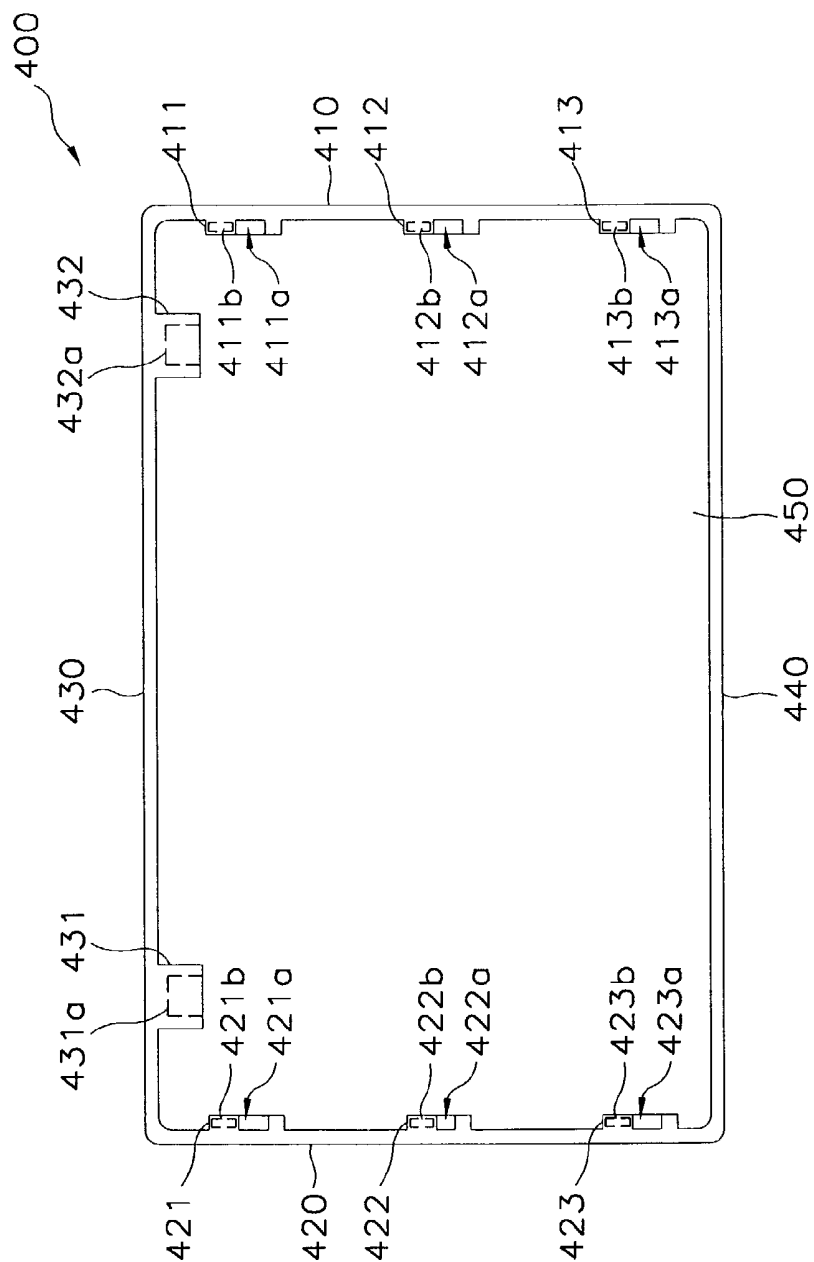


FIG. 5

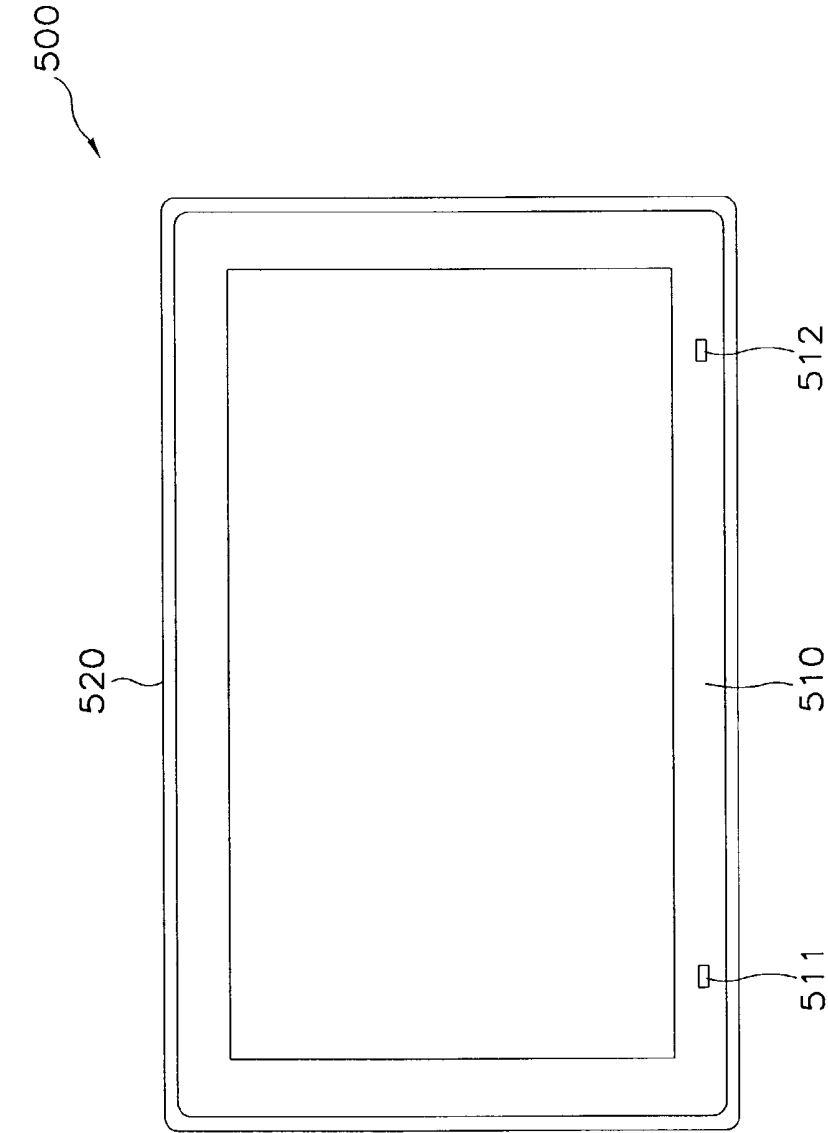


FIG. 6

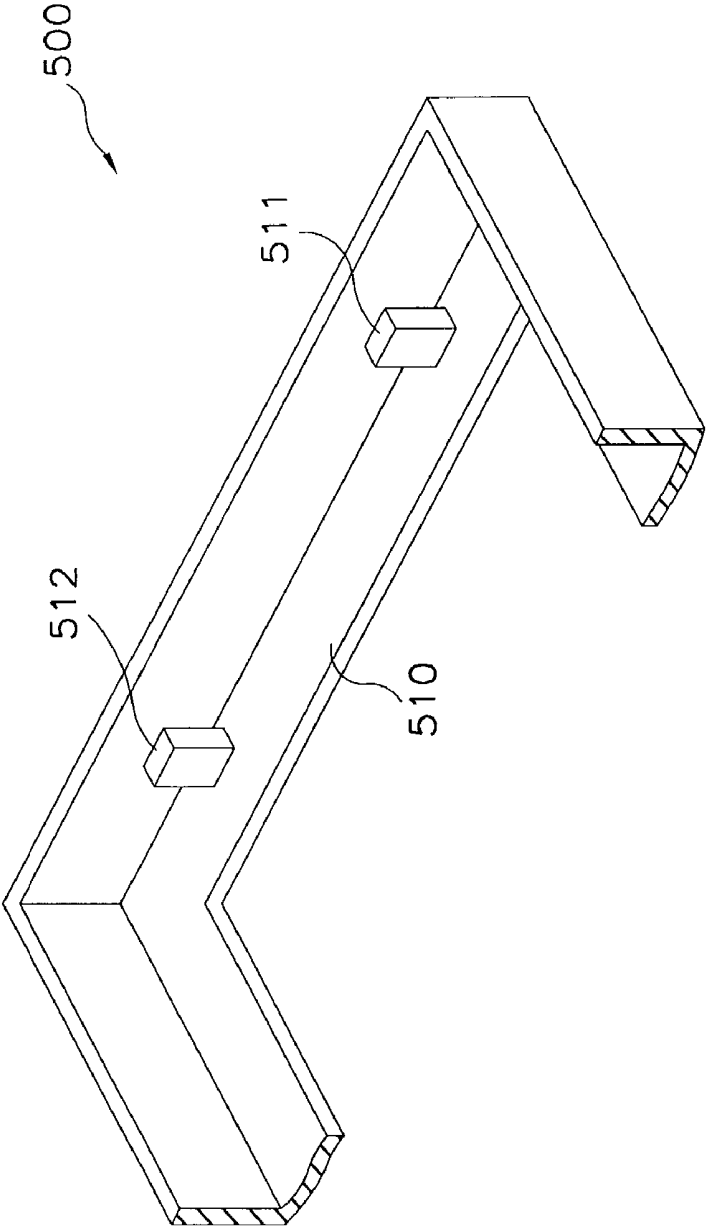


FIG. 7B

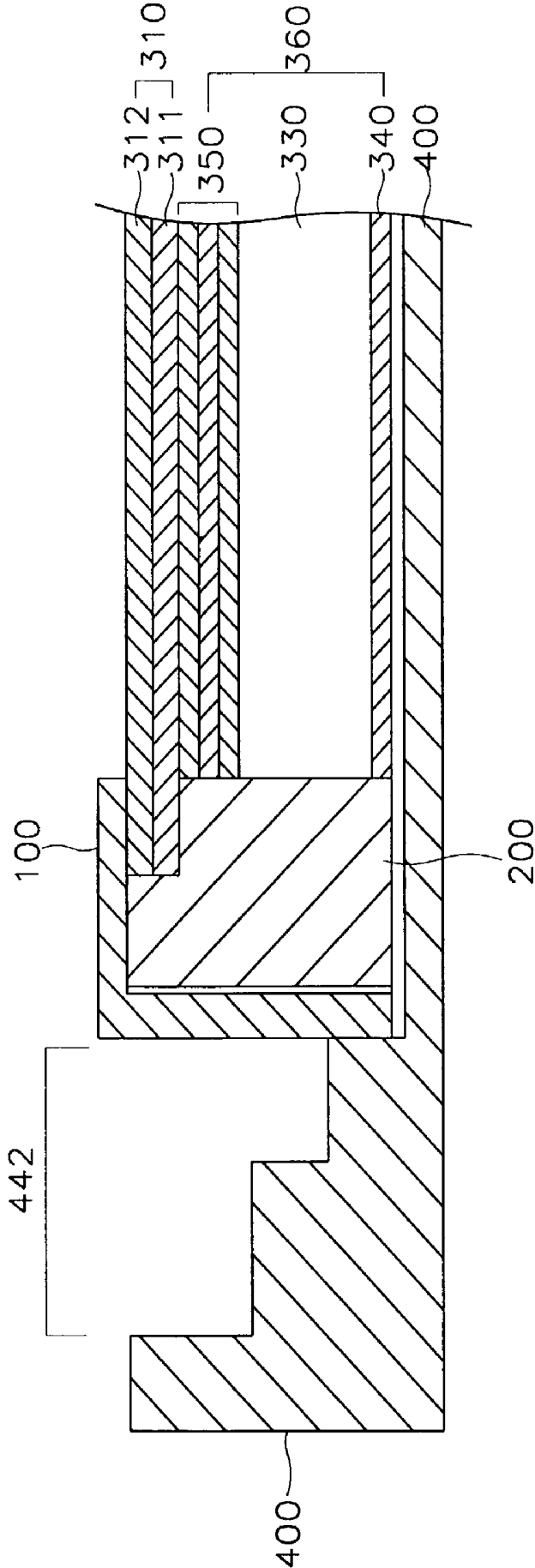


FIG. 8

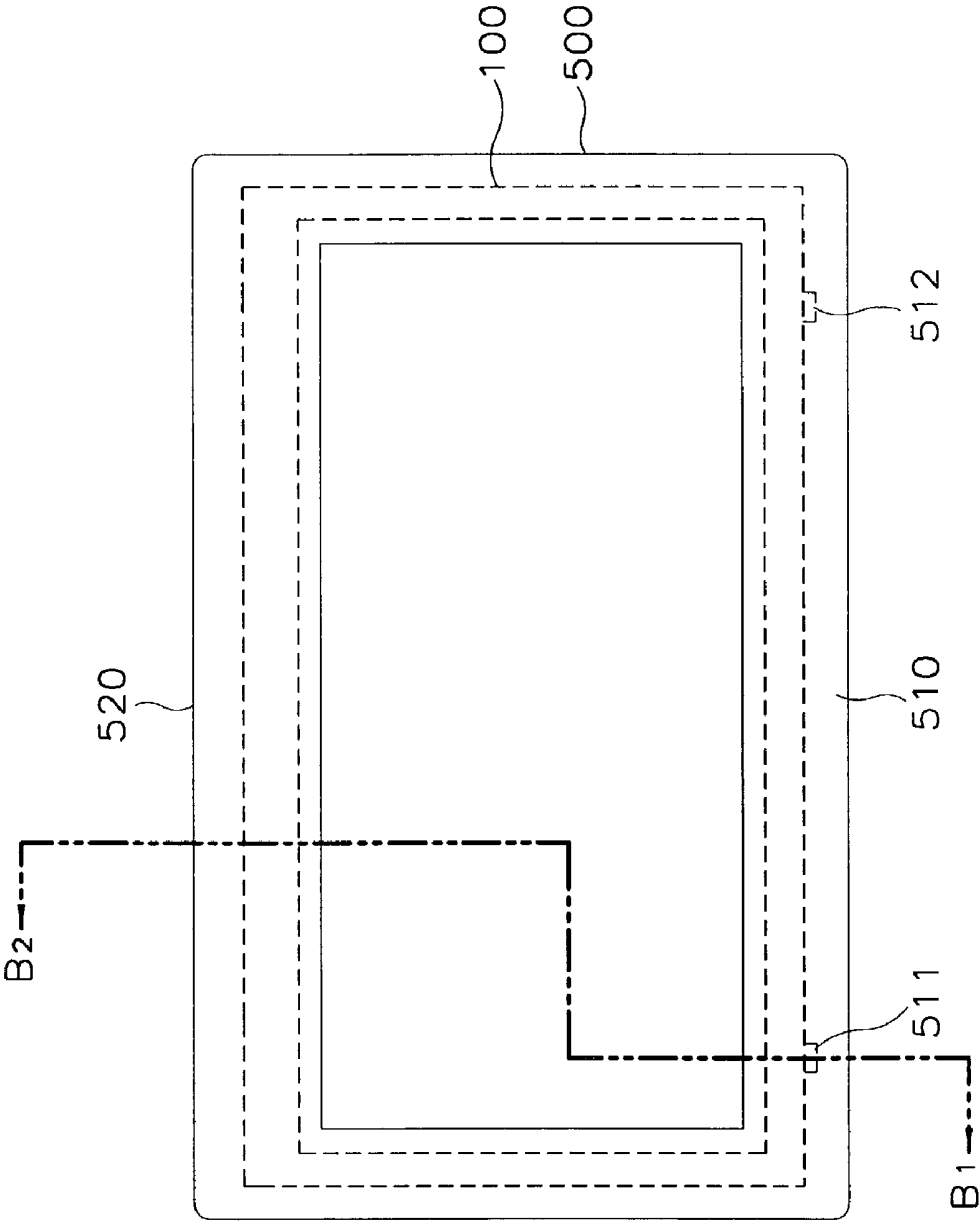


FIG. 9

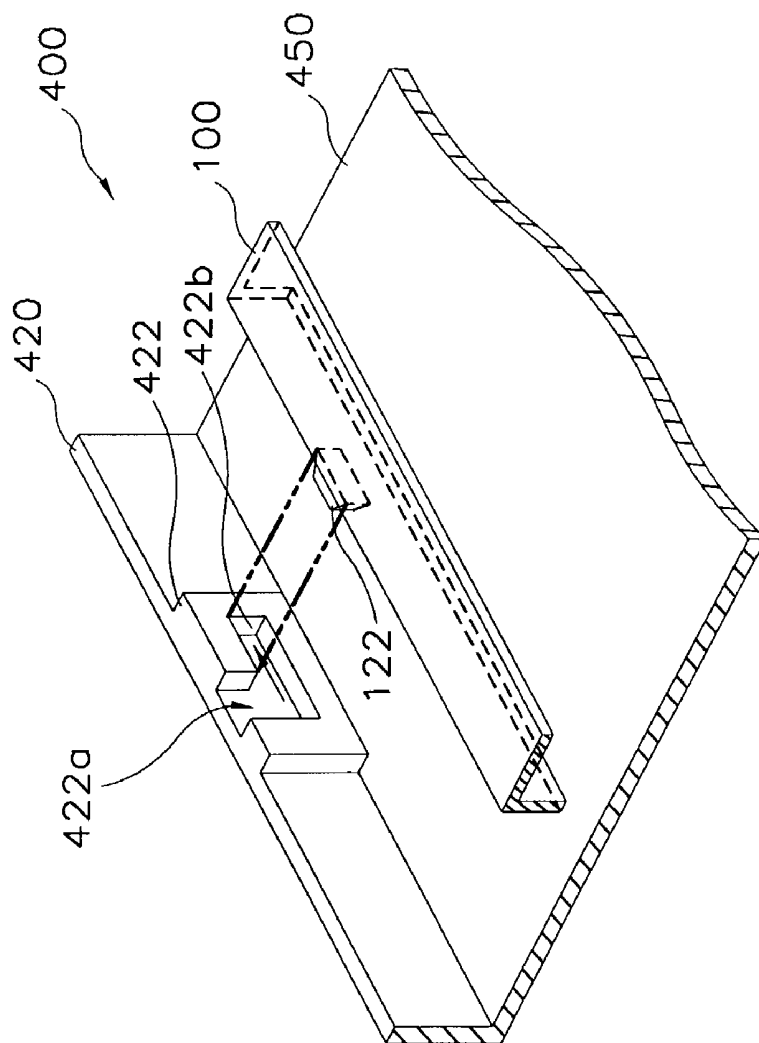


FIG. 10

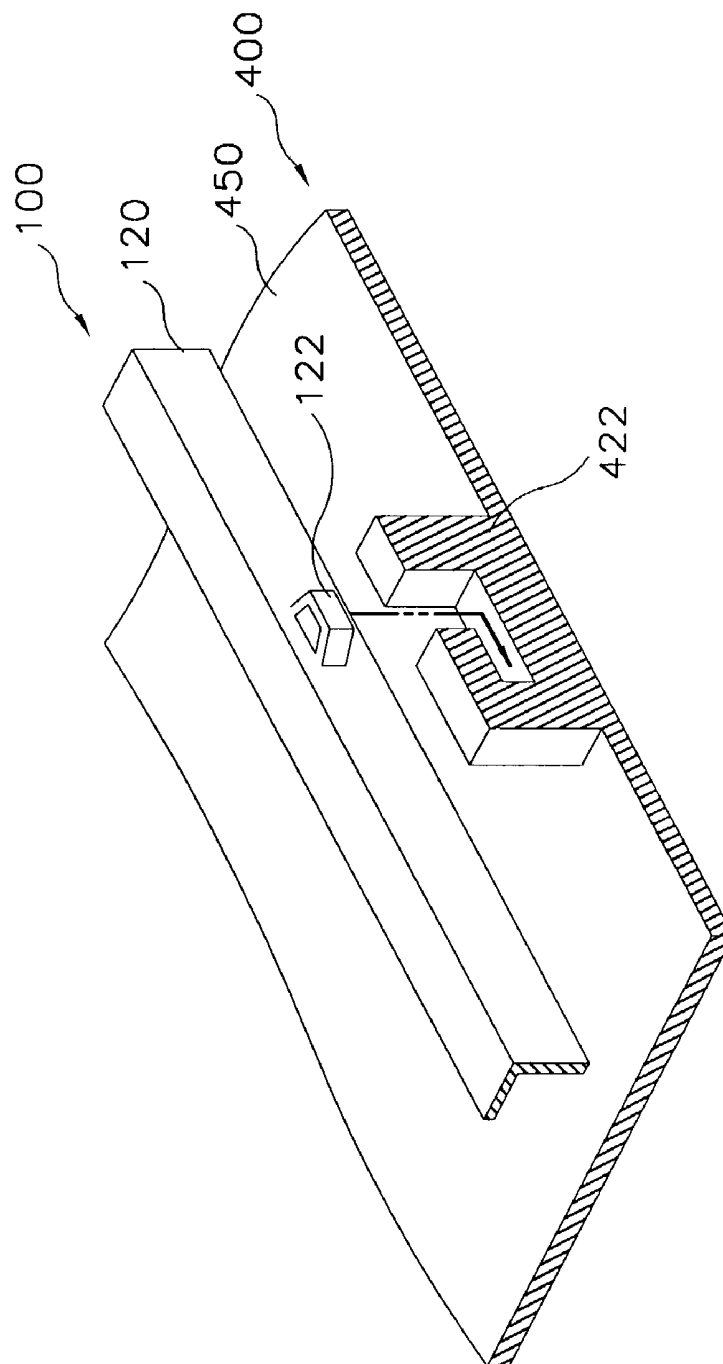


FIG. 11

