



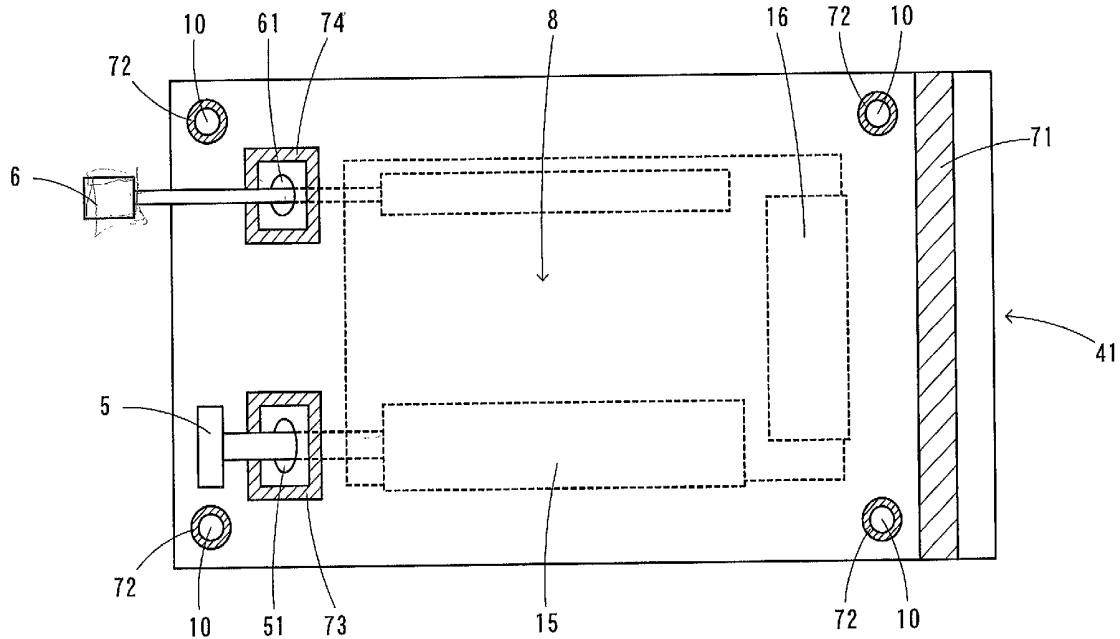
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(19) **United States**(12) **Patent Application Publication**
Nagasaki(10) **Pub. No.: US 2001/0010570 A1**(43) **Pub. Date: Aug. 2, 2001**(54) **DISPLAY MODULE AND METHOD FOR
MANUFACTURING THE SAME**(75) **Inventor: Yutoku Nagasaki, Tokyo (JP)**Correspondence Address:
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G02F 1/13(52) **U.S. Cl.** **349/61; 349/58; 349/187**(57) **ABSTRACT**

A display module comprises: a liquid crystal panel for displaying a predetermined image; a light emitter which is arranged on the liquid crystal panel and emits light for displaying an image; and a bag which contains and fixes the liquid display panel and the light emitter. The bag includes at least an area through which an image display area of the liquid crystal panel can be seen. The bag having an opening which is sealed up, and the inside thereof is retained in a low-pressure atmosphere. Hence, the bag fixes the liquid crystal panel and the light emitter.



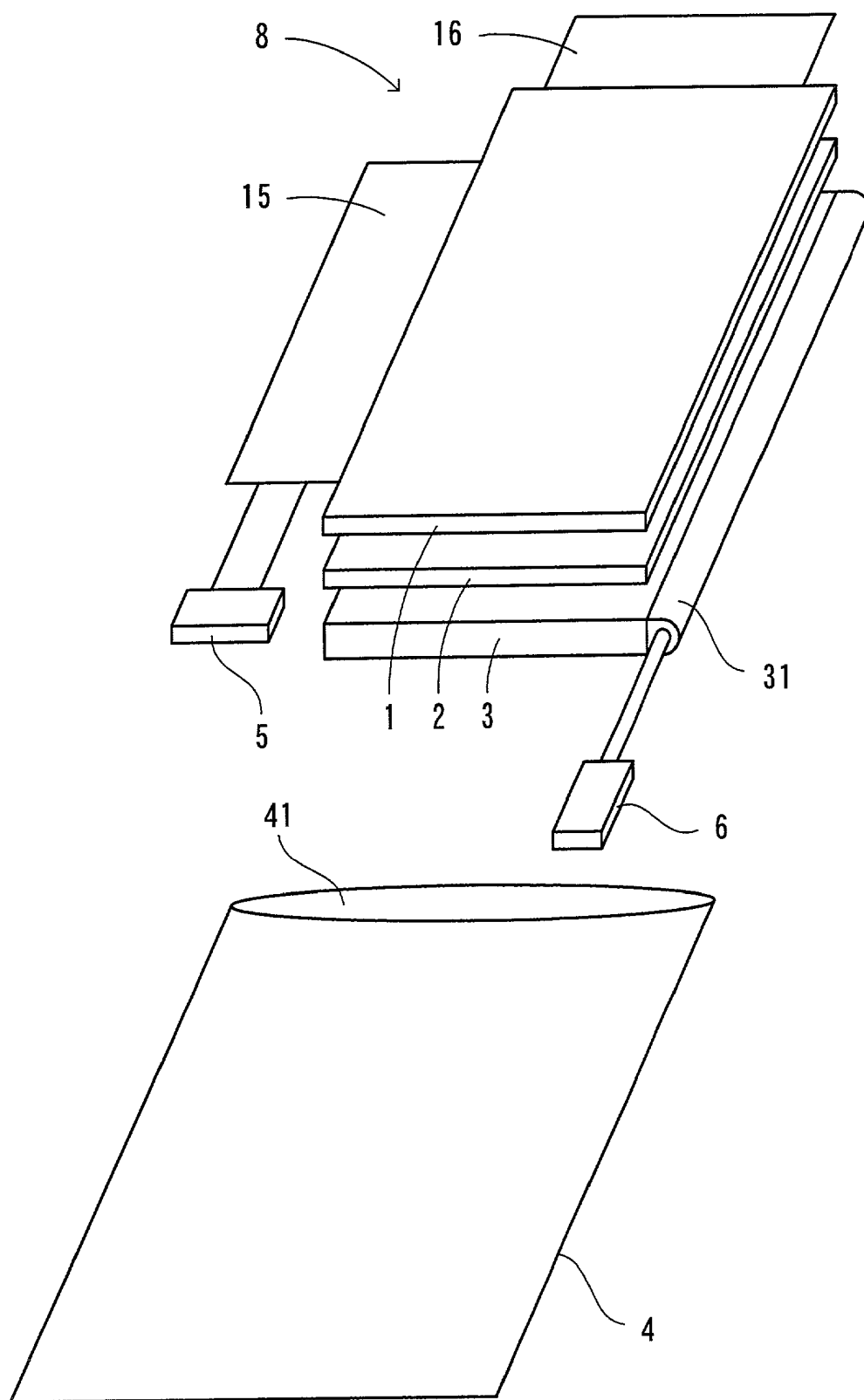


FIG. 1

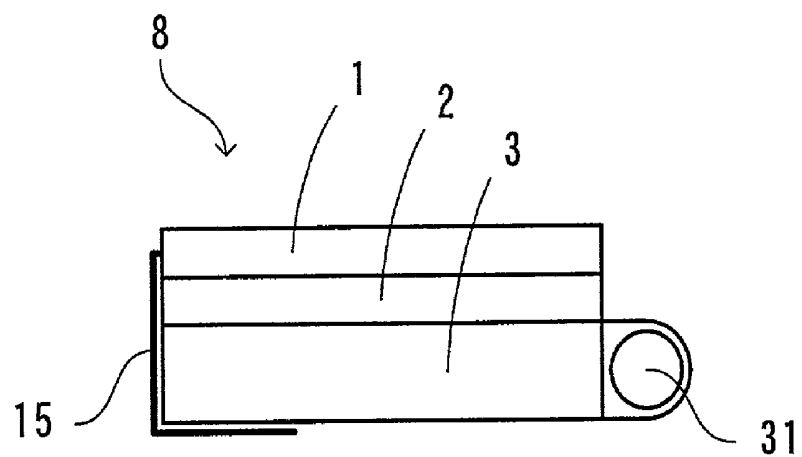


FIG. 2A

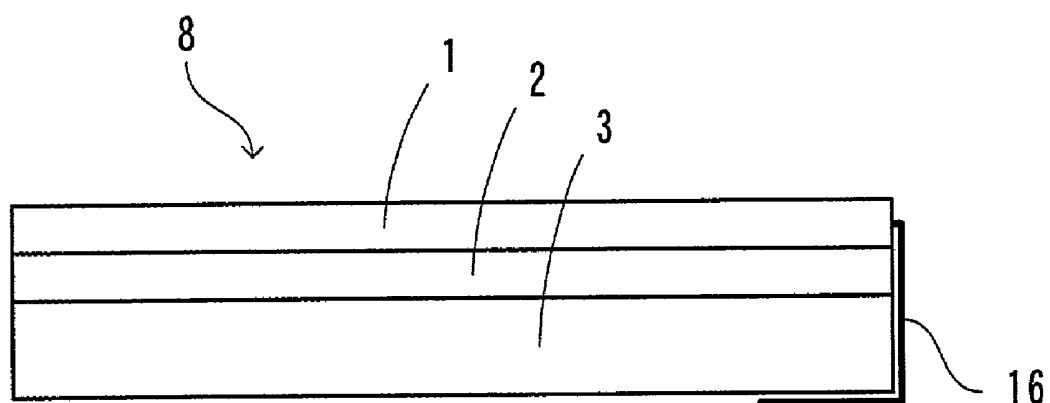


FIG. 2B

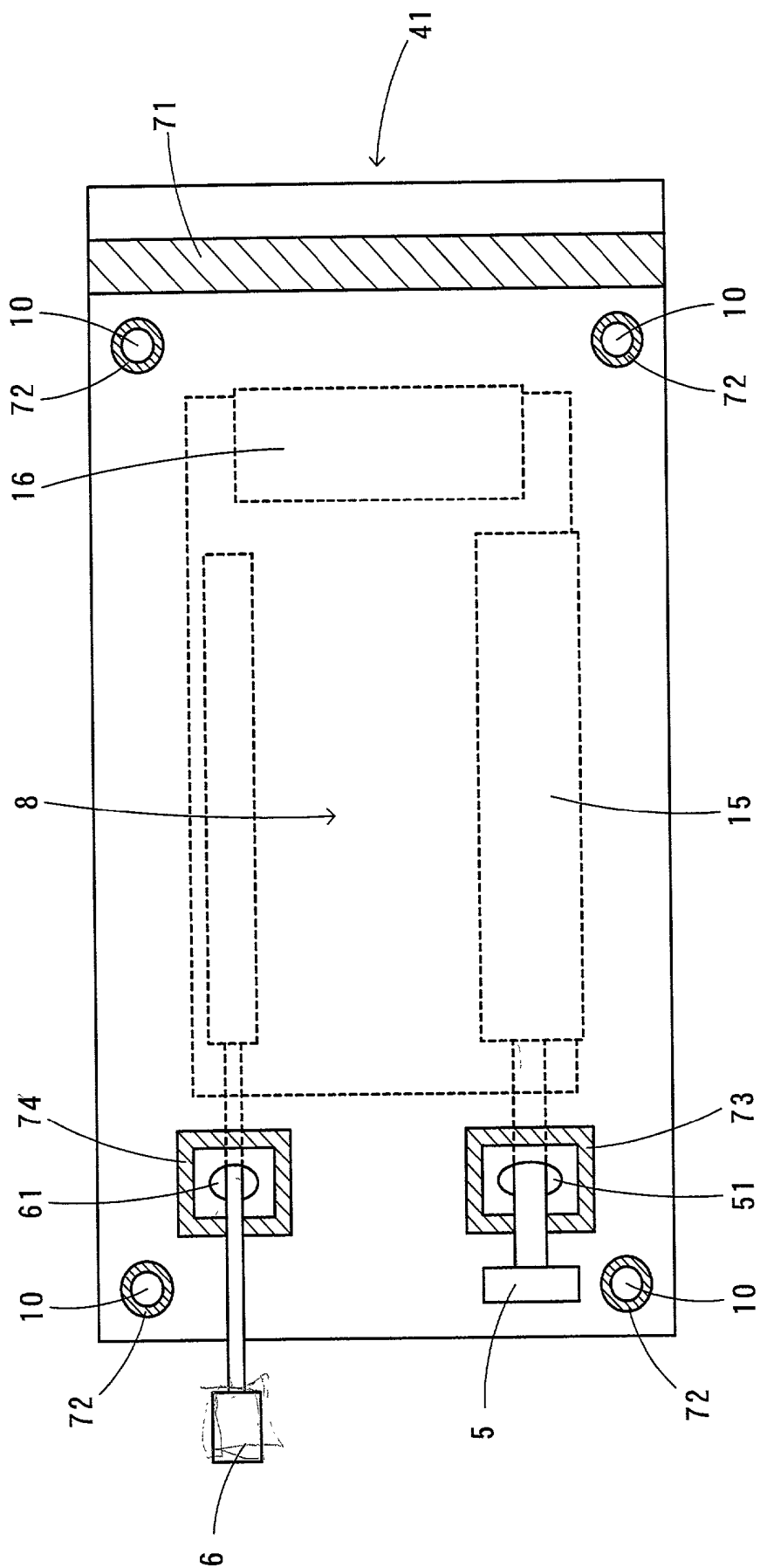


FIG. 3

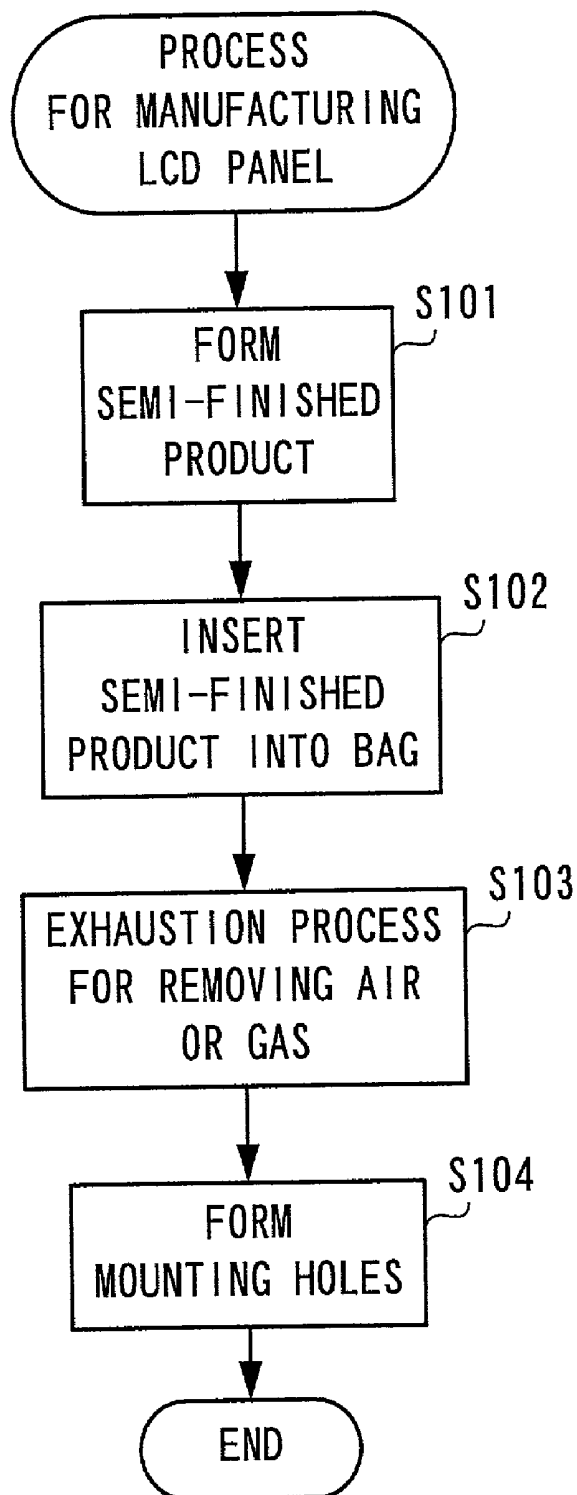


FIG. 4



FIG. 5A

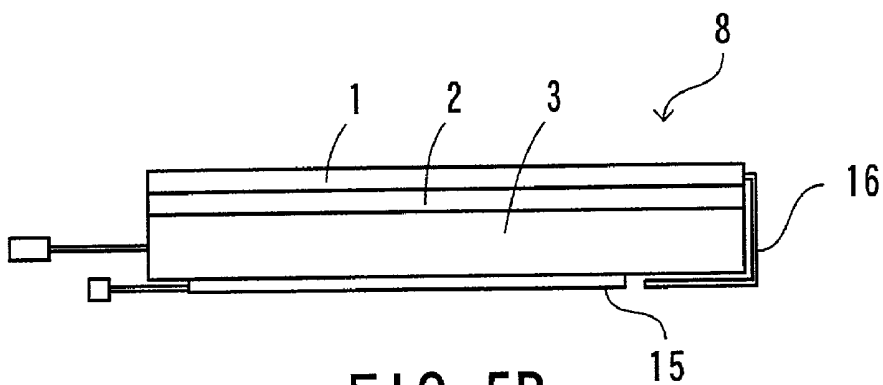


FIG. 5B

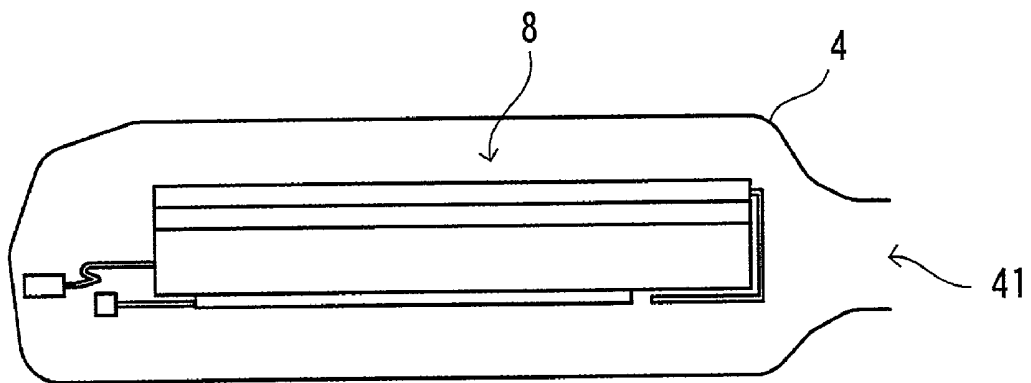


FIG. 5C

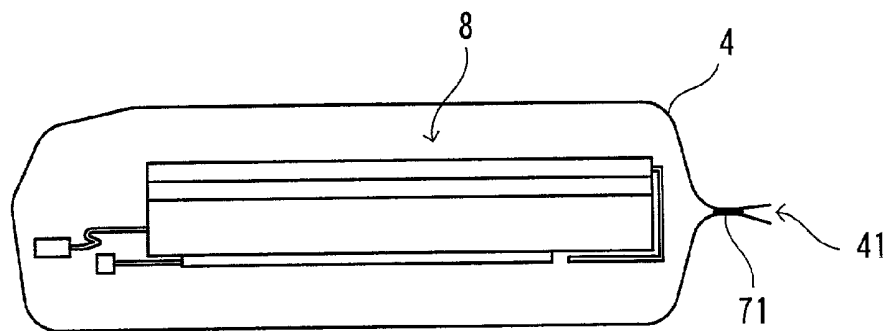


FIG. 5D

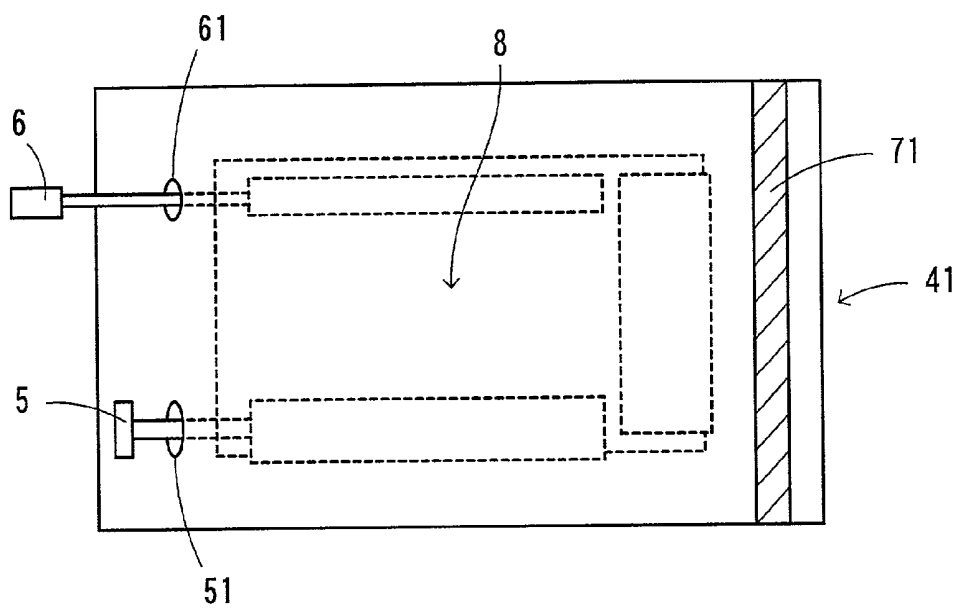


FIG. 5E

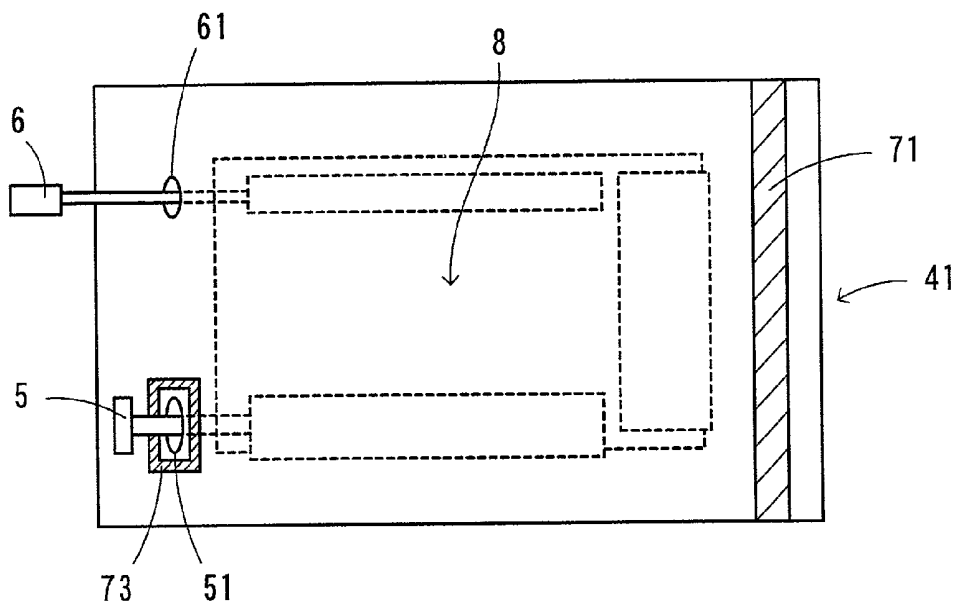


FIG. 5F

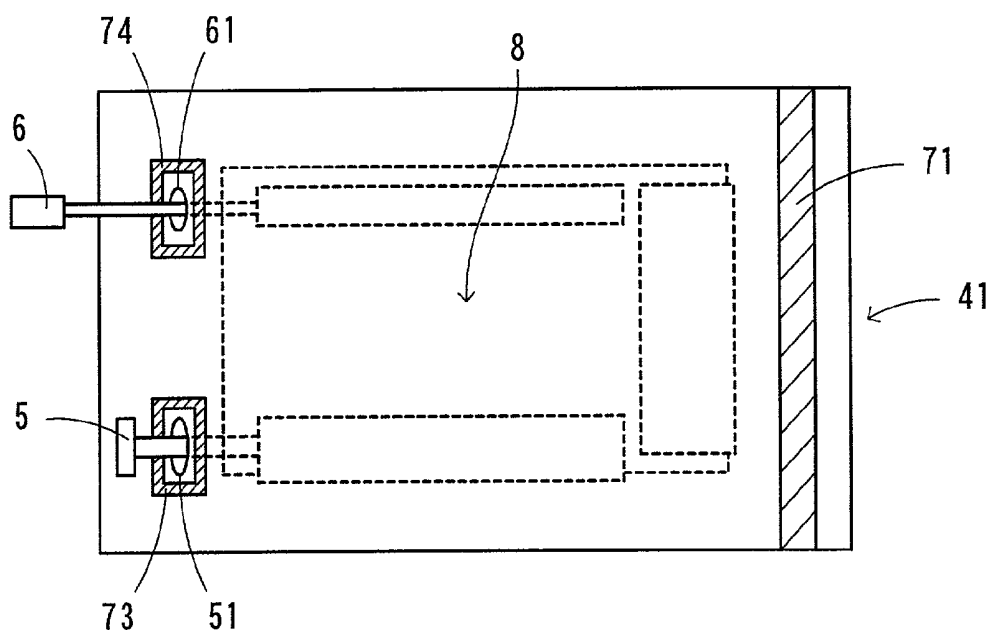


FIG. 5G

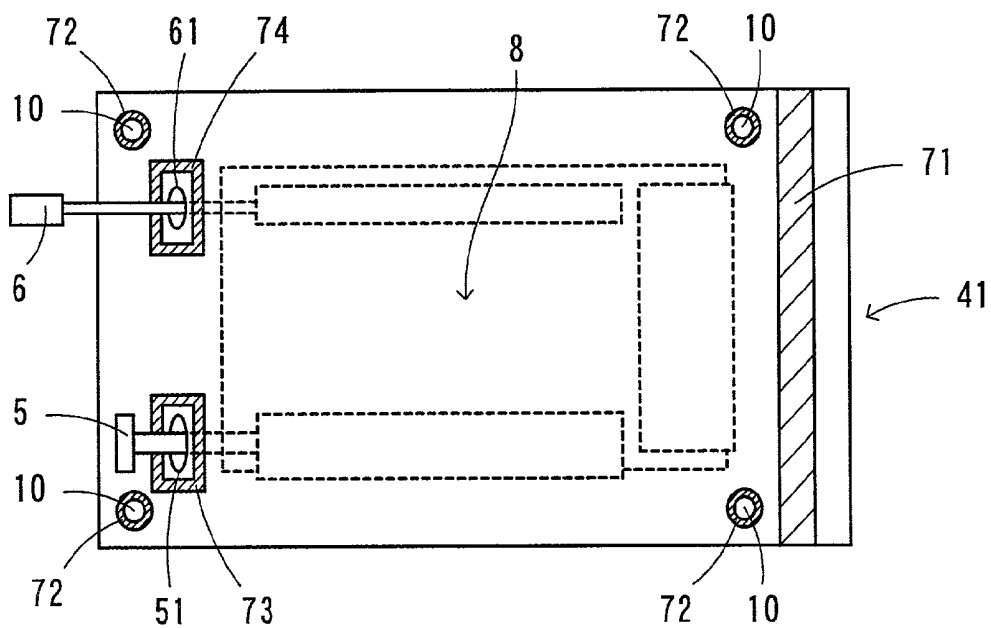


FIG. 5H

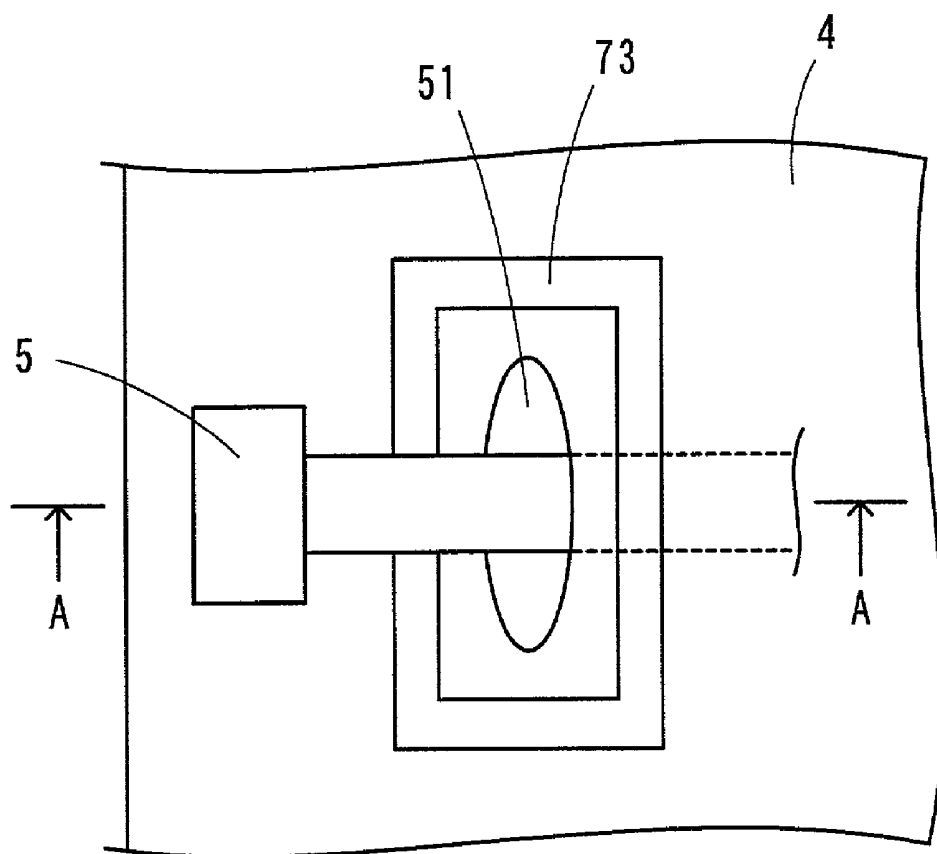


FIG. 6A

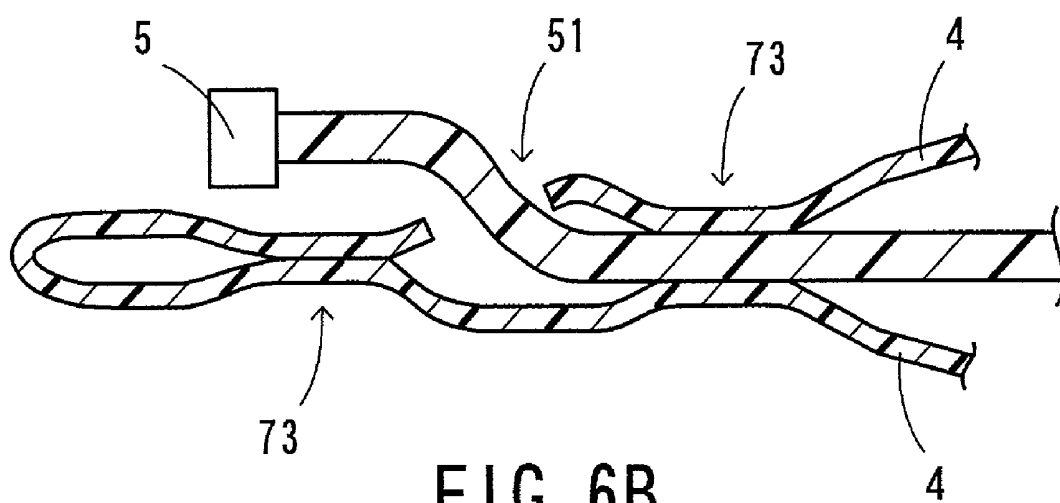


FIG. 6B

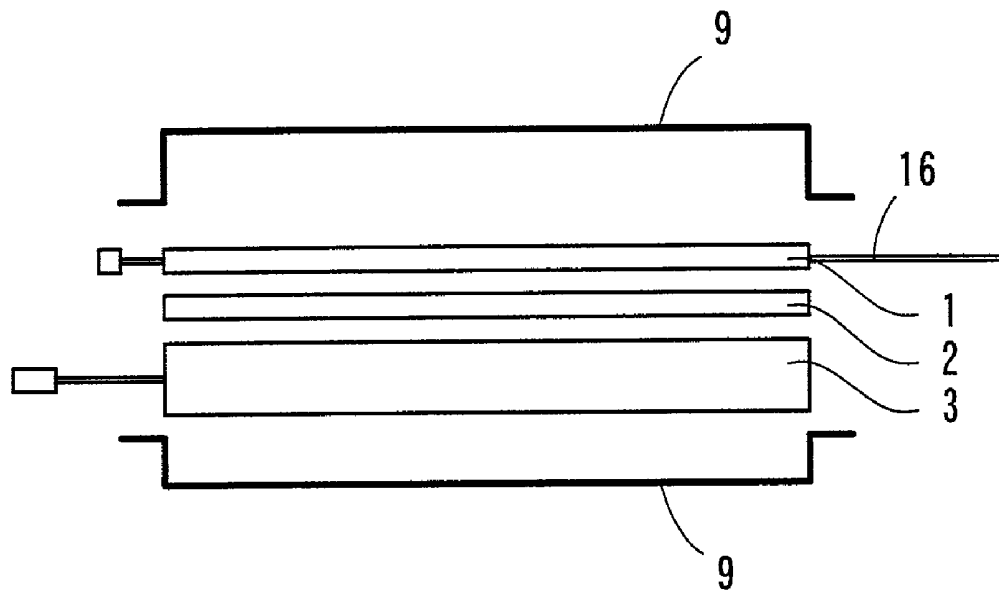


FIG. 7A

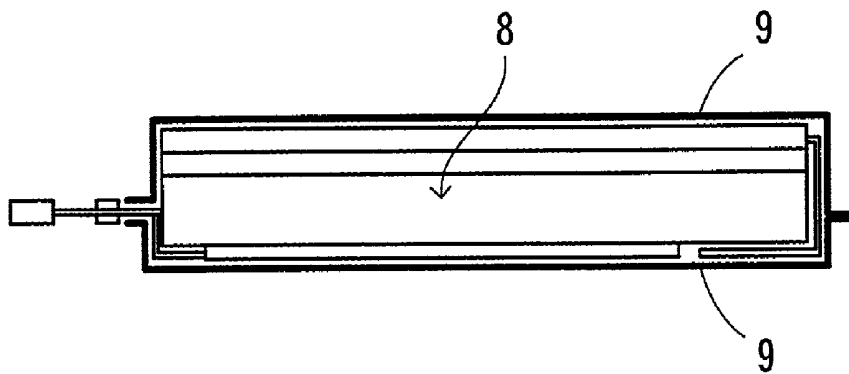


FIG. 7B

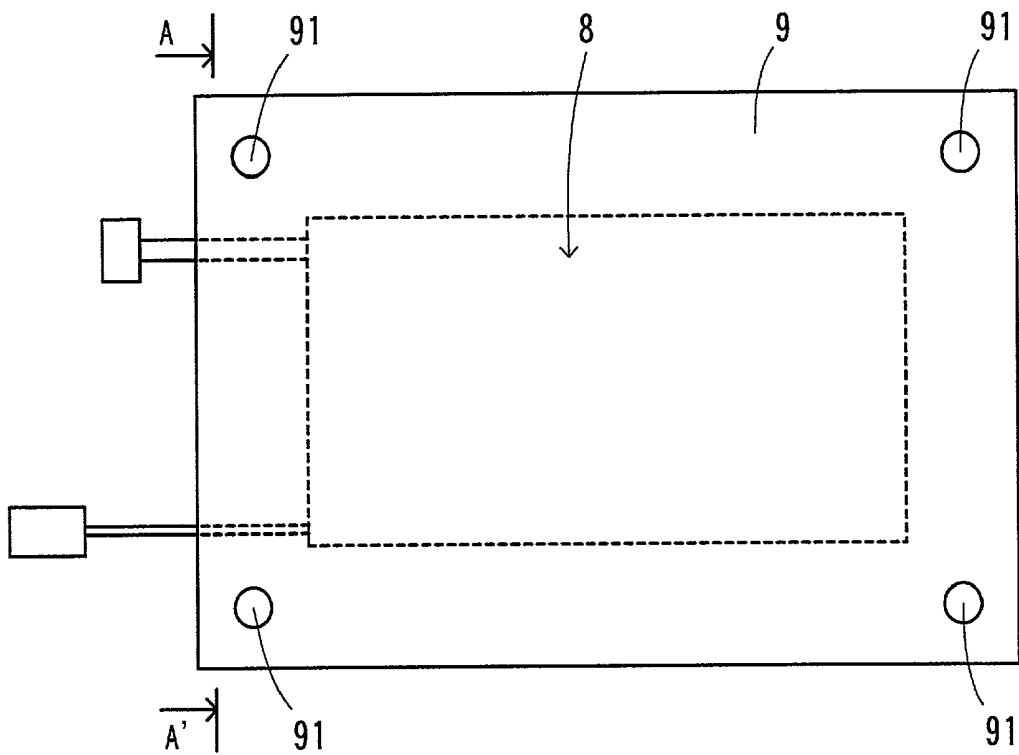