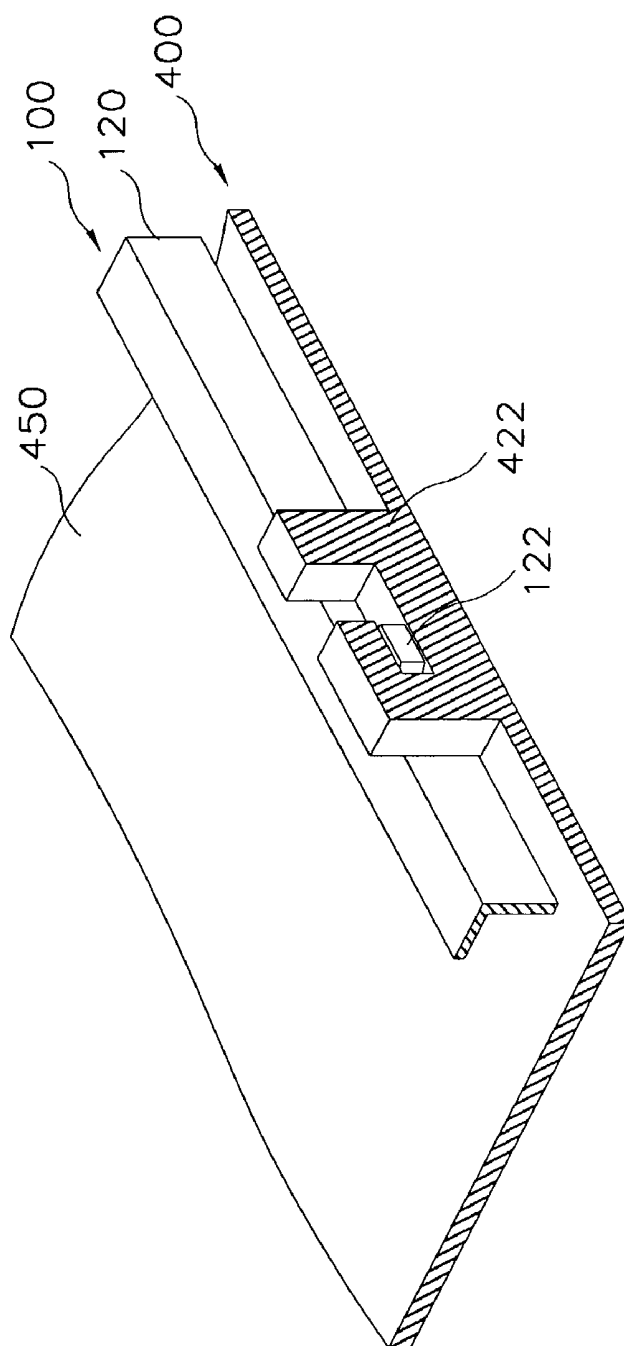


FIG. 12

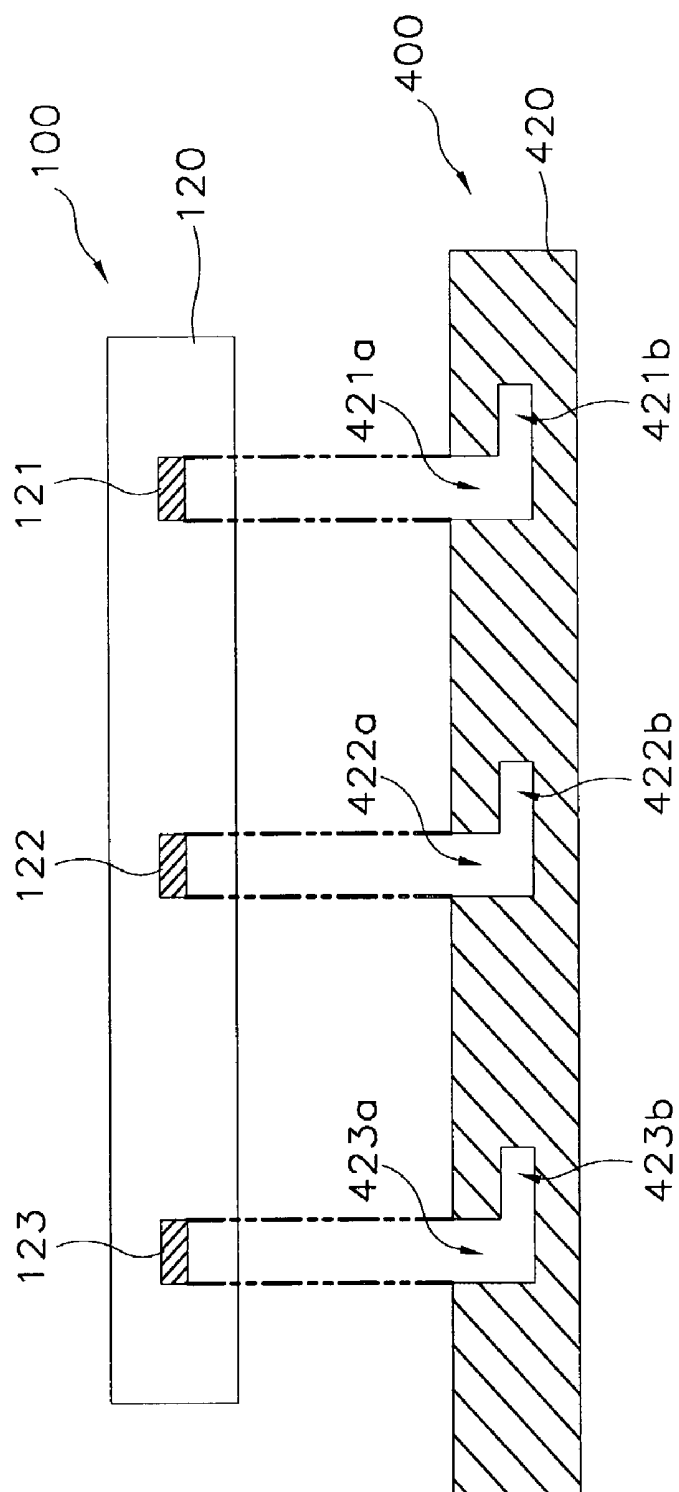


FIG. 13

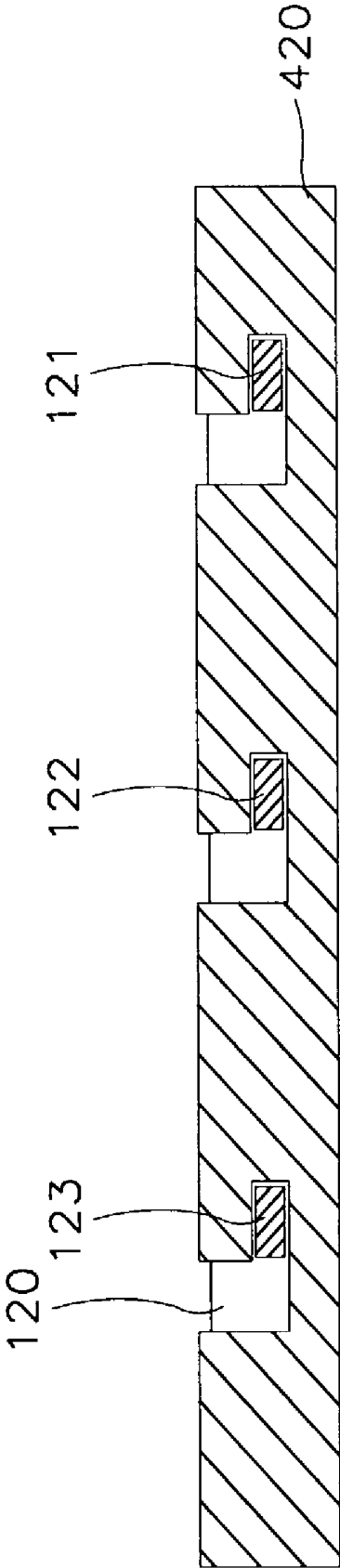


FIG. 14

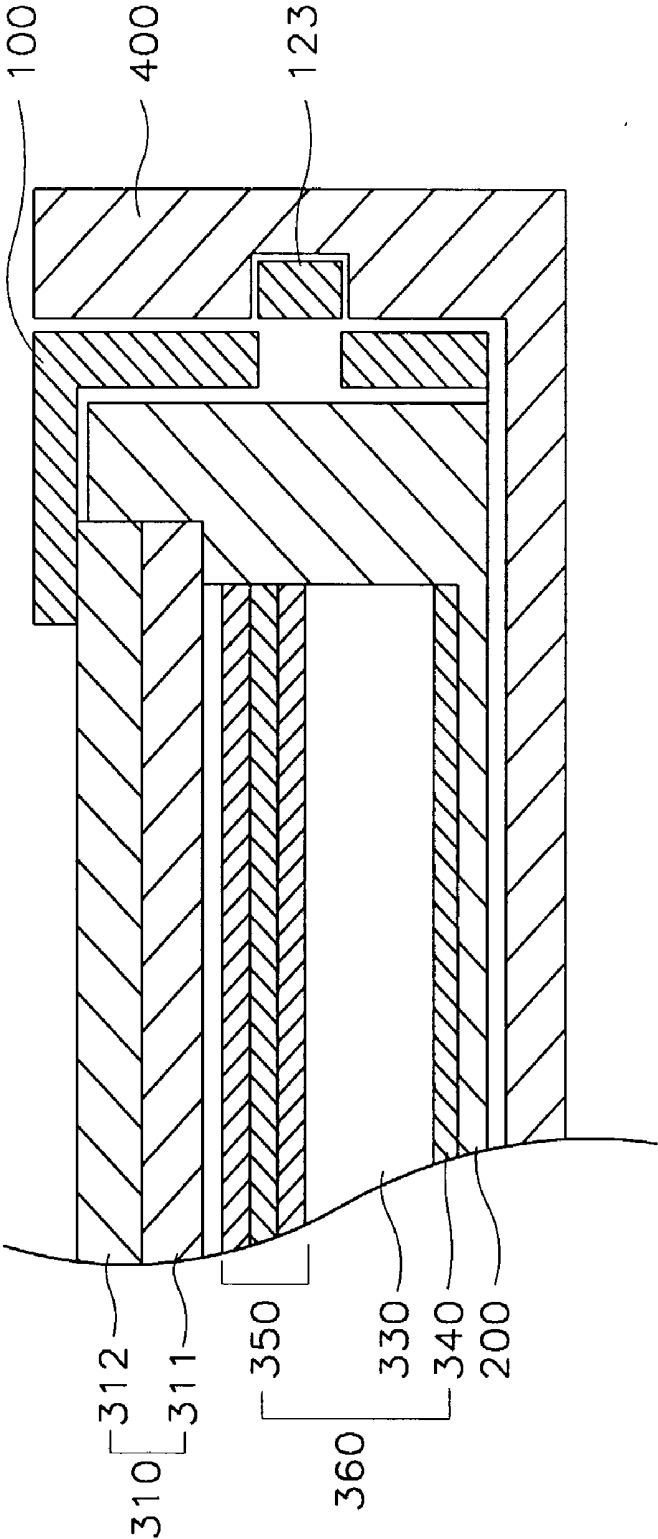


FIG. 15

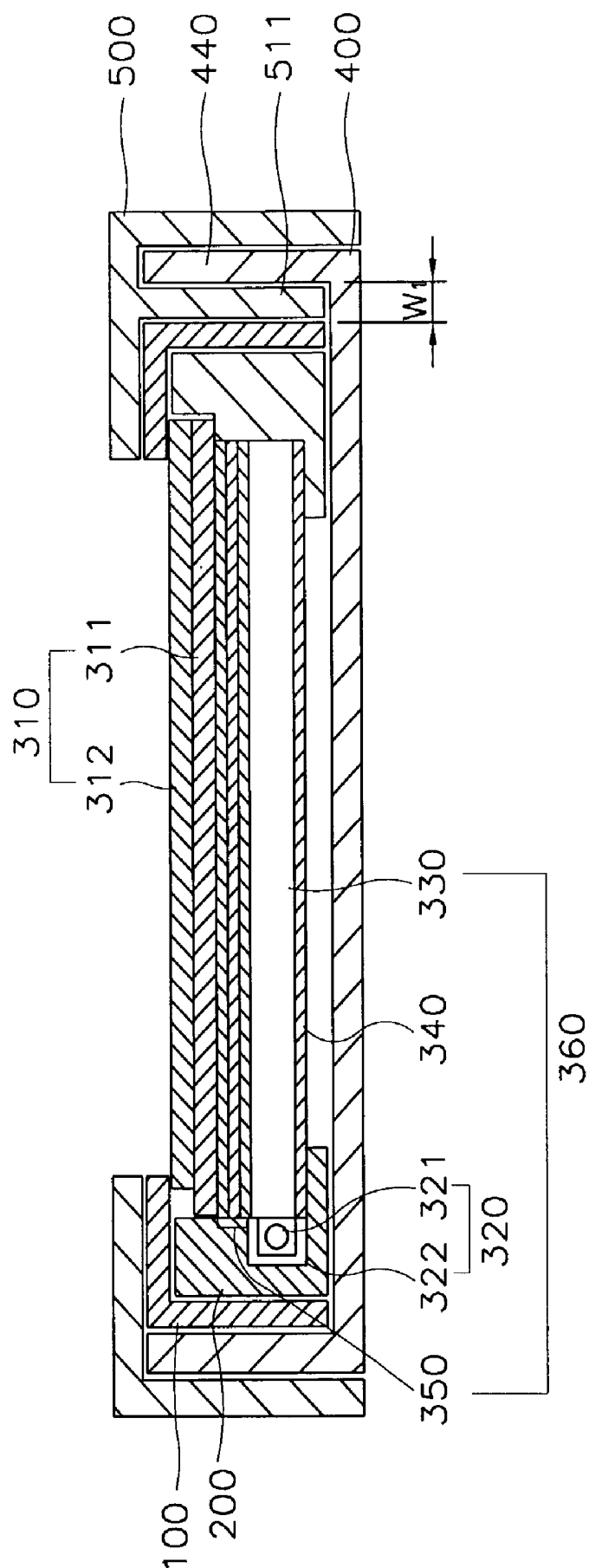


FIG. 16

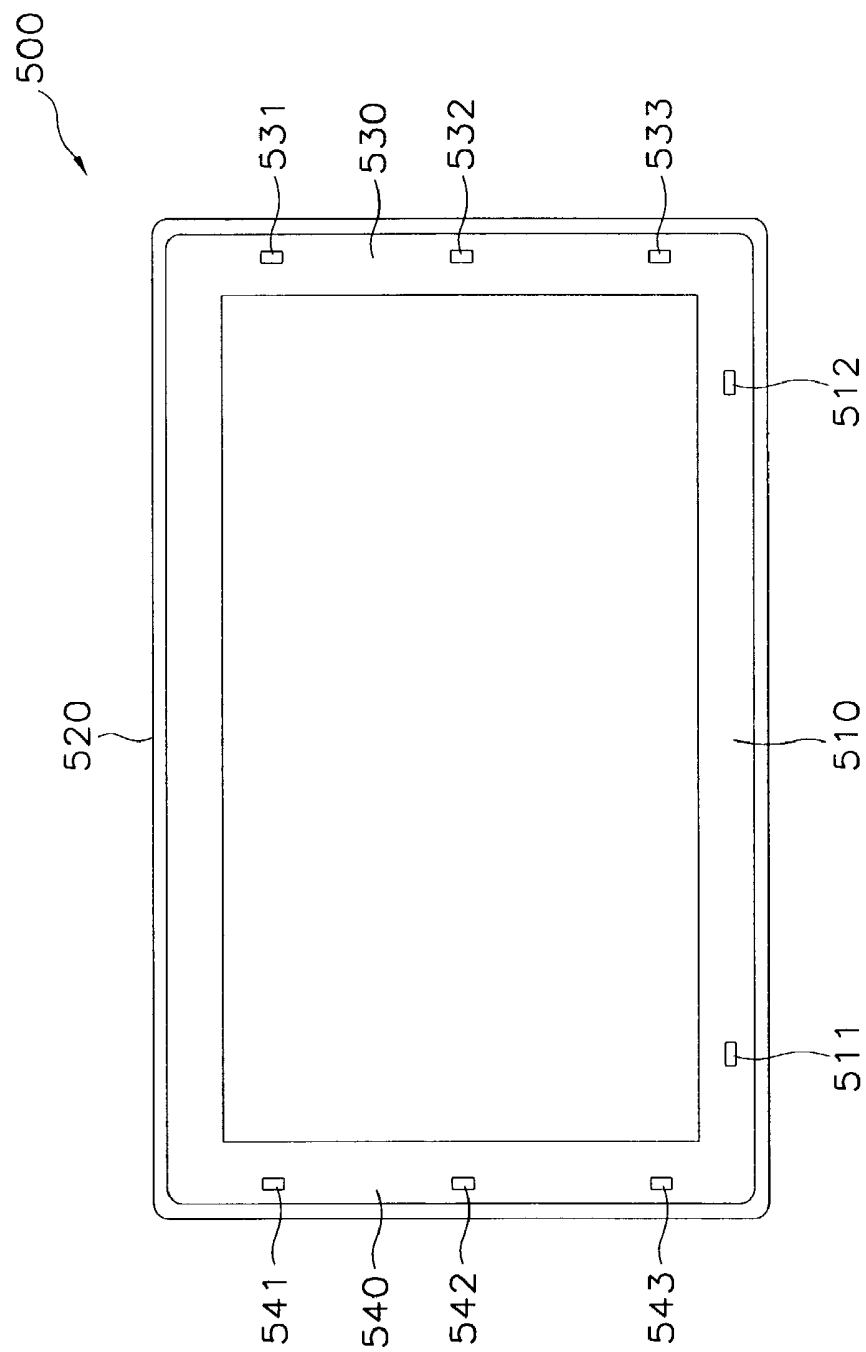


FIG. 17

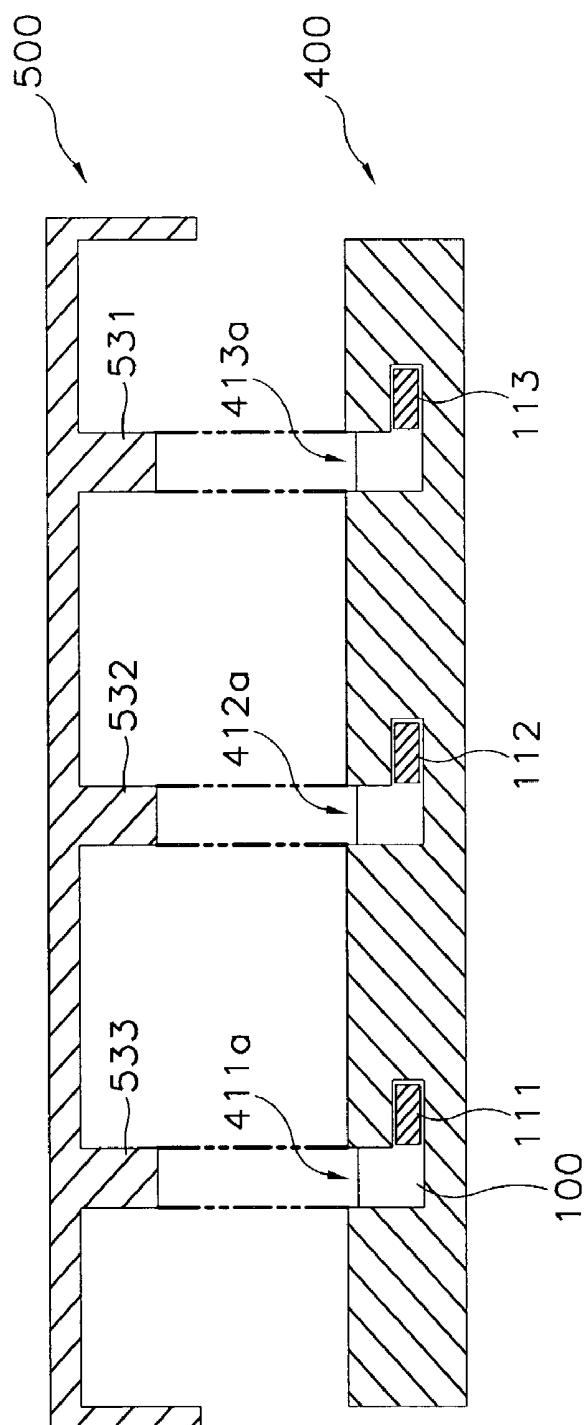


FIG. 18