FIG. 8A

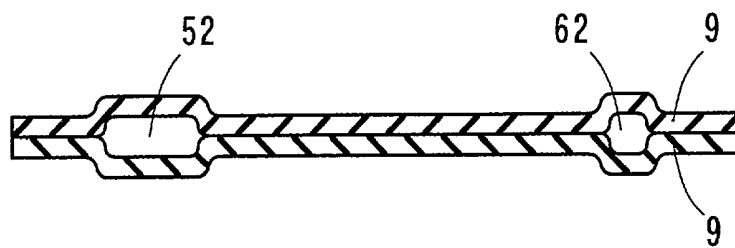


FIG. 8B

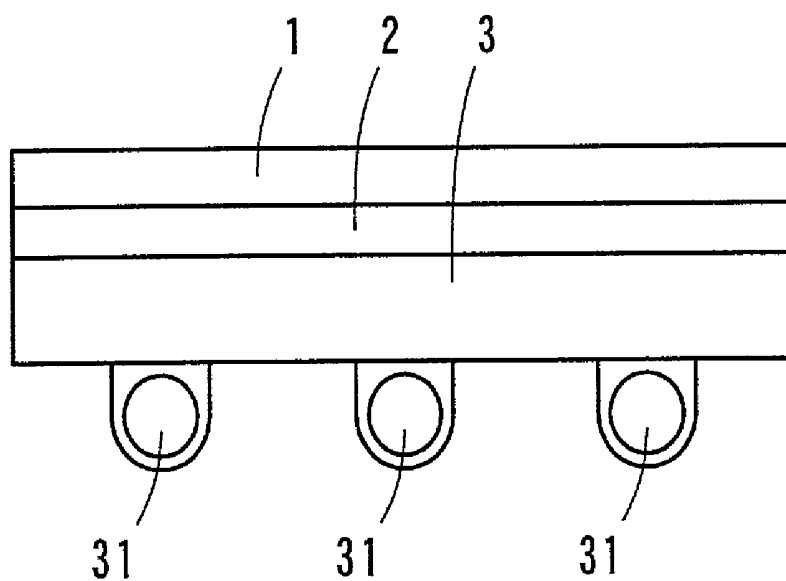


FIG. 9

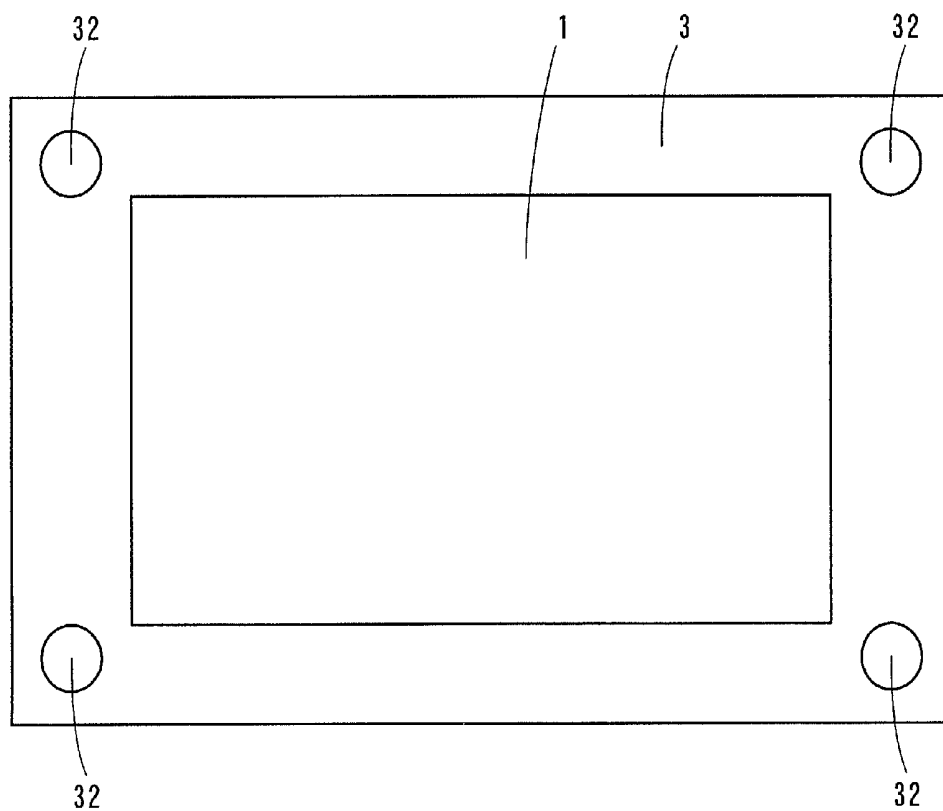


FIG. 10

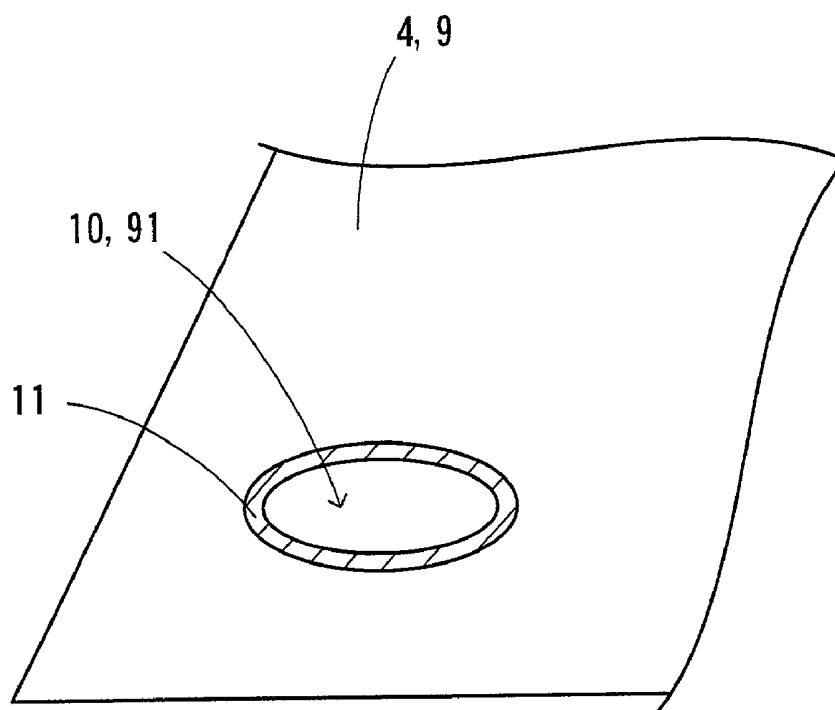


FIG. 11

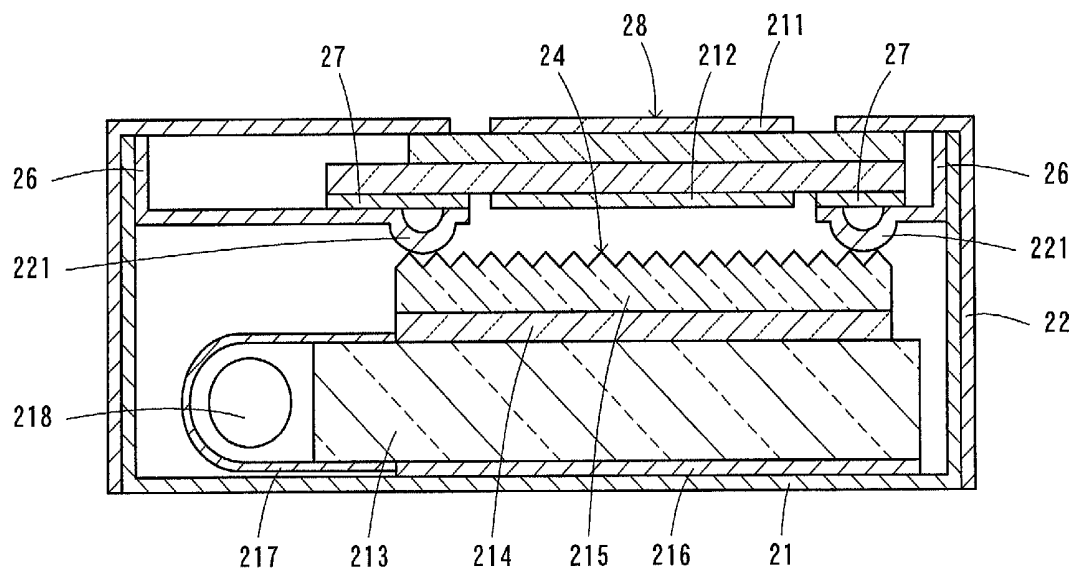


FIG. 12
(PRIOR ART)

DISPLAY MODULE AND METHOD FOR MANUFACTURING THE SAME

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a display module and a manufacturing method thereof, and, more particularly, to a display module having a backlight and a liquid crystal panel incorporated with each other and a manufacturing method thereof.

[0003] 2. Description of the Related Art

[0004] Generally, an LCD module is composed of a backlight unit having a backlight and a display unit having a liquid crystal panel, both of which are separately manufactured and are tightened up together with screws, etc.

[0005] In such an LCD module, because the backlight unit and the display unit are tightened and formed up with screws, etc., a lot of parts are needed in one LCD module. In other words, processes for manufacturing the LCD modules are quite complicated.

[0006] In order to reduce the number of parts, a well-known LCD module is one including the liquid crystal panel and the backlight which are incorporated with each other. One example of such an LCD module is disclosed in Unexamined Japanese Patent Application KOKAI Publication No. H10-282900.

[0007] In the LCD module disclosed in the above publication, a metal lower shield case **21** is engaged with a metal upper shield case **22**, as shown in **FIG. 12**. The lower shield case **21** and the upper shield case **22** are connected with each other with non-illustrated hooks, thus forming a case of the LCD module.

[0008] Inside the case of the LCD module, a conductive optical plate **213**, which includes a light source **218**, and an optical sheet **24**, which includes a diffusion sheet **214** and a prism sheet **215** layered on the diffusion sheet **214**, are included in a layered structure. Further, metal supporting plates **26** each including a projection **221** on the lower surface thereof is placed on the optical sheet **24**. A liquid crystal panel **28** including polarizing plates **211** and **212** is affixed onto the supporting plates **26** with both-sided adhesive tape **27**. Reference numerals **216** and **217** denote reflection plates in **FIG. 12**.

[0009] As explained, the LCD module disclosed in Unexamined Japanese Patent Application KOKAI Publication No. H10-282900 includes a lower shield case **21** and an upper shield case **22** which are made of metal. In this structure, the LCD module may not desirably operate.

[0010] Particularly, when the lower shield case **21** contacts the upper shield case **22** to be engaged with each other, a portion thereof may be rubbed with each other and metal dusts may come out. Such metal dusts may cause a short circuit between terminals in the display module. Hence, the LCD module does not desirably operate.

[0011] Since the metal cases are used, the LCD module is manufactured at a high cost.

[0012] The disclosure of Unexamined Japanese Patent Application KOKAI Publication No. H10-282900 is herein incorporated by reference in its entirety.

SUMMARY OF THE INVENTION

[0013] It is accordingly an object of the present invention to provide a display module, which can be manufactured at a low cost and can stably operate, and a method for manufacturing the same.