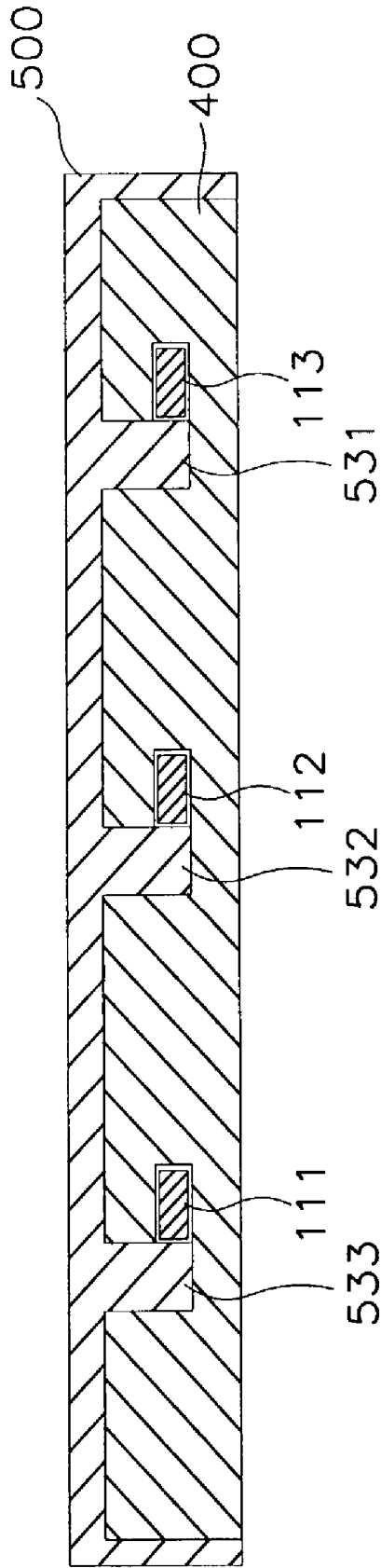


FIG. 19

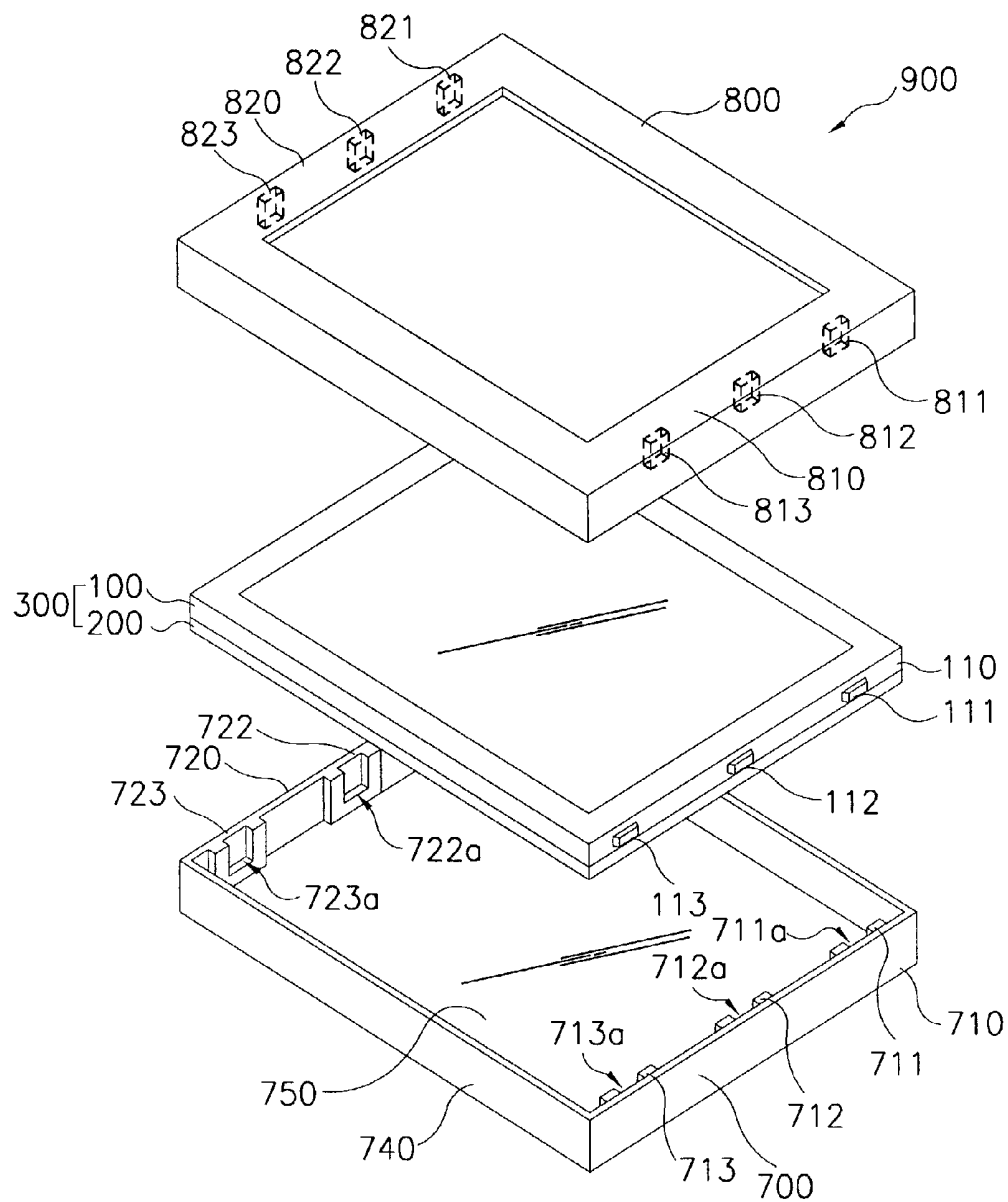


FIG. 20

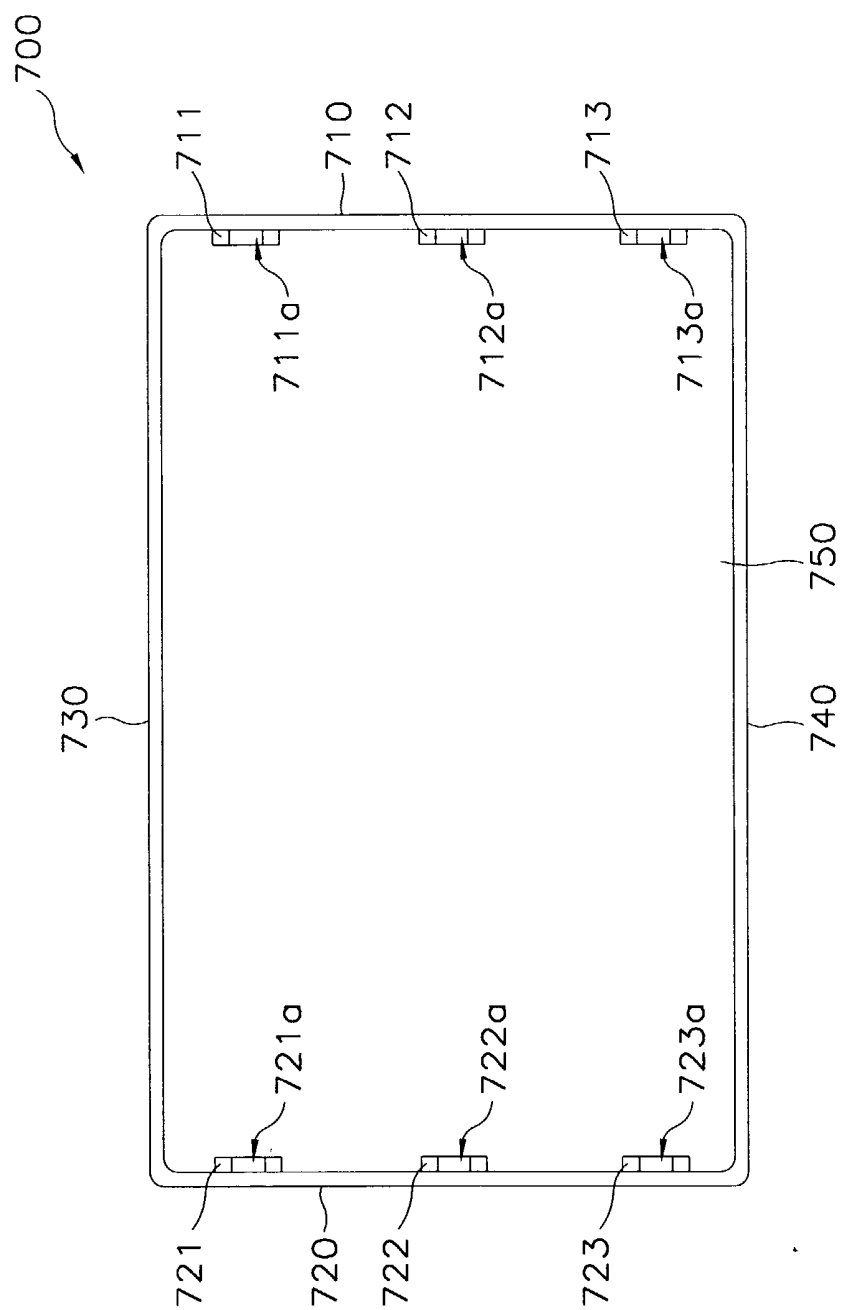


FIG. 21

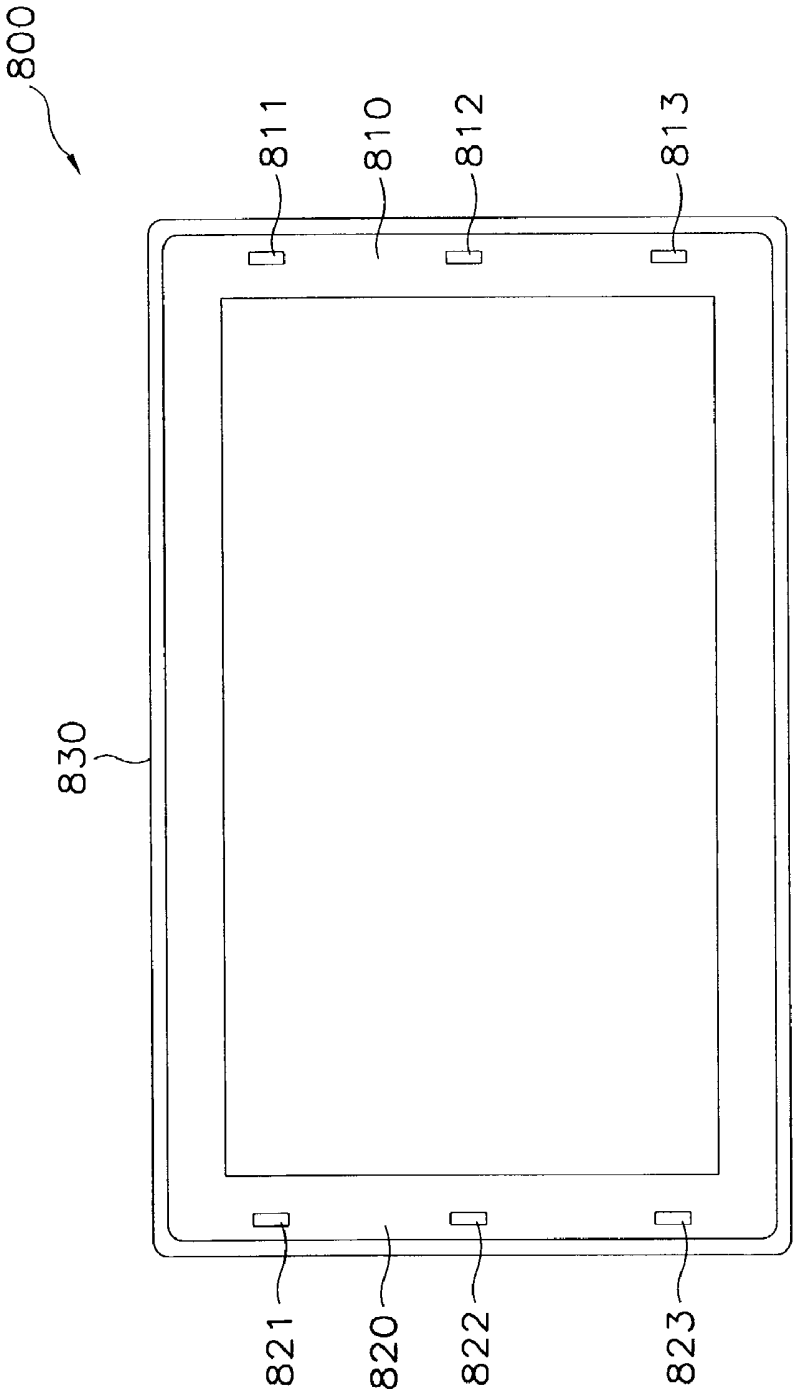


FIG. 22

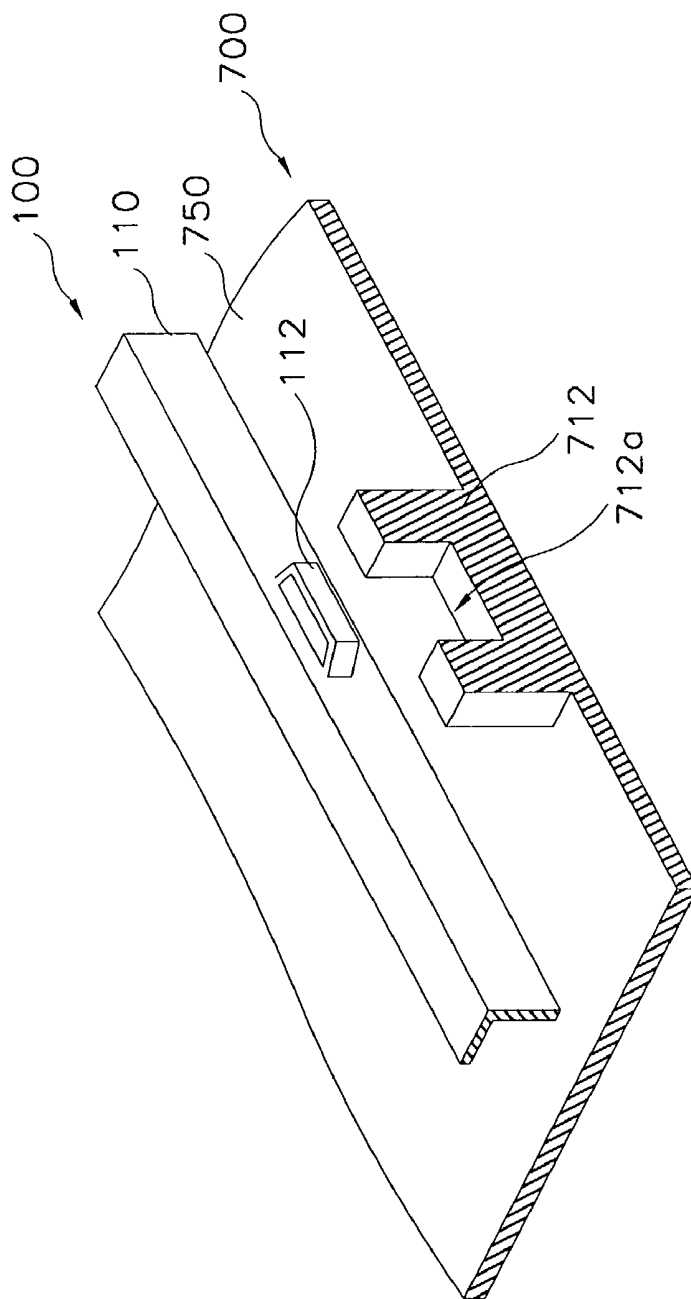


FIG. 23

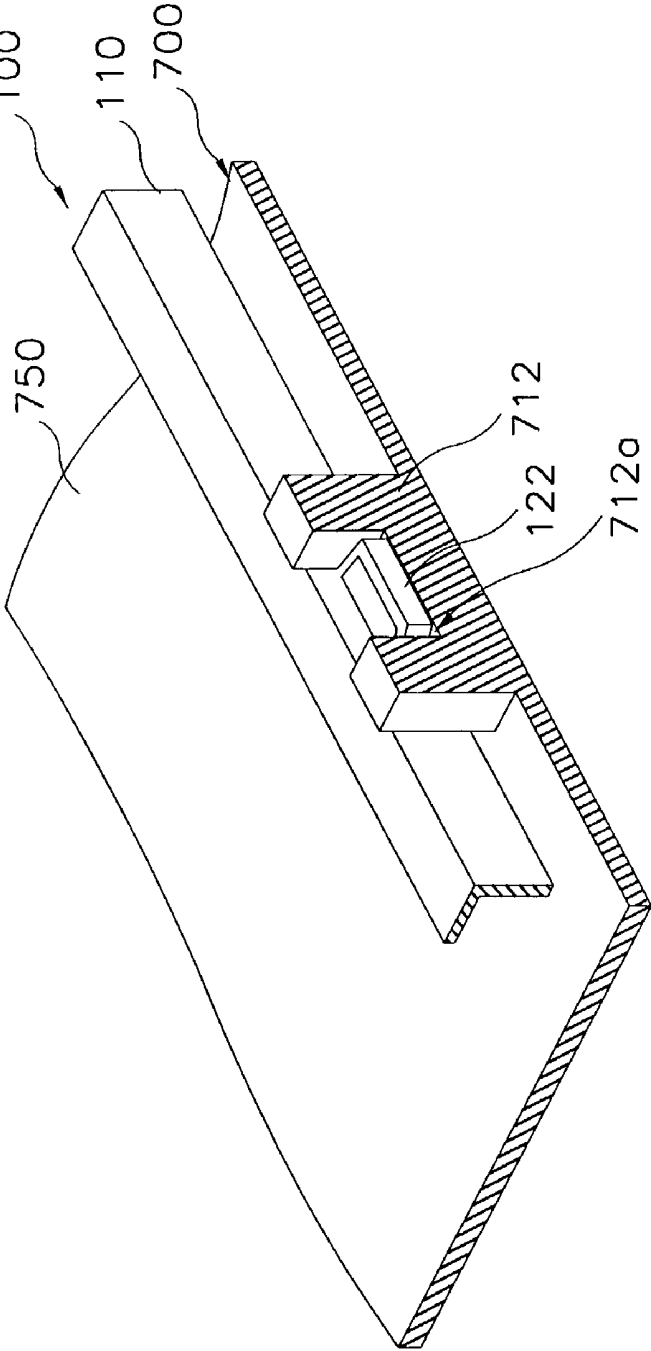


FIG. 24

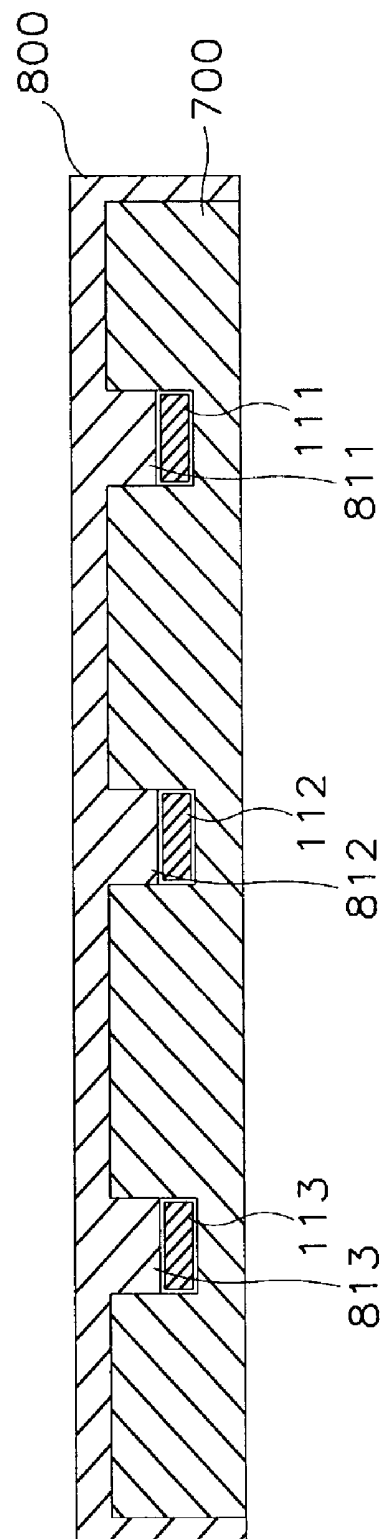


FIG. 25