[0014] In order to accomplish the above object, according to the first aspect of the present invention, there is provided a display module comprising:

[0015] a liquid crystal panel which includes a display area for displaying an image, and displays a predetermined image;

[0016] a light emitter which is arranged on the liquid crystal panel, and emits light for displaying an image; and

[0017] a resin member which contains and fixes the liquid crystal panel and the light emitter, and includes at least an area through which the display area can externally be seen.

[0018] According to this invention, a display module, which can stably operate and can be manufactured at a low price, is provided.

[0019] The resin member may be a bag having an opening which is closed.

[0020] An inside of the resin member may be retained in a low-pressure atmosphere.

[0021] The display module may further comprise a connector for supplying a signal and power source for displaying a predetermined image, and

[0022] the resin member may have a lead-through hole for taking out the connector, and a peripheral section of the lead-through hole may be sealed up.

[0023] A peripheral section of the mounting hole may be sealed up.

[0024] The resin member may be a pair of shaped resins which are formed in an inward shape which is substantially same as an outward shape of the liquid panel and the light emitter which are joined together.

[0025] The resin member may have a mounting hole for mounting the display module on a corner of the resin member.

[0026] A peripheral section of the mounting hole may be reinforced with a reinforcing member.

[0027] The light emitter may be larger in size than the liquid crystal panel, and include the mounting hole in an area of the light emitter which sticks out from the liquid crystal panel.

[0028] The resin member may be formed from a transparent member.

[0029] According to the second aspect of the present invention, there is provided a method for manufacturing a display module, comprising:

[0030] forming a semi-finished product by putting a liquid crystal panel, which has a display area for displaying an image and displays a predetermined image, together with a light emitter, which emits light for displaying an image;

[0031] inserting the semi-finished product into a resin member including an area through which at least the display area can externally be seen; and

[0032] fixing the semi-finished product inside the resin member.

[0033] The resin member may be a bag; and

[0034] the fixing may include removing air or gas from the resin member, thereby hermetically connecting the resin member with the semi-finished product.

[0035] The display panel may include a connector for supplying a signal and power source for displaying a predetermined image, and

[0036] a lead-through hole for taking out the connector may be formed, after the semi-finished product is fixed inside the resin member.

[0037] The forming the lead-through hole may include forming the lead-through hole after a peripheral section of the hole is sealed up.

[0038] The forming the lead-through hole may include sealing up the peripheral section of the lead-through hole.

[0039] The display panel may include a connector for supplying a signal and power source for displaying a predetermined image, and

[0040] a lead-through hole for taking out the connector in the resin member may be formed, before fixing the semi-finished product inside the resin member.

[0041] The resin member may have an opening for inserting the semi-finished product; and

[0042] the fixing the semi-finished product inside the resin member may include removing air or gas from the resin member through the head-through hole, after sealing up the opening.

[0043] The fixing the semi-finished product may include sealing up the opening using a thermocompression technique or adhesive tape.

[0044] The resin member may be a pair of shaped resins which are formed as to have an inward shape which is substantially same as an outward shape of a state of the liquid crystal panel and the light emitter being joined together; and

[0045] the fixing the semi-finished product may include

[0046] sandwiching the semi-finished product with the pair of shaped resins, and

[0047] sealing up peripheral sections of the pair of shaped resins sandwiching the semi-finished product.

[0048] The method for manufacturing a display module may further comprise cutting off a predetermined area of the resin member, thereby exposing the display area.

[0049] The light emitter may be larger in size than the liquid crystal panel, and include a mounting hole for mounting the display module into another device in an area of the light emitter which sticks out from the liquid crystal panel, and

[0050] a penetrating hole may be formed by forming a hole in a position of the resin member which corresponds to a position of the mounting hole, after fixing the semi-finished product inside the resin member.

[0051] The sealing up may include sealing the peripheral sections of the pair of shaped resins using a thermocompression technique or with adhesive tape.

BRIEF DESCRIPTION OF THE DRAWINGS

[0052] The object and other objects and advantages of the present invention will become more apparent upon reading of the following detailed description and the accompanying drawings in which:

[0053] FIG. 1 is a diagram showing the structure of an LCD module according to the first embodiment of the present invention;

[0054] FIGS. 2A and 2B are diagrams each showing a semi-finished product forming the LCD module of FIG. 1;

[0055] FIG. 3 is a planer view of the LCD module of the first embodiment;

[0056] FIG. 4 is a flowchart for explaining a process for manufacturing the LCD module according to the first embodiment;

[0057] FIGS. 5A to 5H are diagrams each showing a manufacturing process of the LCD module;

[0058] FIG. 6A is a planer view showing the structure of peripheral sections of a lead-through hole, and FIG. 6B is a cross sectional view taken along a line A-A' of FIG. 6A;

[0059] FIGS. 7A and 7B are diagrams each showing the structure of an LCD module according to the second embodiment of the present invention;

[0060] FIG. 8A is a planer view of the LCD module according to the second embodiment, and FIG. 8B is a cross sectional view taken along a line A-A' of FIG. 8A;

[0061] FIG. 9 is a diagram showing another structure of a conductive optical plate;

[0062] FIG. 10 is a planer view showing the conductive optical plate in a state where the conductive optical plate has mounting holes;

[0063] FIG. 11 is a diagram showing one mounting hole having a reinforcing ring; and

[0064] FIG. 12 is a cross sectional view showing a conventional LCD module.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0065] An LCD (Liquid Crystal Display) module according to the first embodiment of the present invention will now be explained with reference to the accompanying drawings.

[0066] The LCD module of the first embodiment comprises a display panel 1, an optical sheet 2, a conductive optical plate 3, and a bag 4, as shown in FIG. 1. The display panel 1, the optical sheet 2, and the conductive optical plate 3 are enclosed into the bag 4, thereby manufacturing the LCD module.

[0067] The display panel 1 is formed of liquid crystal which is enclosed between a pair of substrates, and displays predetermined letters, characters, images, etc. by applying a predetermined voltage to the liquid crystal. The display panel 1 has flexible wiring sheets 15 and 16 on at least two sides thereof, respectively. The flexible wiring sheets 15 and 16 processes a control signal from any external device, and supplies the liquid crystal with a predetermined voltage. The display panel 1 has an interface connector 5 for connecting the flexible wiring sheets 15, 16 and the external device.

[0068] When the display panel 1, the optical sheet 2 and the conductive optical plate 3 are enclosed inside the bag 4, the flexible wiring sheets 15 and 16 are bent to hold the optical sheet 2 and the conductive optical plate 3, as illustrated in FIGS. 2A and 2B. In this structure, the display panel 1, the optical sheet 2 and the conductive optical plate 3 are temporarily fixed. The display panel 1, the optical sheet 2, and the conductive optical plate 3, in the state where they are temporarily fixed by the flexible wiring sheets 15 and 16, are hereinafter referred to as a semi-finished product 8.

[0069] The optical sheet 2 includes a light adjustment sheet, such as a prism sheet, etc. and a diffusion sheet which are layered on one top of another, and arranged on the display panel 1. The optical sheet 2 evenly sets the luminance of the backlight for displaying letters, characters, etc.

[0070] The conductive optical plate 3 is arranged on the optical sheet 2, and emits the backlight. The conductive optical plate 3 includes a light source 31 arranged on the side surface thereof. The light source 31 is a fluorescent tube or the like. The light emitted from the light source 31 is radiated from the surface of the conductive optical plate 31 through the inside of the conductive optical plate 3. The light radiated from the surface of the conductive optical plate 3 is so-called a backlight. The conductive optical plate 3 has a lamp connector 6 for connecting the light source 31 to the power source.

[0071] The bag 4 is transparent, and made of polyethylene, etc. The bag 4 has an opening 41 for enclosing the semi-finished product 8. The inside of the bag 4 enclosing the semi-finished product 8 is retained in a low-pressure atmosphere. Thus, as illustrated in FIG. 3, the bag 4 has a sealing section 71 for preventing any outer air entering from the opening 41.

[0072] Four mounting holes 10 for mounting the LCD module into any other device are formed on the four corners of the bag 4, respectively, as shown in FIG. 3. A sealing section 72 for preventing any outer air is formed around each of the four mounting holes 10.