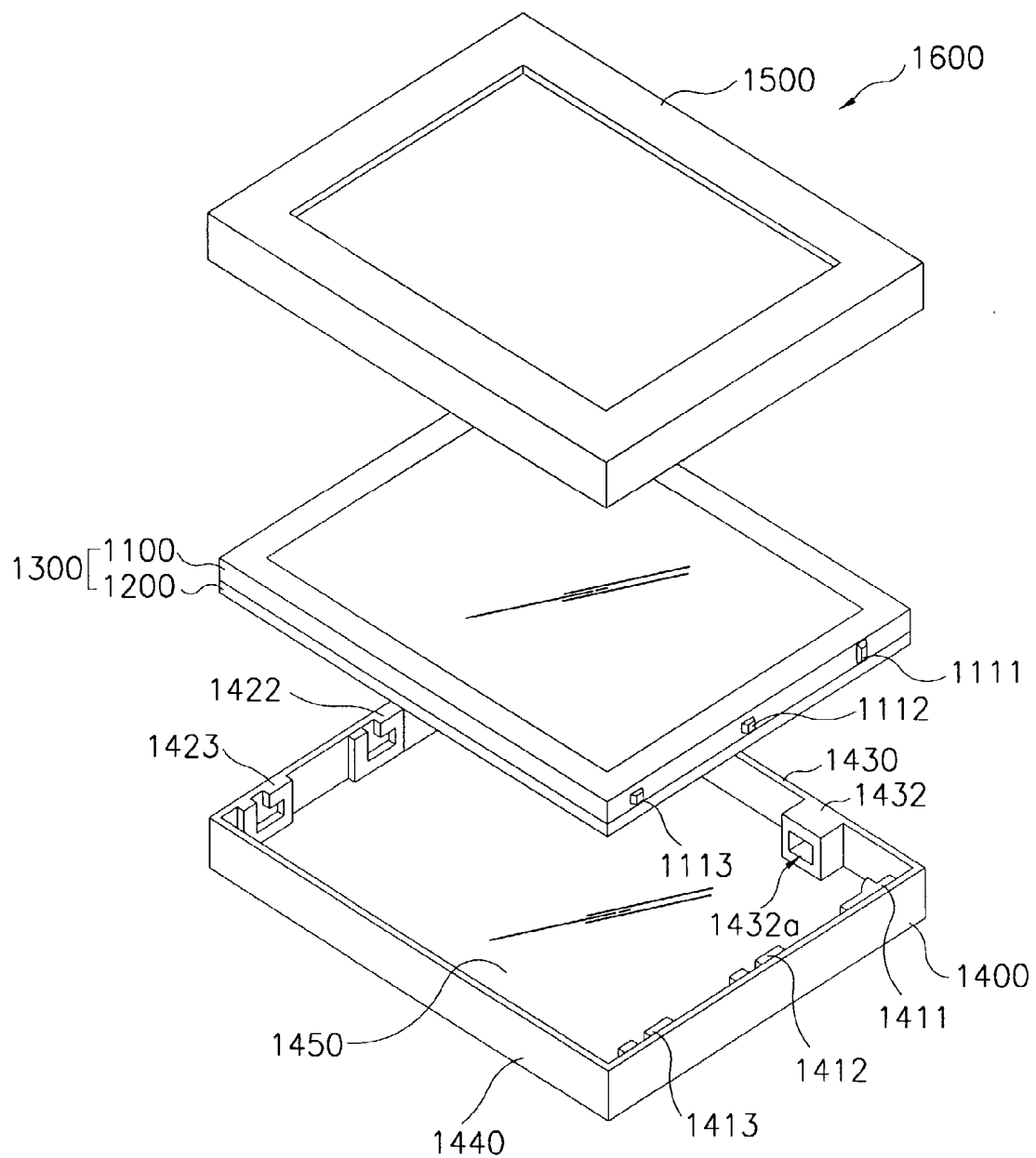


FIG. 26

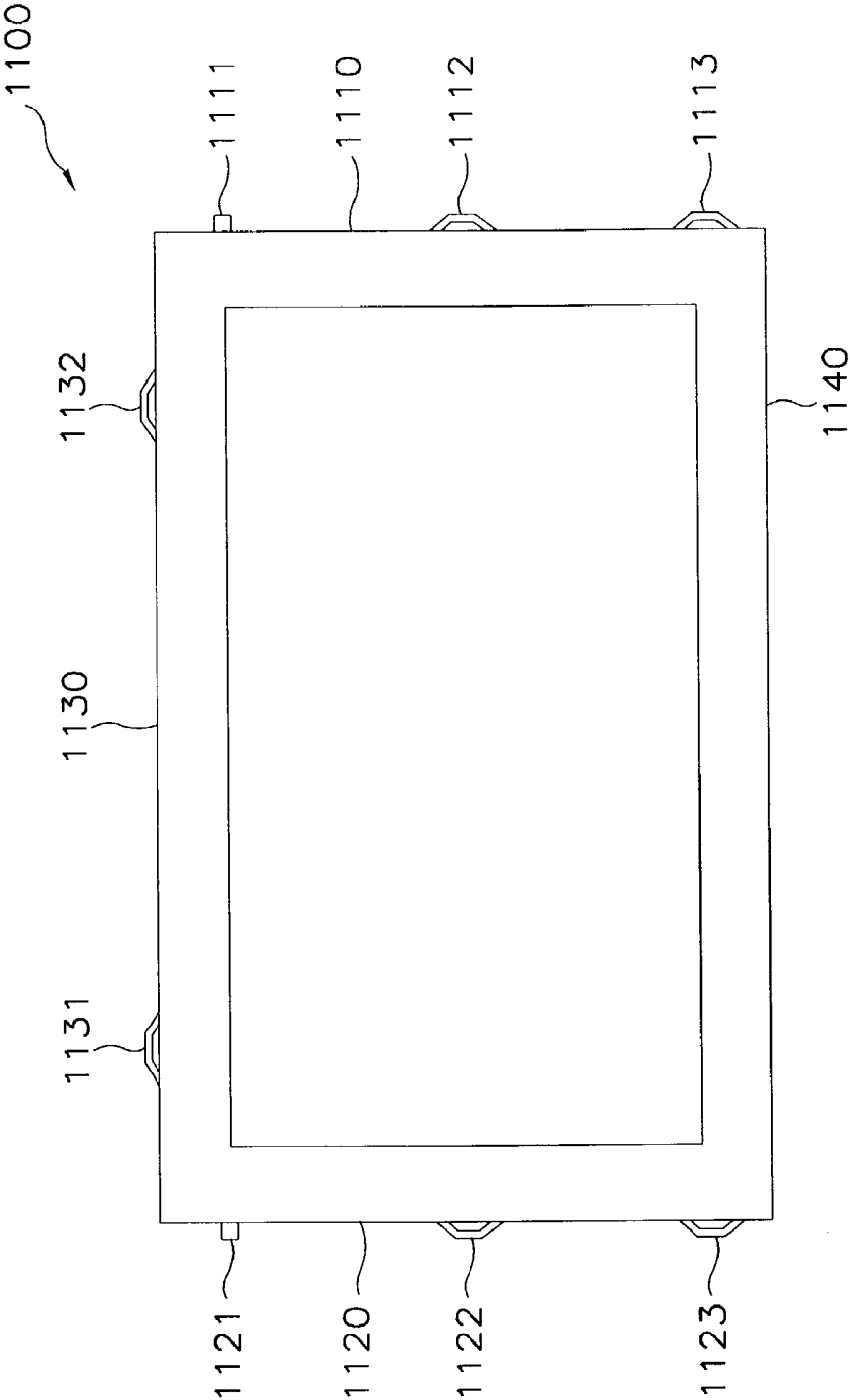


FIG. 27

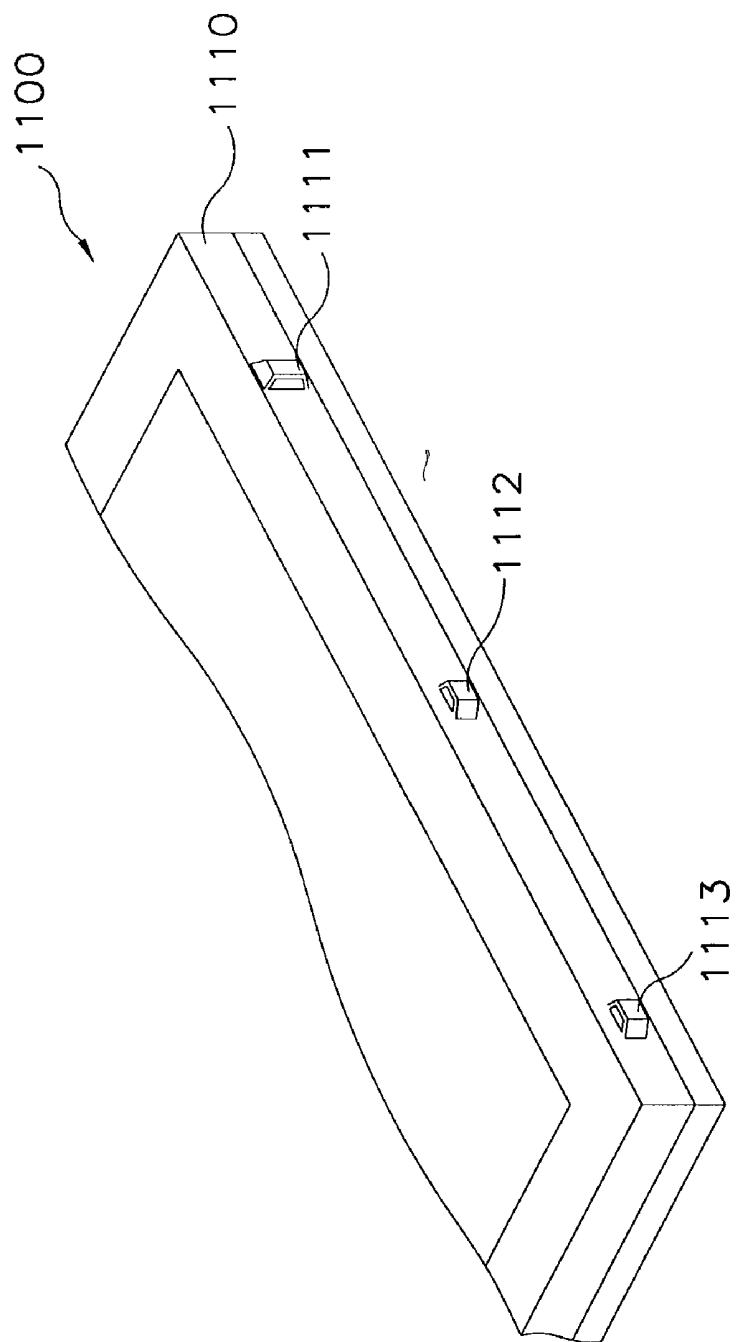


FIG. 28

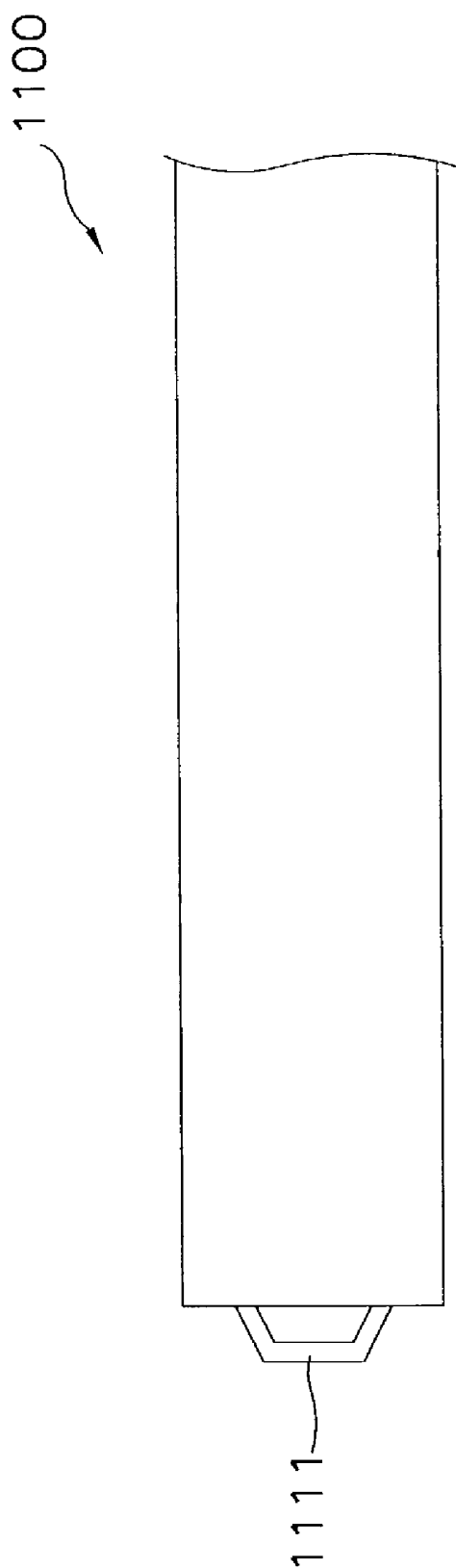


FIG. 29

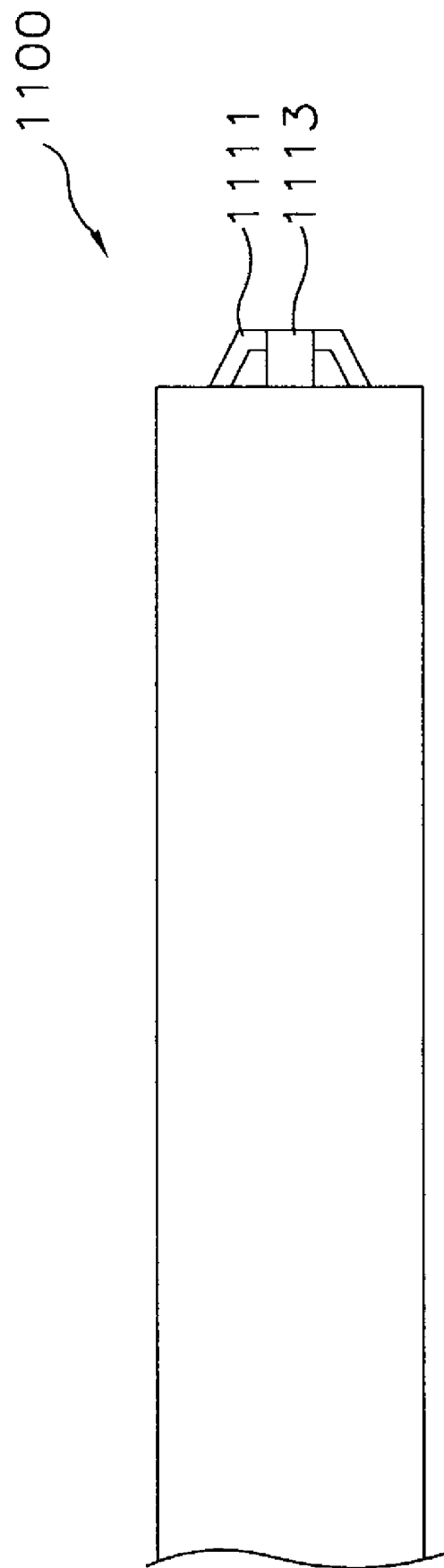


FIG. 30

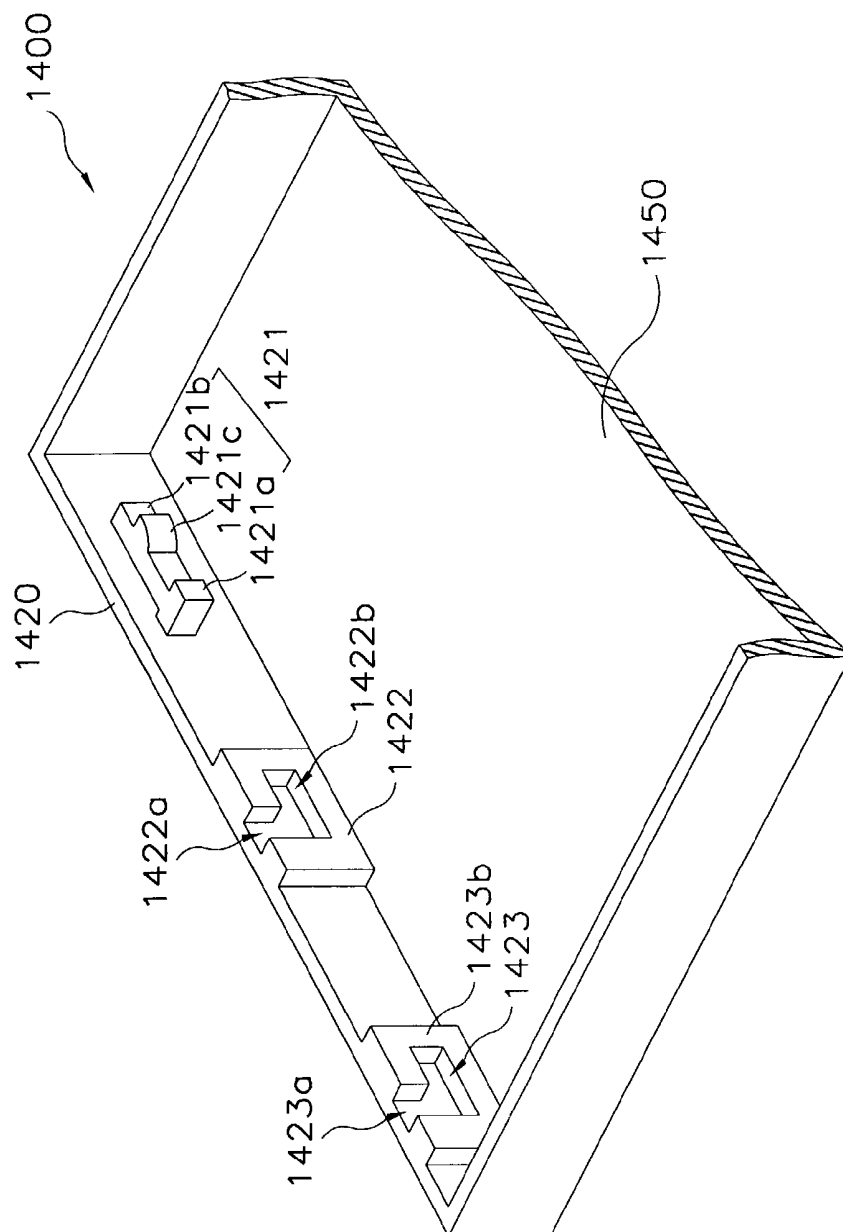


FIG. 31

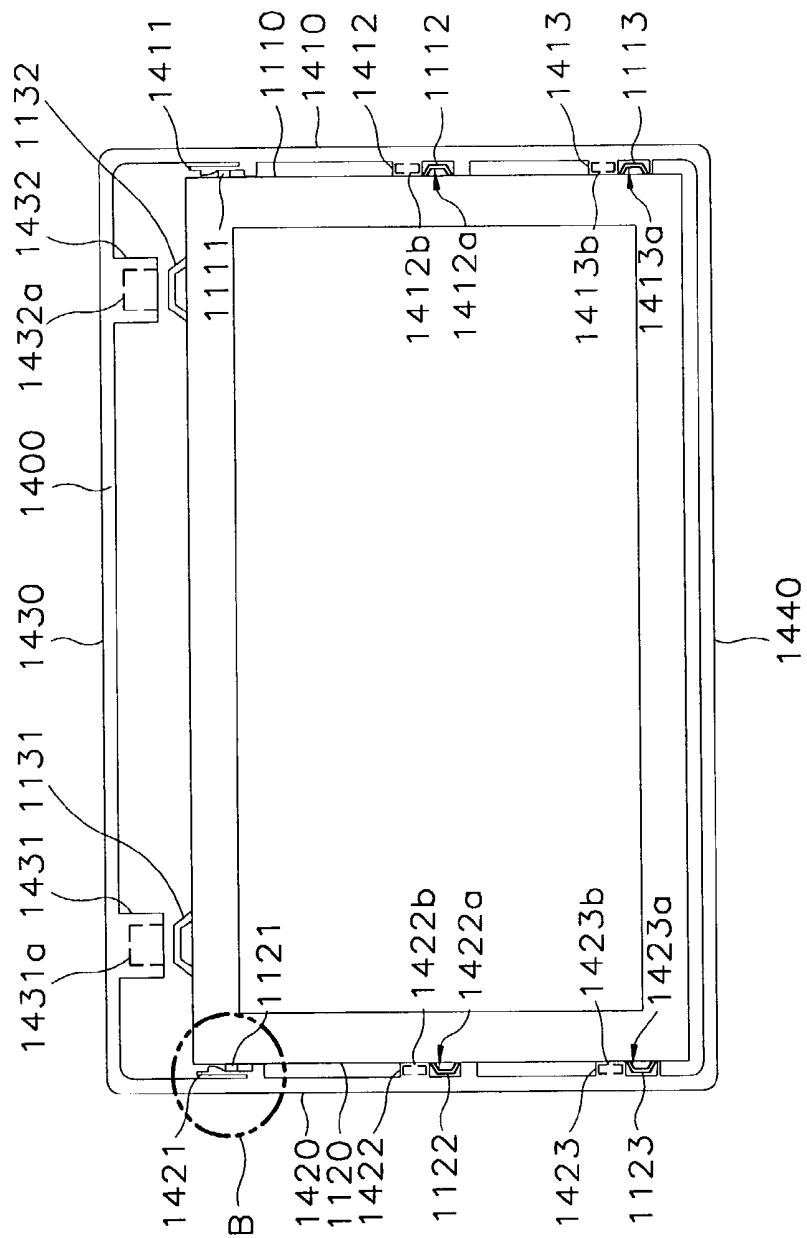


FIG. 32

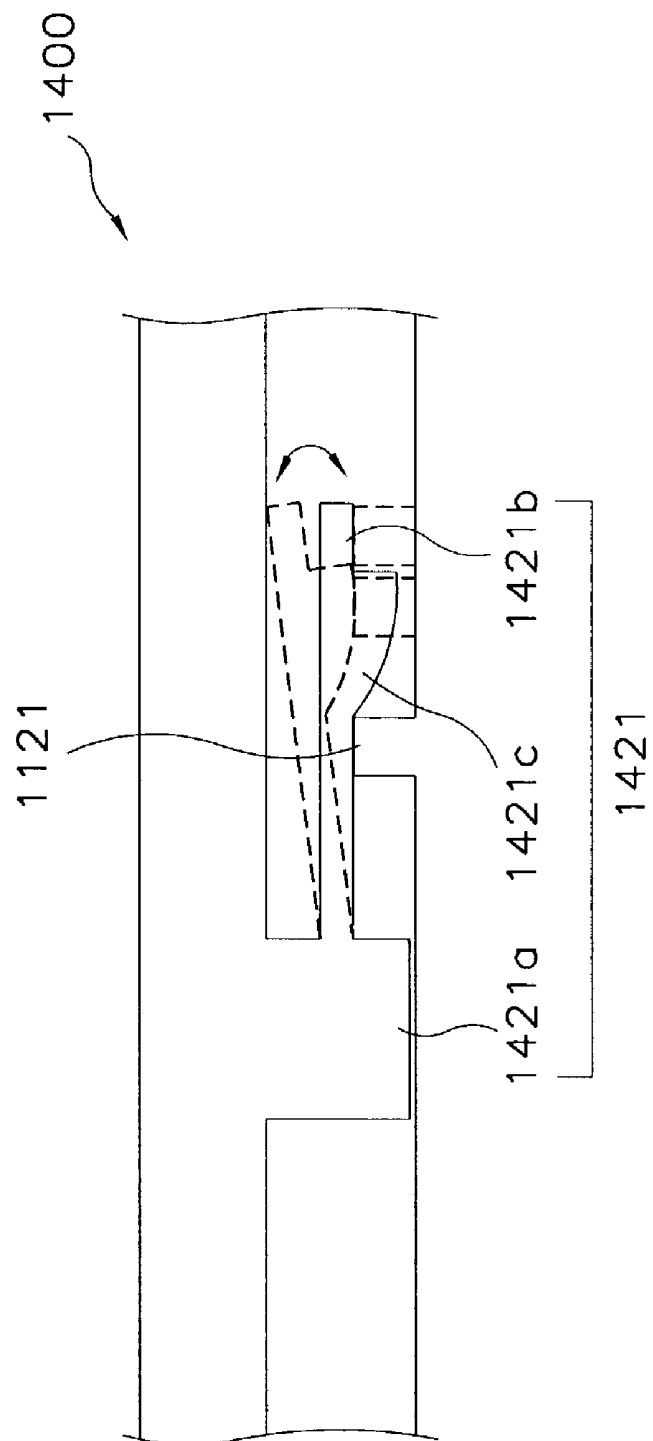
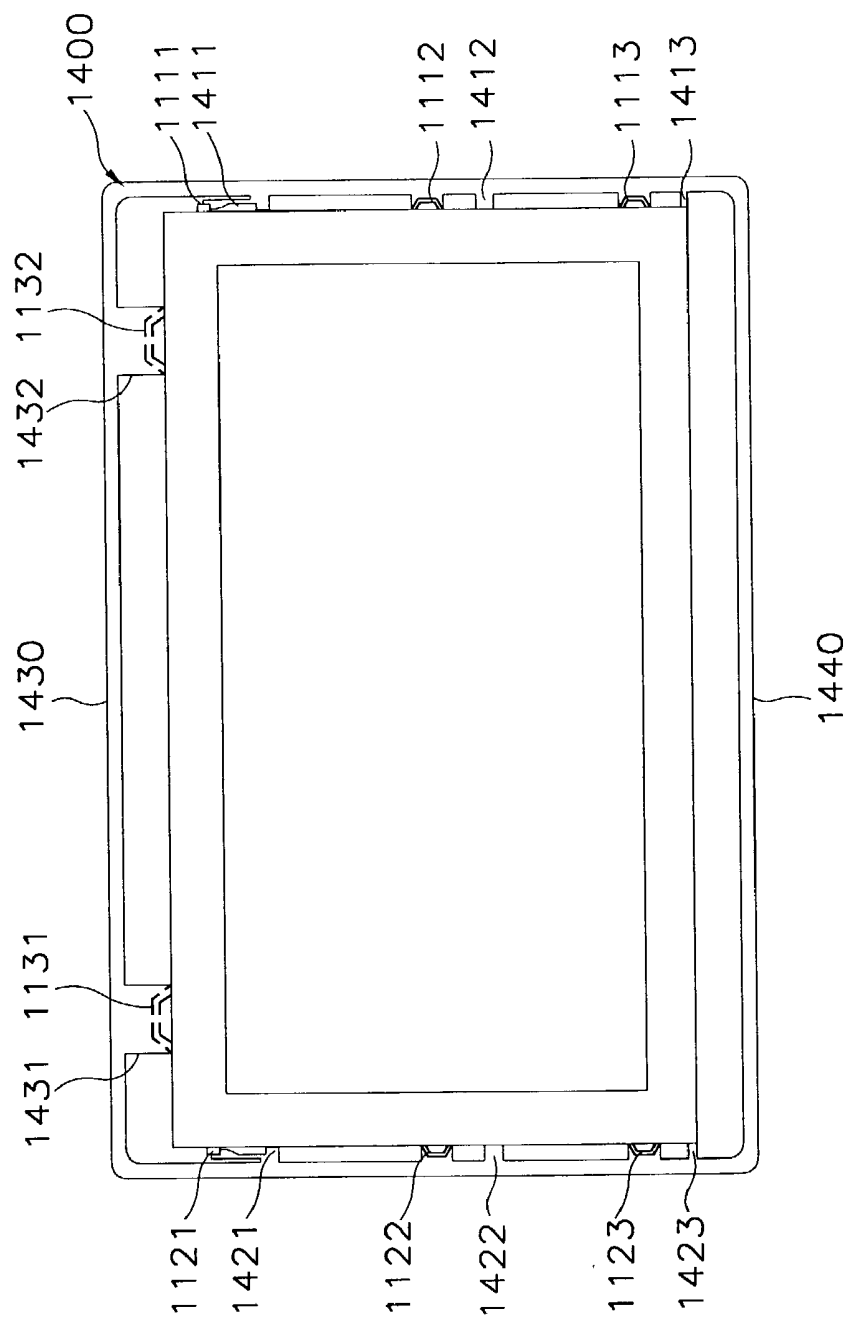


FIG. 33



LIQUID CRYSTAL DISPLAY APPARATUS

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a liquid crystal display apparatus, and more particularly to a liquid crystal display apparatus in which a liquid crystal display module is tightly combined with cases, which is available for a notebook computer.

[0003] 2. Description of the Related Art

[0004] Recently, information processors have been rapidly developed in a trend with various architectures, functions and faster information processing speed. Such information processors need display devices such as a liquid crystal display apparatus for displaying processed information to a user.

[0005] When a voltage is applied to a liquid crystal cell, a molecular arrangement of the liquid crystal is changed. The liquid crystal display device converts variations in optical characteristics such as a birefringence, a rotatory polarization, a dichroism and a light scattering according to the molecular arrangements of the liquid crystal into variations in visual characteristics, thereby displaying an image.

[0006] A size of the liquid crystal display apparatus gradually increases according to a demand of the user, and a liquid crystal display module and cases for receiving the liquid crystal display module also have dimensions that gradually increase in response to the size of the liquid crystal display apparatus. Thus, research concerning not only an assembled structure between the liquid crystal display module and cases but also a layout for parts of the liquid crystal display apparatus is performed so as to meet an augmentation of the dimension of the liquid crystal display apparatus and reductions of a weight, a size and a thickness of the liquid crystal display apparatus in these days.

[0007] In particular, a combining space according to a combination of the liquid crystal display module and cases becomes more important as for an installation structure between the liquid crystal display module and cases.

[0008] FIG. 1 is an exploded perspective view schematically showing a conventional liquid crystal display apparatus.

[0009] Referring to FIG. 1, a liquid crystal display apparatus 60 has a liquid crystal display module 30, for displaying an image, and cases including a front case (not shown) and a rear case 40 in order to receive the liquid crystal display module 30.

[0010] The liquid crystal display module 30 includes a display unit for displaying the image, a back light assembly for supplying a light to the display unit, a mold frame for receiving the display unit and the back light assembly, and a top chassis combining with the mold frame to fix the display unit and the back light assembly to the mold frame. When the back light assembly and the display unit are successively received in the mold frame, the top chassis combines with the mold frame.

[0011] A top installation method is utilized for mounting the liquid crystal display module 30 in the rear case 40. Particularly, first, second, third, and fourth mounting por-

tions 11, 12, 13 and 14 having predetermined heights are formed on four corners of the top chassis 10 of the liquid crystal display module 30. First, second, third and fourth screwed combining holes 11a, 12a, 13a and 14a are formed through the first, second, third and fourth mounting portions 11, 12, 13 and 14, respectively. First, second, third and fourth burrings 41, 42, 43 and 44 corresponding to the first, second, third and fourth screwed combining holes 11a, 12a, 13a and 14a are formed on four corners of the rear case 40 corresponding to the first, second, third and fourth mounting portions 11, 12, 13 and 14.

[0012] When the first, second, third and fourth screwed combining holes 11a, 12a, 13a and 14a of the top chassis 10 correspond to the first, second, third and fourth burrings 41, 42, 43 and 44 of the rear case 40, respectively, first, second, third and fourth screws 11b, 12b, 13b and 14b engage with the first, second, third and fourth screwed combining holes 11a, 12a, 13a and 14a and the first, second, third and fourth burrings 41, 42, 43 and 44, thereby fixing the liquid crystal display module 30 to the rear case 40.

[0013] The top installation method, however, has some disadvantages as follows.

[0014] First, the number of assembling steps for fabrication of the liquid crystal display apparatus 60 increases since the liquid crystal display module 30 is combined with the cases using the screws. Hence, productivity as well as operation efficiency decreases in fabricating the liquid crystal display apparatus 60.

[0015] Also, manufacturing costs and time for the liquid crystal display apparatus 60 increase because additional parts such as the screws are demanded for combining the liquid crystal display module 30 with those cases.

[0016] Furthermore, an overall size of the liquid crystal display apparatus 60 increases because the first, second, third and fourth mounting portions 11, 12, 13, and 14 are protruded from side walls of the top chassis toward outside.

SUMMARY OF THE INVENTION

[0017] The present invention provides a liquid crystal display apparatus in which a liquid crystal display module is tightly combined with cases.

[0018] The present invention further provides a liquid crystal display apparatus enhancing productivity by reducing the number of parts demanded for a fabrication of the liquid crystal display apparatus.

[0019] In one aspect, there is provided a liquid crystal display apparatus comprising a liquid crystal display module having at least one first protruding portion, a rear case for receiving the liquid crystal display module, wherein the rear case has at least one first fixing portion for guiding and fixing the at least one first protruding portion, and a front case combined with the rear case wherein the front case has at least one second protruding portion for fixing the liquid crystal display module.

[0020] The liquid crystal display module includes a back light assembly for generating a light, a display unit for receiving the light to display an image, a mold frame for receiving the back light assembly and the display unit, and a top chassis for fixing the display unit and the back light assembly to the mold frame by combining with the mold

frame, which has a first side wall and a second side wall opposed each other wherein the at least one first protruding portion having a predetermined height is formed on the first and the second side walls, respectively.

[0021] The at least one first fixing portion is respectively formed on third and fourth side walls of the rear case corresponding to the first and second side walls of the top chassis. The at least one first fixing portion includes at least one first fixing groove extended from upper faces of the third and the fourth side walls of the rear case toward a bottom face of the rear case, and a second fixing groove extended from a lower portion of the first fixing groove toward a fifth side wall disposed between the third and the fourth side walls of the rear case.

[0022] The liquid crystal display module slides toward the second fixing groove of the rear case to be combined with the rear case when the at least one first protruding portion of the top chassis is received in the first fixing groove of the rear case.

[0023] The at least one second protruding portion is protruded from first and second upper faces of the front case corresponding to the third and the fourth side walls of the rear case, and the at least one second protruding portion is received in the at least one first fixing groove of the rear case. A bottom face of the at least one second protruding portion of the front case directly contacts a bottom face of the at least one first fixing groove of the rear case.

[0024] Also, a third protruding portion protruded toward the bottom face of the rear case is formed on a third upper face of the front case positioned on a sixth side wall of the rear case corresponding to the fifth side wall of the rear case. The third protruding portion of the front case is received in an isolation space formed between the sixth side wall of the rear case and the liquid crystal display module, and a bottom face of the third protruding portion directly contacts the bottom face of the rear case.

[0025] Also, a fourth protruding portion protruded toward the fifth side wall of the rear case is formed on a seventh side wall of the top chassis corresponding to the fifth side wall of the rear case. The at least one second fixing portion is formed on the fifth side wall of the rear case wherein the at least one second fixing portion has a third fixing groove formed from the liquid crystal display module received in the rear case toward the fifth side wall of the rear case. Hence, the liquid crystal display module is fixed as the fourth protruding portion of the top chassis is received in the third fixing groove formed on the second fixing portion of the rear case when the liquid crystal display module slides toward the fifth side wall of the rear case.

[0026] In addition, the at least one first fixing portion comprises a fourth fixing groove extended from upper faces of the third and the fourth side walls of the rear case toward the bottom face of the rear case. The at least one second protruding portion is protruded by a predetermined height from the first and second upper faces of the front case corresponding to the third and fourth side walls of the rear case. The liquid crystal display module combines the rear case by the first protruding portion of the top chassis received in a lower portion of the fourth fixing groove, and the second protruding portion of the front case received in an upper portion of the fourth fixing groove so as to press the

first protruding portion. A height of the fourth fixing groove is substantially identical to a sum of heights of the first protruding portion of the top chassis and the second protruding portion of the front case.

[0027] In another aspect, there is provided a liquid crystal display apparatus comprising a liquid crystal display module having a first protruding portion and a second protruding portion, and a rear case for receiving the liquid crystal display module wherein the rear case has a fixing groove for guiding and receiving the first protruding portion and a fixing protuberance for fixing the liquid crystal display module.

[0028] The liquid crystal display module includes a back light assembly for generating a light, a display unit for receiving the light and displaying an image, a mold frame for receiving the back light assembly and the display unit, and a top chassis combined with the mold frame for fixing the display unit and the back light assembly, which has a first side wall and a second side wall opposed each other wherein first and second protruding portions protruding by a predetermined height from the first and second side walls.

[0029] The fixing groove is formed on third and fourth side walls of the rear case corresponding to the first and second side walls of the top chassis. The fixing groove includes a first fixing groove formed from upper faces of the third and fourth side walls of the rear case toward a bottom face of the rear case, and a second fixing groove extended from a lower portion of the first fixing groove toward a fifth side wall of the rear case.

[0030] The liquid crystal display module slides toward the second fixing groove of the rear case to be combined with the rear case after the first protruding portion of the top chassis is received in the first groove of the rear case.

[0031] The fixing protuberances are formed on the third and said fourth side walls of the rear case corresponding to the second protruding portion formed on the first and second side walls of the top chassis. Also, each fixing protuberance has a supporting portion having a predetermined height toward an opposing side wall, a body extended from an end of the supporting portion toward the fifth side wall and separated by a predetermined interval from the third and the fourth side walls, and a suspending portion protruding from the body and engaging with the second protruding portion of the top chassis, preventing the liquid crystal display module from being moved. The suspending portion has a slope shape gradually wider toward said fifth side wall of the rear case.

[0032] According to the liquid crystal display apparatus of the present invention, the liquid crystal display module is fixed in the rear case as protuberances formed on the top chassis are combined with fixing portions formed on the rear case, and also the liquid crystal display module is firmly fixed by fixing protuberances formed on the front case. Therefore, the combining strength between the liquid crystal module and those cases can increase, and productivity of the liquid crystal display apparatus can be improved by reducing the number of parts demanded in fabricating the liquid crystal module and cases.

BRIEF DESCRIPTION OF THE DRAWINGS

[0033] The above and other advantages of the present invention will become apparent by describing exemplary embodiment with reference to the attached drawings in which:

[0034] **FIG. 1** is an exploded perspective view schematically showing a conventional liquid crystal display apparatus;

[0035] **FIG. 2** is an exploded perspective illustrating a liquid crystal display apparatus according to one embodiment of the present invention;

[0036] **FIG. 3** is a plan view showing a structure of a top chassis shown in **FIG. 2**;

[0037] **FIG. 4** is a plan view showing a structure of a rear case shown in **FIG. 2**;

[0038] **FIG. 5** is a plan view showing a structure of a front case shown in **FIG. 2**;

[0039] **FIG. 6** is a partially cut perspective view illustrating the front case shown in **FIG. 5**;

[0040] **FIG. 7A** is a plan view showing an assembled structure between the top chassis and the rear case;

[0041] **FIG. 7B** is a cross-sectional view taken along the line of C_1 - C_2 for illustrating the assembled structure between the top chassis and the rear case shown in **FIG. 7A**;

[0042] **FIG. 8** is a plan view showing an assembled structure among the front case, the top chassis and the rear case shown in **FIG. 7A**;

[0043] **FIGS. 9 to 11** are partially cut perspective views illustrating a method for combining the top chassis with the rear case;

[0044] **FIGS. 12 and 13** are cross-sectional views illustrating the method for combining the top chassis with the rear case;

[0045] **FIG. 14** is a cross-sectional view taken along the line of A_1 - A_2 for illustrating the assembled structure of the top chassis and the rear case shown in **FIG. 7A**;

[0046] **FIG. 15** is a cross-sectional view taken along the line of B_1 - B_2 for illustrating the assembled structure of the liquid crystal display device shown in **FIG. 8**;

[0047] **FIG. 16** is a plan view showing a front case according to another embodiment of the present invention;

[0048] **FIGS. 17 and 18** are cross-sectional views illustrating a combination of the front case and the rear case;

[0049] **FIG. 19** is an exploded perspective view showing a liquid crystal display apparatus according to another embodiment of the present invention;

[0050] **FIG. 20** is a plan view showing a structure of a rear case shown in **FIG. 19**;

[0051] **FIG. 21** is a plan view showing a structure of a front case shown in **FIG. 19**;

[0052] **FIGS. 22 and 23** are partially cut perspective views illustrating a method for combining the top chassis with the rear case shown in **FIG. 19**;

[0053] **FIG. 24** is a cross-sectional view showing an assembled structure of the top chassis, the rear case and the front case;

[0054] **FIG. 25** is an exploded perspective view showing a liquid crystal display device according to still another embodiment of the present invention;

[0055] **FIG. 26** is a plan view showing a structure of a top chassis shown in **FIG. 25**;

[0056] **FIG. 27** is a partial perspective view showing a structure of the top chassis shown in **FIG. 25**;

[0057] **FIGS. 28 and 29** are side views illustrating the top chassis shown in **FIG. 25**;

[0058] **FIG. 30** is a partially cut perspective view showing the rear case shown in **FIG. 25**;

[0059] **FIG. 31** is a plan view showing the top chassis and the rear case shown in **FIG. 25** before the top chassis combines with the rear case;

[0060] **FIG. 32** is an enlarged plan view showing 'B' shown in **FIG. 31**; and

[0061] **FIG. 33** is a plan view illustrating an assembled structure of the top chassis and the rear case shown in **FIG. 25**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0062] Hereinafter, a liquid crystal display device according to various embodiments of the present invention will be described in detail with reference to the drawings.

[0063] **FIG. 2** is an exploded perspective view showing a liquid crystal display device according to one embodiment of the present invention, **FIG. 3** is a plan view illustrating a structure of a top chassis in **FIG. 2**, **FIG. 4** is a plan view showing a structure of a rear case in **FIG. 2**, **FIG. 5** is a plan view showing a structure of a front case in **FIG. 2**, and **FIG. 6** is a partially cut perspective view showing the front case in **FIG. 5**.

[0064] Referring to **FIG. 2**, a liquid crystal display apparatus 600 has a liquid crystal display module 300 for displaying an image, and cases for receiving the liquid crystal display module 300. Those cases include a front case 500 and a rear case 400.

[0065] The liquid crystal display module 300 includes a display unit 310 for displaying the image, and a back light assembly 360 disposed under the display unit 310 for supplying a light to the display unit 310 (see **FIG. 7B**). The display unit 310 and the back light assembly 360 are received in a mold frame 200. Also, a top chassis 100 is provided for fixing the display unit 310 and the back light assembly 360 to the mold frame 200.

[0066] In particular, when the back light assembly 360 and the display unit 310 are subsequently received in the mold frame 200, the top chassis 100 is provided on the display unit 310. The top chassis 100 has a rectangular clamp shape. The top chassis 100 covers an upper portion of the display unit 310 except for an effective display area of the display unit 310. The top chassis 100 is combined with the mold frame

200 so that inner surfaces of four side walls of the top chassis **100** correspond to outer surfaces of side walls of the mold frame **200**.

[0067] As shown in **FIGS. 2 and 3**, the top chassis **100** has a first side wall **110**, a second side wall **120**, a third side wall **130** and a fourth side wall **140**. First to third protuberances **111**, **112** and **113** respectively having a predetermined height are formed on the first side wall **110** of the top chassis **100**, and fourth to sixth protuberances **121**, **122** and **123** respectively having a predetermined height are formed on the second side wall **120** of the top chassis **100**. The second side wall **120** is opposed to the first side wall **110**. In addition, seventh and eighth protuberances **131** and **132** are formed on the third side wall **130**, which locates between the first side wall **110** and the second side wall **120**. The first to eighth protuberances **111**, **112**, **113**, **121**, **122**, **123**, **131** and **132** can be formed by partially cutting predetermined portions of the first to third side walls **110**, **120** and **130** of the top chassis **100** and extending the portions toward outside. The first to eighth protuberances **111**, **112**, **113**, **121**, **122**, **123**, **131** and **132** may have various shapes such as hemi-circular shapes, trapezoidal shapes or rectangular shapes when the first to eighth protuberances **111**, **112**, **113**, **121**, **122**, **123**, **131** and **132** are observed from the direction of the cases **500** and **400**. Preferably, the first to eighth protuberances **111**, **112**, **113**, **121**, **122**, **123**, **131** and **132** have trapezoidal shapes, respectively.

[0068] Referring to **FIGS. 2 and 4**, the rear case **400** includes fifth to eighth side walls **410**, **420**, **430** and **440**, and a bottom face **450** enclosed by the fifth to eighth side walls **410**, **420**, **430** and **440**. An upper face of the rear case **400** corresponding to the bottom face **450** is opened. First to third protruding portions **411**, **412** and **413** having a predetermined height are formed on the fifth side wall **410** of the rear case **400**, which corresponds to and is combined with the first side wall **110** of the top chassis **100**. Also, fourth to sixth protruding portions **421**, **422** and **423** having a predetermined height are formed on the sixth side wall **420** of the rear case **400**, which corresponds to and is combined with the second side wall **120** of the top chassis **100**. Furthermore, seventh and eighth protruding portions **431** and **432** having a predetermined height are formed on the seventh side wall **430** of the rear case **400**, which corresponds to and is combined with the third side wall **130** of the top chassis **100**.

[0069] First to sixth fixing grooves **411a**, **412a**, **413a**, **421a**, **422a** and **423a** are respectively formed on the first to sixth protruding portions **411**, **412**, **413**, **421**, **422** and **423** so as to be combined with the first to sixth protuberances **111**, **112**, **113**, **121**, **122** and **123** formed on the first and second side walls **110** and **120** of the top chassis **100**. In addition, seventh to twelfth fixing grooves **411b**, **412b**, **413b**, **421b**, **422b** and **423b** are formed on the first to sixth protruding portions **411**, **412**, **413**, **421**, **422** and **423**. The first to sixth fixing grooves **411a**, **412a**, **413a**, **421a**, **422a** and **423a** are respectively formed from upper ends of the fifth and sixth side walls **410** and **420** of the rear case **400** toward the bottom face **450** of the rear case **400**. The seventh to twelfth fixing grooves **411b**, **412b**, **413b**, **421b**, **422b** and **423b** are respectively extended from lower portions of the first and sixth fixing grooves **411a**, **412a**, **413a**, **421a**, **422a** and **423a** toward the seventh side wall **430** of the rear case **400**. Thus, each corresponding pair of the first to sixth fixing grooves **411a**, **412a**, **413a**, **421a**, **422a** and **423a** and the seventh to

twelfth fixing grooves **411b**, **412b**, **413b**, **421b**, **422b** and **423b** may form a shape of "L".

[0070] Thirteenth and fourteenth fixing grooves **431a** and **432a** are formed on the seventh and eighth protruding portions **431** and **432** positioned on the seventh side wall **430** of the rear case **400** so that the thirteenth and fourteenth fixing grooves **431a** and **432a** are combined with the seventh and eighth protuberances **131** and **132** formed on the third side wall **130** of the top chassis **100**.

[0071] The rear case **400** includes first and second suspending protuberances **441** and **442** respectively extended from the bottom face **450** and the eighth side wall **440**. The first and second suspending protuberances **441** and **442** will be described in detail with reference to **FIGS. 7A and 7B**.

[0072] Referring to **FIGS. 5 and 6**, and further **FIG. 16**, the front case **500** has four side walls, and first to fourth top faces **510**, **520**, **530** and **540**. The four side walls of the front case **500** are combined with the fifth to eighth side walls **410**, **420**, **430**, and **440** of the rear case **400**, and the first to fourth top faces **510**, **520**, **530** and **540** cover a non-effective display area of the liquid display module **300**. Also, a lower face of the front case **500** corresponding to an effective display area of the liquid display module **300** is opened.

[0073] Ninth and tenth protuberances **511** and **512** are formed on the first top face **510** of the front case **500** positioned over the eighth side wall **440** of the rear case **400**. Each of the ninth and tenth protuberances **511** and **512** has a substantially same height as a height of the eighth side wall **440** of the rear case **400** as shown in **FIG. 6**. The ninth and tenth protuberances **511** and **512** will be described more detail with reference to cross-sectional views.

[0074] **FIG. 7A** is a plan view showing an assembled structure between the top chassis and the rear case, **FIG. 7B** is a cross-sectional view taken along the line of C₁-C₂ for illustrating the assembled structure between the top chassis and the rear case, and **FIG. 8** is a plan view showing an assembled structure among the front case, the top chassis and the rear case.

[0075] When the liquid crystal display module **300** including the display unit **310** is received in the rear case **400** as shown in **FIG. 7B**, the first to third protuberances **111**, **112** and **113** formed on the first side wall **110** of the top chassis **100** are respectively combined with the first to third fixing grooves **411a**, **412a** and **413a** formed on the fifth side wall **410** of the rear case **400**. Also, the fourth to sixth protuberances **121**, **122** and **123** formed on the second side wall **120** of the top chassis **100** are respectively combined with the fourth to sixth fixing grooves **421a**, **422a** and **423a** formed on the sixth side wall **420** of the rear case **400**, as shown in **FIG. 7A**.

[0076] Then, the first to sixth protuberances **111**, **112**, **113**, **121**, **122** and **123** move toward the seventh side wall **430** of the rear case **400**, so the first to sixth protuberances **111**, **112**, **113**, **121**, **122** and **123** are received in the seventh to twelfth fixing grooves **411b**, **412b**, **413b**, **421b**, **422b** and **423b**, respectively. In this way, the rear case **400** is combined with the top chassis **100**, which is illustrated in **FIGS. 9-11**. The seventh and eighth protuberances **131** and **132** formed on the third side wall **130** of the top chassis **100** are respectively combined with the thirteenth and fourteenth fixing grooves **431a** and **432a** formed on the seventh side wall **430** of the rear case **400**.

[0077] When the liquid crystal display module 300 moves toward the seventh side wall 430 of the rear case 400 to be combined with the rear case 400, an isolation space A is formed between the eighth side wall 440 of the rear case 400 and the fourth side wall 140 of the top chassis 100.

[0078] Referring to FIG. 7B, the first and second suspending protuberances 441 and 442 are protruded from the eighth side wall 440 of the rear case 400 toward the liquid crystal display module 300 along the bottom face 450 of the rear case 400. The first and second suspending protuberances 441 and 442 have terraced shapes gradually lowered from the eighth side wall 440 to the liquid crystal display module 300. The widths of the first and second suspending protuberances 441 and 442 are identical to a width W1 of the isolation space A between the liquid crystal module 300 and the eighth side wall 440 of the rear case 400. Hence, an end of the liquid crystal display module 300 moves along the first and second suspending protuberances 441 and 442 of the rear case 400 when the liquid crystal display module 300 moves toward the seventh side wall 430 after the liquid crystal display module 300 is received in the rear case 400. A predetermined portion of the fourth side wall 140 of the top chassis 100 corresponds to terraced portions of the first and second suspending protuberances 441 and 442 when the liquid crystal display module 300 completely moves, thereby preventing the liquid crystal display module 300 from being moved toward the eighth side wall 440 of the rear case 400.

[0079] The front case 500 is combined with the rear case 400 while the liquid crystal display module 300 is received in the rear case 400. The ninth and tenth protuberances 511 and 512 are inserted into the isolation space A between the rear case 400 and the top chassis 100. Widths of the ninth and tenth protuberances 511 and 512 are substantially identical to the width W1 of the isolation space A so that the ninth and tenth protuberances 511 and 512 are tightly inserted into the isolation space A. Thus, the liquid crystal display module 300 does not move in the isolation space A by the ninth and tenth protuberances 511 and 512, as shown in FIGS. 8 and 15.

[0080] FIGS. 9 to 11 are partially cut perspective views illustrating a method for combining the top chassis with the rear case, and FIGS. 12 and 13 are cross-sectional views illustrating the method for combining the top chassis with the rear case.

[0081] Referring to FIGS. 9 to 13, the fifth protuberance 422 formed on the sixth side wall 420 of the rear case 400 includes the fifth fixing groove 422a formed from the upper face of the sixth side wall 420 toward the bottom face 450 of the rear case 400, and the eleventh fixing groove 422b extended from the lower portion of the fifth fixing groove 422a toward the seventh side wall 430 of the rear case 400. The fifth fixing groove 422a is higher than the eleventh fixing groove 422b. That is, an upper face of the eleventh fixing groove 422b is not exposed to the upper face of the sixth side wall 420.

[0082] The fifth protuberance 122 protruding toward the sixth side wall 420 of the rear case 400 by a predetermined height is formed on the second side wall 120 of the top chassis 100 corresponding to the sixth side wall 420 of the rear case 400. A portion of the second side wall 120 of the top chassis 100 is partially cut in the direction parallel with

the bottom face 450 of the rear case 400, and the cut portion of the second side wall 120 of the top chassis 100 is extended toward the sixth side wall 420 of the rear case 400. The fifth protuberance 122 protrudes toward the sixth side wall 420 of the rear case 400.

[0083] When the top chassis 100 is received in the rear case 400, the fifth protuberance 122 of the top chassis 100 is inserted into the fifth fixing groove 422a of the rear case 400. The liquid crystal display module 300 moves toward the seventh side wall 430 of the rear case 400 when the fifth protuberance 122 makes contact with a bottom face of the fifth fixing groove 422a. The fifth protuberance 122 is combined with the eleventh fixing groove 422b so that the liquid crystal display module 300 is fixed in the rear case 400. Namely, the fifth protuberance 122 is fixed by an upper end of the fifth protruding portion 422 adjacent the eleventh fixing groove 422b, thereby preventing the liquid crystal display module 300 from being moved through the opened upper face of the rear case 400. Therefore, the liquid crystal display module 300 received in the rear case 400 cannot move through the opened upper face of the rear case 400.

[0084] FIG. 14 is a cross-sectional view taken along the line of A₁-A₂ for illustrating the assembled structure of the top chassis and the rear case shown in FIG. 7A, and FIG. 15 is a cross-sectional view taken along the line of B₁-B₂ for illustrating the assembled structure of the liquid crystal display device shown in FIG. 8.

[0085] Referring to FIG. 14, the back light assembly 360 is received in the mold frame 200. In particular, a reflection plate 340 is received in a bottom face of the mold frame 200, and then a light guiding plate 330 is mounted thereon. Optical sheets 350 are mounted on the light guiding plate 330 so that the back light assembly 360 is received in the mold frame 200. The display unit 310 is mounted on the back light assembly 360.

[0086] When the back light assembly 360 and the display unit 310 are received in the mold frame 200, the top chassis 100 is provided for fixing the back light assembly 360 and the display unit 310 in the mold frame 200. The top chassis 100 is combined with the mold frame 200, thereby completing the liquid crystal display module 300.

[0087] The completed liquid crystal display module 300 is received in the rear case 400. The sixth protuberance 123 formed on the second side wall 120 of the top chassis 100 is combined with the sixth and twelfth fixing grooves 423a and 423b formed on the sixth side wall 420 of the rear case 400. That is, the sixth protuberance 123 of the top chassis 100 moves along the sixth fixing groove 423a toward the twelfth fixing groove 423b to be combined therewith. Hence, the liquid crystal display module 300 is fixed in the rear case 400 so that the liquid crystal display module 300 is not separated from the rear case 400 through the opened upper face of the rear case 400.

[0088] Referring to FIG. 15, the front case 500 is combined with the rear case 400 after the liquid crystal display module 300 is received in the rear case 400. The ninth protuberance 511 is formed on the first upper face 510 of the front case 500. The ninth protuberance 511 protrudes from the first upper face 510 toward the rear case 400 and has a width substantially identical to the width W1 of the isolation space A formed between the liquid crystal display module

300 and the rear case **400**. Also, a height of the ninth protuberance **511** is identical to a height of the eighth side wall **440**.

[0089] When the liquid crystal display module **300** is received in the rear case **400**, the liquid crystal display module **300** moves toward the seventh side wall **430** of the rear case **400** to be combined therewith. The isolation space A is formed between the eighth side wall **440** of the rear case **400** and the fourth side wall **140** of the top chassis **100**. The ninth protuberance **511** formed on the first upper face **510** of the front case **500** is inserted into the isolation space A. Therefore, the liquid crystal display module **300** does not move toward the eighth side wall **440** of the rear case **400**.

[0090] FIG. 16 is a plan view showing a front case according to another embodiment of the present invention, and FIGS. 17 and 18 are cross-sectional views illustrating a combination of the front case and the rear case shown in FIG. 16.

[0091] Referring to FIG. 16, eleventh to sixteenth protuberances **531**, **532**, **533**, **541**, **542** and **543** toward the bottom face **450** of the rear case **400** are respectively formed on the third and fourth upper faces **530** and **540** of the front case **500** except the first and second upper faces **510** and **520** of the front case **500**. The eleventh to sixteenth protuberances **531**, **532**, **533**, **541**, **542** and **543** correspond to the first to sixth fixing grooves **411a**, **412a**, **413a**, **421a**, **422a** and **423a** of the rear case **400**, respectively. In addition, the eleventh to sixteenth protuberances **531**, **532**, **533**, **541**, **542** and **543** are spaced from the side walls of the front case **500** by a length identical to a width of each of the fifth and sixth side walls **410** and **420** of the rear case **400**.

[0092] As shown in FIGS. 17 and 18, after the liquid crystal display module **300** is received in the rear case **400**, the eleventh to thirteenth protuberances **531**, **532** and **533** are respectively inserted into the first to third fixing grooves **411a**, **412a** and **413a** when the front case **500** is combined with the rear case **400**. Heights of the eleventh to thirteenth protuberances **531**, **532** and **533** are substantially the same as those of the first to third fixing grooves **411a**, **412a** and **413a**. As a result, a wall of each of the eleventh to thirteenth protuberances **531**, **532** and **533** close an inlet of each of the seventh to ninth fixing grooves **411b**, **412b** and **413b** when the eleventh to thirteenth protuberances **531**, **532** and **533** are received in the first to third fixing grooves **411a**, **412a** and **413a**. Therefore, the liquid crystal display module **300** cannot move toward the eighth side wall **440** of the rear case **400**.

[0093] Hereinafter, it will be described an assembled structure of a liquid crystal display module and cases of a liquid crystal display apparatus according to another embodiment of the present invention with reference to FIGS. 19 to 24.

[0094] FIG. 19 is an exploded perspective view showing a liquid crystal display apparatus according to another embodiment of the present invention, FIG. 20 is a plan view showing a structure of a rear case shown in FIG. 19, and FIG. 21 is a plan view showing a structure of a front case shown in FIG. 19. In FIG. 19, elements identical to those in FIG. 2 have the same reference numerals and the description concerning their functions will be omitted.

[0095] Referring to FIG. 19, a liquid crystal display apparatus **900** has a liquid crystal display module **300** for

displaying an image, and cases for receiving the liquid crystal display module **300**. Those cases include a front case **800** and a rear case **700**.

[0096] When a back light assembly **360** and a display unit **310** are successively received in a mold frame **200**, a top chassis **100** is mounted on the display unit **310**. The top chassis **100** covers an upper portion of the display unit **310** besides an effective display area of the display unit **310**, and insides of four side walls of the top chassis **100** are combined with outsides of side walls of the mold frame **200**, respectively.

[0097] First to third protuberances **111**, **112** and **113** are formed on a first side wall **110** of the top chassis **100**, and fourth to sixth protuberances **121**, **122** and **123** are formed on a second side wall **120** facing the first side wall **110** of the top chassis **100**.

[0098] As shown in FIG. 20, the rear case **700** includes a bottom face **750** and ninth to twelfth side walls **710**, **720**, **730** and **740**. Ninth to eleventh protruding portions **711**, **712** and **713** having a predetermined height are formed on the ninth side wall **710** of the rear case **700** combined with the first side wall **110** of the top chassis **100**. Also, twelfth to fourteenth protruding portions **721**, **722** and **723** having a predetermined height are formed on the tenth side wall **720** of the rear case **700** combined with the second side wall **120** of the top chassis **100**.

[0099] Fifteenth to seventeenth fixing grooves **711a**, **712a** and **713a** are respectively formed on the ninth to eleventh protruding portions **711**, **712** and **713** from an upper end of the ninth side wall **710** toward the bottom face **750** of the rear case **700**. Eighteenth to twentieth fixing grooves **721a**, **722a** and **723a** are respectively formed on the twelfth to fourteenth protruding portions **721**, **722** and **723** from an upper end of the tenth side wall **720** of the rear case **700** toward the bottom face **750** of the rear case **700**.

[0100] Referring to FIG. 21, the front case **800** is combined with the rear case **700** after the liquid crystal display module **300** is received in the rear case **700**. Seventeenth to nineteenth protuberances **811**, **812** and **813** having a predetermined height are formed on a fifth upper face **810** of the front case **800** adjacent to the ninth side wall **710** of the rear case **700**. The seventeenth to nineteenth protuberances **811**, **812** and **813** are formed toward the bottom face **750** of the rear case **700**. In addition, twentieth to twenty-second protuberances **821**, **822** and **823** having a predetermined height toward the bottom face **750** of the rear case **700** are formed on a sixth upper face **820** of the front case **800** adjacent to the tenth side wall **720** of the rear case **700**. The seventeenth to twenty-second protuberances **811**, **812**, **813**, **821**, **822** and **823** are formed spaced from side walls of the front case **800** by a distance identical to each of the thickness of the ninth and tenth side walls **710** and **720**.

[0101] FIGS. 22 and 23 are partially cut perspective views illustrating a method for combining the top chassis with the rear case in FIG. 19, and FIG. 24 is a cross-sectional view showing an assembled structure of the top chassis, the rear case and the front case shown in FIG. 19.

[0102] Referring to FIGS. 22 and 23, the tenth protruding portion **712** formed on the ninth side wall **710** of the rear case **700** includes the sixteenth fixing groove **712a** formed

from an upper end of the ninth side wall **710** toward the bottom face **750** of the rear case **700**.

[0103] A second protuberance **112** having a predetermined height toward the ninth side wall **710** of the rear case **700** is formed on the first side wall **110** of the top chassis **100** corresponding to the ninth side wall **710** of the rear case **700**. The first side wall **110** of the top chassis **100** is partially cut in parallel with the bottom face **750** of the rear case **700** and toward the ninth side wall **710** of the rear case **700**, and the second protuberance **112** is protruded toward a cut portion of the first side wall **110** of the top chassis **100**. When the top chassis **100** is received in the rear case **700**, the second protuberance **112** of the top chassis **100** is inserted into the sixteenth fixing groove **712a** of the rear case **700**.

[0104] Referring to FIG. 24, when the liquid crystal display module **300** is received in the rear case **700**, the front case **800** is mounted thereon. The seventeenth to nineteenth protuberances **811**, **812** and **813** protruded from the fifth upper face **810** of the front case **800** are inserted into the fifteenth to seventeenth fixing grooves **711a**, **712a** and **713a**, respectively. That is, each of the fifteenth to seventeenth fixing grooves **711a**, **712a** and **713a** has a depth identical to a sum of heights of the first to third protuberances **111**, **112** and **113** of the top chassis **100** and heights of the seventeenth to nineteenth protuberances **811**, **812** and **813** of the front case **800**. The seventeenth to nineteenth protuberances **811**, **812** and **813** of the front case **800** pressurize the first to third protuberances **111**, **112** and **113**, thereby preventing the liquid crystal display module **300** from being deviated from the rear case **700**.

[0105] Hereinafter, it will be described an assembled structure of a liquid crystal display module and cases of a liquid crystal display apparatus according to still another embodiment of the present invention with reference to FIGS. 25 to 33.

[0106] FIG. 25 is an exploded perspective view showing a liquid crystal display apparatus according to still another embodiment of the present invention, FIG. 26 is a plan view showing a structure of a top chassis shown in FIG. 25, FIG. 27 is a partial perspective view showing a structure of the top chassis shown in FIG. 25, and FIGS. 28 and 29 are side views illustrating the top chassis shown in FIG. 25.

[0107] Referring to FIG. 25, a liquid crystal display apparatus **1600** has a liquid crystal display module **1300** for displaying an image, and cases for receiving the liquid crystal display module **1300**. Those cases include a front case **1500** and a rear case **1400**.

[0108] When a back light assembly and a display unit are successively received in a mold frame **1200**, a top chassis **1100** is mounted on the display unit. The top chassis **1100** has a rectangular cramp shape. The top chassis **1100** covers an upper portion of the display unit except for an effective display area of the display unit, and insides of four side walls of the top chassis **1100** are combined with outsides of side walls of the mold frame **1200**, respectively.

[0109] As shown in FIGS. 26 to 29, the top chassis **1100** has thirteenth to sixteenth side walls **1110**, **1120**, **1130** and **1140**. Twenty-third to twenty-fifth protuberances **1111**, **1112** and **1113** each having a predetermined height are formed on the thirteenth side wall **1110** of the top chassis **1100**, and twenty-sixth to twenty-eighth protuberances **1121**, **1122** and

1123 each having a predetermined height are formed on the fourteenth side wall **1120** corresponding to the thirteenth side wall **1110**. Also, twenty-ninth and thirtieth protuberances **1131** and **1132** each having a predetermined height are formed on the fifteenth side wall **1130** of the top chassis **1100**. The twenty-third to thirtieth protuberances **1111**, **1112**, **1113**, **1121**, **1122**, **1123**, **1131** and **1132** are formed by cutting predetermined portions of the thirteenth to fifteenth side walls **1110**, **1120** and **1130** of the top chassis **1100**. The twenty-fourth, twenty-fifth, twenty-seventh and twenty-eighth protuberances **1112**, **1113**, **1122** and **1123** are extended parallel with a bottom face **1450** of the rear case **1400**, with various shapes. The twenty-fourth, twenty-fifth, twenty-seventh and twenty-eighth protuberances **1112**, **1113**, **1122** and **1123** respectively have semicircular shapes, trapezoidal shapes or rectangular shapes when observed from the front and rear cases **1500** and **1400**. Among them, trapezoidal shapes are preferable. In the meantime, the twenty-third and twenty-sixth protuberances **1111** and **1121** are extended perpendicular to the bottom face **1450** of the rear case **1400**. The twenty-third and twenty-sixth protuberances **1111** and **1121** have trapezoidal shapes when observed from the nineteenth side wall **1430** of the rear case **1400**.

[0110] FIG. 30 is a partially cut perspective view showing the rear case shown in FIG. 25.

[0111] Referring to FIGS. 25 and 30, the rear case **1400** has seventeenth to twentieth side walls **1410**, **1420**, **1430** and **1440**, and the bottom face **1450** enclosed by the seventeenth to twentieth side walls **1410**, **1420**, **1430** and **1440**. An upper face of the rear case **1400** corresponding to the bottom face **1450** is opened. Fifteenth and sixteenth protruding portions **1412** and **1413** each having a predetermined height are formed on the seventeenth side wall **1410** of the rear case **1400** combined with the thirteenth side wall **1110** of the top chassis **1100**. Seventeenth and eighteenth protruding portions **1422** and **1423** each having a predetermined height are formed on the eighteenth side wall **1420** of the rear case **1400** combined with the fourteenth side wall **1120** of the top chassis **1100**.

[0112] Twenty-first to twenty-fourth fixing grooves **1412a**, **1413a**, **1422a** and **1423a** are formed on the fifteenth to eighteenth protruding portions **1412**, **1413**, **1422** and **1423**. The twenty-first to twenty-fourth fixing grooves **1412a**, **1413a**, **1422a** and **1423a** are formed from upper ends of the seventeenth and eighteenth side walls **1410** and **1420** of the rear case **1400** toward the bottom face **1450** of the rear case **1400**. Also, twenty-fifth to twenty-eighth fixing grooves **1412b**, **1413b**, **1422b** and **1423b** are formed on the fifteenth to eighteenth protruding portions **1412**, **1413**, **1422** and **1423**. The twenty-fifth to twenty-eighth fixing grooves **1412b**, **1413b**, **1422b** and **1423b** are parallel with the bottom face **1450** of the rear case **1400** and protrude toward the nineteenth side wall **1430**.

[0113] First and second fixing protuberances **1411** and **1412** are respectively formed on the seventeenth and eighteenth side walls **1410** and **1420** of the rear case **1400**, and the first and second fixing protuberances **1411** and **1412** are combined with the twenty-third and twenty-sixth protuberances **1111** and **1121**, respectively. The first and second fixing protuberances **1411** and **1412** respectively have supporting portions **1411a** and **1421a**, and bodies **1411b** and **1421b**. Supporting portions **1411a** and **1421a** protrude

toward opposite side walls by a predetermined height, and bodies **1411b** and **1421b** are extended from ends of supporting portions **1411a** and **1421a** toward the nineteenth side wall **1430**. Suspending portions **1411c** and **1421c** are formed on sides of the bodies **1411b** and **1421b**, and the suspending portions **1411c** and **1421c** are protruded from the bodies **1411b** and **1421b**. The suspending portions **1411c** and **1421c** are engaged with the twenty-third and the twenty-sixth protuberances **1111** and **1121**.

[0114] The bodies **1411b** and **1421b** are separated from the seventeenth and the eighteenth side walls **1410** and **1420** by a predetermined interval, and the suspending portions **1411c** and **1421c** have a slope shape that is gradually wider toward the nineteenth side wall **1430** of the rear case **1400**.

[0115] Twenty-ninth and thirtieth fixing grooves **1431a** and **1432a** are formed on the nineteenth and twentieth protruding portions **1431** and **1432** which are formed on the nineteenth side wall **1430** of the rear case **1400** and protrude toward the twentieth side wall **1440** by a predetermined height. The twenty-ninth and thirtieth fixing grooves **1431a** and **1432a** are combined with the twenty-ninth and thirtieth protuberances **1131** and **1132** formed on the fifteenth side wall **1130** of the top chassis **1100**, respectively.

[0116] FIG. 31 is a plan view showing the top chassis and the rear case shown in FIG. 25 before the top chassis is completely combined with the rear case, FIG. 32 is an enlarged plan view showing 'B' shown in FIG. 31, and FIG. 33 is a plan view illustrating an assembled structure of the top chassis and the rear case shown in FIG. 25.

[0117] Referring to FIG. 31, when the liquid crystal display module **1300** is received in the rear case **1400**, the twenty-fourth and twenty-fifth protuberances **1112** and **1113** formed on the thirteenth side wall **1110** of the top chassis **1100** are respectively combined with the twenty-first and twenty-second fixing grooves **1412a** and **1413a** formed on the seventeenth side wall **1410** of the rear case **1400**. Also, the twenty-seventh and twenty-eighth protuberances **1122** and **1123** of the top chassis **1100** are respectively combined with the twenty-third and twenty-fourth fixing grooves **1422a** and **1423a** of the rear case **1400**.

[0118] The twenty-third and twenty-sixth protuberances **1111** and **1121** make contact with portions of bodies **1411a** and **1421b** positioned between the supporting portions **1411a** and **1421a** and the suspending portions **1411c** and **1421c** of the first and second fixing protuberances **1411** and **1421**.

[0119] When the liquid crystal display module **1300** moves toward the nineteenth side wall **1430** of the rear case **1400**, the twenty-fourth and twenty-fifth protuberances **1112** and **1113** formed on the thirteenth side wall **1110** of the top chassis **1100** are respectively combined with the twenty-fifth and twenty-sixth fixing grooves **1412b** and **1413b** formed on the seventeenth side wall **1410** of the rear case **1400**. In addition, the twenty-seventh and twenty-eighth protuberances **1122** and **1123** formed on the fourteenth side wall **1120** of the top chassis **1100** are respectively combined with the twenty-seventh and twenty-eighth fixing grooves **1422a** and **1423b** formed on the eighteenth side wall **1420** of the rear case **1400**.

[0120] Referring to FIG. 32, the twenty-third and twenty-sixth protuberances **1111** and **1121** are inclined to the

seventeenth and eighteenth side walls **1410** and **1420** of the rear case **1400** and move toward the nineteenth side wall **1430** of the rear case **1400** through the suspending portions **1411c** and **1421c** having slope shapes as those bodies **1411b** and **1421b** are inclined toward the seventeenth and eighteenth side walls **1410** and **1420** of the rear case by elastic forces of bodies **1411b** and **1421b**.

[0121] As shown in FIG. 33, the twenty-third and twenty-sixth protuberances **1111** and **1121** are engaged with bodies **1411b** and **1421b** at ends of the suspending portions **1411c** and **1421c**, and the bodies **1411b** and **1421b** support the twenty-third and the twenty-sixth protuberances **1111** and **1121** by restoring force of the bodies **1411b** and **1421b**. The twenty-third and twenty-sixth protuberances **1111** and **1121** are hung by the suspending portions **1411c** and **1421c**, thereby preventing the liquid crystal display module **1300** from being moved toward the twentieth side wall **1440** corresponding to the nineteenth side wall **1430** of the rear case **1400**.

[0122] Also, the twenty-ninth and thirtieth protuberances **1131** and **1132** formed on the fifteenth side wall **1130** of the top chassis **1100** are respectively combined with the twenty-ninth and thirtieth fixing grooves **1431a** and **1432a** formed on the nineteenth side wall **1430** of the rear case **1400** when the liquid crystal display module **1300** moves toward the nineteenth side wall **1430** of the rear case **1400**. Therefore, the liquid crystal module **1300** is not separated from the rear case **1400** through the open upper face of the rear case **1400**.

[0123] An isolation space A is formed between the liquid crystal display module **1300** and the twentieth side wall **1440** of the rear case **1400** as shown in FIG. 33. Also, at least one protuberance inserted into the isolation space A may be formed on an upper face of the front case **1500** corresponding to the twentieth side wall **1440** of the rear case **1400** so as to more effectively prevent the liquid crystal display module **1300** from being moved toward the isolation space A.

[0124] As described above, according to the liquid crystal display apparatus of the present invention, protuberances are formed on the top chassis, and fixing portions to be combined with the protuberances are formed on the rear case facing the top chassis. Also, fixing protuberances are formed on predetermined portions of the front case, and the fixing protuberances are inserted into between the liquid crystal display module and the rear case.

[0125] Therefore, the liquid crystal display module is fixed in the rear case as the protuberances formed on the top chassis are combined with the fixing portions formed on the rear case, and also the liquid crystal display module is tightly fixed therein by the fixing protuberances formed on the front case.

[0126] In addition, the combining strength between the liquid crystal module and the cases can increase, and productivity of the liquid crystal display apparatus can be improved by reducing the number of parts demanded in order to assemble the liquid crystal module and cases.

[0127] Although the preferred embodiments of the present invention have been described, it is understood that the present invention should not be limited to these preferred embodiments but various changes and modifications can be

made by one skilled in the art within the spirit and scope of the present invention as hereinafter claimed.

What is claimed is:

1. A liquid crystal display apparatus comprising:

a liquid crystal display module having at least one first protruding portion;

a rear case for receiving said liquid crystal display module, said rear case having at least one first fixing portion for guiding and fixing said at least one first protruding portion; and

a front case combined with said rear case, said front case having at least one second protruding portion for fixing said liquid crystal display module.

2. The liquid crystal display apparatus of claim 1, wherein said liquid crystal display module comprises:

a back light assembly for generating a light;

a display unit for receiving the light to display an image;

a mold frame for receiving said back light assembly and said display unit; and

a top chassis for fixing said display unit and said back light assembly to said mold frame by combining with said mold frame, said top chassis having opposing first and second side walls wherein each of said first and second side walls of said top chassis comprises said at least one first protruding portion.

3. The liquid crystal display apparatus of claim 2, wherein said rear case comprises third and fourth side walls corresponding to said first and second side walls of said top chassis, and each of said third and fourth side walls comprises said at least one first fixing portion.

4. The liquid crystal display apparatus of claim 3, wherein said at least one first fixing portion comprises:

at least one first fixing groove extended from upper faces of said third and fourth side walls of said rear case toward a bottom face of said rear case; and

a second fixing groove extended from a lower portion of said first fixing groove toward a fifth side wall disposed between said third and fourth side walls of said rear case.

5. The liquid crystal display apparatus of claim 4, wherein said liquid crystal display module slides toward said second fixing groove of said rear case to be combined with said rear case when said at least one first protruding portion of said top chassis is received in said first fixing groove of said rear case.

6. The liquid crystal display apparatus of claim 4, wherein said at least one second protruding portion is protruded from a first and a second upper faces of said front case corresponding to said third and fourth side walls of said rear case, and said at least one second protruding portion is received in said at least one first fixing groove of said rear case.

7. The liquid crystal display apparatus of claim 6, wherein a bottom face of said at least one second protruding portion of said front case directly contacts a bottom face of said at least one first fixing groove of said rear case.

8. The liquid crystal display apparatus of claim 4, wherein said front case comprises a third upper face corresponding to a sixth side wall opposing said fifth side wall of said rear

case, and said third upper face comprises a third protruding portion protruded toward said bottom face of said rear case.

9. The liquid crystal display apparatus of claim 8, wherein said third protruding portion of said front case is received in an isolation space formed between said sixth side wall of said rear case and said liquid crystal display module, and a bottom face of said third protruding portion directly contacts said bottom face of said rear case.

10. The liquid crystal display apparatus of claim 4, wherein said top chassis comprises a seventh side wall corresponding to said fifth side wall of said rear case, and said seventh side wall comprises a fourth protruding portion protruded toward said fifth side wall of said rear case.

11. The liquid crystal display apparatus of claim 10, wherein said fifth side wall of said rear case comprises at least one second fixing portion having a third fixing groove formed thereon.

12. The liquid crystal display apparatus of claim 11, wherein said liquid crystal display module is fixed as said fourth protruding portion of said top chassis is received in said third fixing groove formed on said second fixing portion of said rear case when said liquid crystal display module slides toward said fifth side wall of said rear case.

13. The liquid crystal display apparatus of claim 3, wherein said at least one first fixing portion comprises at least one fixing groove extended from upper faces of said third and fourth side walls of said rear case toward a bottom face of said rear case.

14. The liquid crystal display apparatus of claim 13, wherein said at least one second protruding portion is protruded by a predetermined height from first and second upper faces of said front case corresponding to said third and fourth side wall of said rear case.

15. The liquid crystal display apparatus of claim 14, wherein said liquid crystal display module combines with said rear case by said first protruding portion of said top chassis being received in a lower portion of said fixing groove, and said second protruding portion of said front case received in an upper portion of said fixing groove so as to press said first protruding portion.

16. The liquid crystal display apparatus of claim 15, wherein a height of said fixing groove is substantially identical to a sum of heights of said first protruding portion of said top chassis and said second protruding portion of said front case.

17. A liquid crystal display apparatus comprising:

a liquid crystal display module having a first protruding portion and a second protruding portion; and

a rear case for receiving said liquid crystal display module, said rear case having a fixing groove for guiding and receiving said first protruding portion and a fixing protuberance combined with said second protruding portion, for fixing said liquid crystal display module to said rear case.

18. The liquid crystal display apparatus of claim 17, wherein said liquid crystal display module comprises:

a back light assembly for generating a light;

a display unit for receiving the light to display an image;

a mold frame for receiving said back light assembly and said display unit; and

a top chassis combined with said mold frame, for fixing said display unit and said back light assembly to said mold frame, said top chassis having opposing first and second side walls wherein each of said first and second side walls comprise first and second protruding portions.

19. The liquid crystal display apparatus of claim 18, wherein said rear case comprises third and fourth side walls corresponding to said first and second side walls of said top chassis, and each of said third and fourth side walls comprises said fixing groove corresponding to said first protruding portion formed on said first and second sidewalls of said top chassis.

20. The liquid crystal display apparatus of claim 19, wherein said fixing groove comprises:

a first fixing groove extended from upper faces of said third and fourth side walls of said rear case toward a bottom face of said rear case; and

a second fixing groove extended from a lower portion of said first fixing groove toward a fifth side wall of said rear case disposed between said third and fourth side walls.

21. The liquid crystal display apparatus of claim 20, wherein said liquid crystal display module slides toward said second fixing groove of said rear case to be combined with said rear case when said first protruding portion of said top chassis is received in said first fixing groove of said rear case.

22. The liquid crystal display apparatus of claim 18, wherein said rear case comprises third and fourth side walls corresponding to said first and second side walls of said top chassis, and each of said third and fourth side walls comprises said fixing protuberance corresponding to said second

protruding portion formed on said first and second side walls of said top chassis.

23. The liquid crystal display apparatus of claim 22, wherein said fixing protuberance comprises:

a supporting portion extending a predetermined height toward an opposing side wall;

a body extended from an end of said supporting portion toward a fifth side wall disposed between said third and fourth side walls and separated by a predetermined interval from said third side wall or said fourth side wall; and

a suspending portion extending from said body and engaging with said second protruding portion of said top chassis, preventing said liquid crystal display module from being moved.

24. The liquid crystal display apparatus of claim 23, wherein said suspending portion has a cross-section which gradually widens toward said fifth side wall of said rear case.

25. The liquid crystal display apparatus of claim 17, further comprising a front case combined with said rear case, said front case having first and second upper faces corresponding to third and fourth side walls of said rear case wherein each of said first and second upper faces comprises a third protruding portion having a predetermined height toward a bottom face of said rear case.

26. The liquid crystal display apparatus of claim 25, wherein said third protruding portion of said front case is received in said fixing groove, and a bottom face of said third protruding portion directly contacts a bottom face of said fixing groove of said rear case.

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摘要(译)			

公开了一种液晶显示装置，其中液晶显示模块和壳体紧密结合。形成在液晶显示模块的顶部框架上的至少一个突起将至少一个固定部分组合在一起，该固定部分形成在对应于至少一个突起的后壳体的一部分上。而且，形成在前壳的一部分上的固定突起插入液晶显示模块和后壳之间，从而防止液晶显示模块移动。因此，液晶显示模块和壳体紧密结合，并且通过减少制造液晶显示模块和壳体所需的部件数量，可以提高液晶显示装置的生产率。