[0073] A lead-through hole 51 for taking out the interface connector 5 is formed in a position corresponding to a position of the interface connector 5 inside the LCD module. A lead-through hole 61 for taking out the lamp connector 6 is formed in a position corresponding to a position of the lamp connector 6 inside the LCD module. Likely to the above, sealing sections 73 and 74 for preventing any outer air are formed around the lead-through holes 51 and 61, respectively.

[0074] A method for manufacturing the LCD module having the above structure will now be described.

[0075] FIG. 4 is a flowchart for explaining a process for manufacturing the LCD module.

[0076] First of all, the semi-finished product 8 is to be formed (Step S101).

[0077] Particularly, as illustrated in FIG. 5A, the display panel 1, the optical sheet 2, and the conductive optical plate 3 are laminated sequentially in this order.

[0078] Subsequently, as illustrated in FIG. 5B, the flexible wiring sheets 15 and 16 of the display panel 1 are bent so as to temporarily fix the display panel 1, the optical sheet 2, and the conductive optical plate 3. Having performed this, the semi-finished product 8 is completely formed.

[0079] As shown in FIG. 5C, the semi-finished product 8 is inserted into the bag 4 from the opening 41 (Step S102).

[0080] After this, an exhaustion process for removing gas or air from the bag 4 is carried out using a vacuum pump, etc. (Step S103).

[0081] Particularly, as shown in FIG. 5D, the sealing section 71 is formed using a thermocompression technique, thereby to close the opening 41.

[0082] Subsequently, the lead-through holes 51 and 61 are formed in the positions respectively corresponding to the positions of the interface connector 5 and the lamp connector 6 inside the bag 4. Then, as shown in FIG. 5E, the interface connector 5 is taken out through the lead-through hole 51, and the lamp connector 6 is taken out through the lead-through hole 61.

[0083] As shown in FIG. 5F, either one of the sealing section 73 or 74 is formed. For example, the sealing section 73 is formed around the lead-through hole 51, using the thermocompression technique. At this time, as shown in FIGS. 6A and 6B, the bag 4 is hermetically connected together with a portion of the interface connector 5. Hence, no outer air should enter the bag 4 from that connected section.

[0084] Thereafter, air or gas is removed from the bag 4 from the lead-through hole 61 using a vacuum pump, etc., thereby to hermetically connect the bag 4 with the semi-finished product 8. Hence, the semi-finished product 8 (the display panel 1, the optical sheet 2, and the conductive optical plate 3) are fixed inside the bag 4.

[0085] As shown in FIG. 5G, the sealing section 74 is formed around the lead-through hole 61 using the thermocompression technique, thus completing the exhaustion process. Hence, the inside of the bag 4 is retained in a low-pressure atmosphere.

[0086] The sealing sections 72 are formed on the four corners of the bag 4 using the thermocompression technique. Then, as shown in FIG. 5H, the mounting holes 10 are formed (Step S104), completing the process for manufacturing the LCD module. I10 Accordingly, the inside of the bag 4 is retained in a low-pressure atmosphere. This simply achieves the display panel 1, the optical sheet 2, and the conductive optical plate 3 to be fixed. Therefore, the LCD module can easily be formed. Since the bag 4 made of polyethylene, no metal dust should come out, and the LCD module which is operable in a stable manner can be manufactured. Because it is not necessary to employ a metal case, the LCD module can be manufactured at a low cost.

[0087] An LCD module according to the second embodiment of the present invention will now be described with reference to the accompanying drawings.

[0088] The LCD module according to the second embodiment has a pair of shaped resins 9 in place of the bag 4 included in the LCD module of the first embodiment. Particularly, as shown in FIG. 7A, the LCD module according to the second embodiment comprises the display panel 1, the optical sheet 2, the conductive optical plate 3, and the pair of shaped resins 9.

[0089] The same display panel 1, optical sheet 2 and conductive optical plate 3 which are described in the first embodiment are employed in the LCD module of this embodiment.

[0090] A metal mold, which has substantially the same shape as the outward shape of the semi-finished product 8, for example, is filled with a synthetic resin, thereby to form a pair of shaped resins 9. Thus, the inward shape of the joined pair of shaped resins 9 is substantially the same as the outside shape of the semi-finished product 8. The shaped resins 9 are transparent. More particularly, a portion of the shaped resins 9, which corresponds to the portion of the display panel 1 displaying letters, images, etc., is transparent.

[0091] The semi-finished product 8 is inserted between the pair of shaped resins 9, thereby the semi-finished product 8 is fixed, as shown in FIG. 7B. Because the shaped resins 9 has substantially the same shape as that of the semi-finished product 8, the exhaustion process described in the first embodiment is not necessary.

[0092] As illustrated in FIG. 8A, the pair of shaped resins 9 have mounting holes 91 for mounting the LCD module into any other device, on the four corners thereof.

[0093] The pair of shaped resins 9 are put together as shown in FIG. 8B, so as to have spaces 52 and 62 for taking out the interface connector 5 and the lamp connector 6.

[0094] A process for manufacturing the above-described LCD module will now be described.

[0095] The procedures for forming the semi-finished product 8 are substantially the same as those of the first embodiment.

[0096] After the formation of the semi-finished product 8, as illustrated in FIG. 7B, the semi-finished product 8 is sandwiched between the pair of shaped resins 9 which are formed in advance. At this time, the interface connector 5 and the lamp connector 6 are taken out respectively from the spaces 52 and 62 of the shaped resins 9.

[0097] After this, the pair of shaped resins 9 melt through heating, for example, the peripheral section thereof, so as to be connected with each other, completing the above-described LCD module.

[0098] The formation of the mounting holes 91 may be performed before or after the above-described manufacturing process.

[0099] Accordingly, in the structure where the semi-finished product 8 is sandwiched by the pair of shaped resins 9, the display panel 1, the optical sheet 2 and the conductive optical plate 3 can be fixed. Therefore, the LCD module can easily be formed. Since the shaped resins 9 which are formed of synthetic resin, no metal dust should come out, and the LCD module which is operable in a stable manner

can be manufactured. Because it is not necessary to employ a metal case, the LCD module can be manufactured at a low cost.

[0100] In the first and second embodiments, the explanations have been made to the edge-light type backlight which includes the light source 31 on the side surface of the conductive optical plate 3. However, as shown in FIG. 9, the LCD module may employ an underneath type backlight, including light sources 31 on the lower surface of the conductive optical plate 3, as illustrated in FIG. 9.

[0101] The formation of the lead-through holes 51 and 61, as explained in the first embodiment, may be performed before or after the insertion of the semi-finished product 8 into the bag 4.

[0102] In the first embodiment, the air or gas is removed from the bag 4, after the interface connector 5 and the lamp connector 6 are taken out from the bag 4. However, the interface connector 5 and the lamp connector 6 may be taken out after the air or gas is removed therefrom. In this case, after the semi-finished product 8 is inserted into the bag 4 without the lead-through holes 51 and 61, the air is removed from the bag 4, and the sealing section 71 is formed. Thereafter, the sealing sections 73 and 74 are formed, and the lead-through holes 51 and 61 are formed, and finally the interface connector 5 and the lamp connector 6 are taken out from the bag 4.

[0103] The mounting hole 10 or 91 may be formed in the conductive optical plate 3. In more particular, as shown in FIG. 10, the conductive optical plate 3 which is larger than the display panel 1 is used, and four holes 32 are formed on the four corners of the conductive optical plate 3. After the semi-finished product 8 is inserted into the bag 4, or after the semi-finished product 8 is sandwiched by the shaped-resins 9, four holes are made in the four corners of the bag 4 or the shaped resins 9 so as correspond to the holes 32. Thus formed penetrating holes may be made as the mounting holes 10 or 91.

[0104] As shown in FIG. 11, a reinforcing ring 11 may be formed around each of the mounting holes 10 and 91. The reinforcing ring 11 may be a plastic ring, or a ring-shaped sheet for hole reinforcement prepared for generally-sold loose-leaf type papers.

[0105] In the above embodiments, the sealing sections 71, 72, 73 and 74 are formed using the thermocompression technique. However, any adhesive tapes or glues may be used for sealing up the bag 4 or the shaped resins 9.

[0106] A slit may be made in the bag 4 in advance. In this case, the bag 4 is torn at the slit after the semi-finished product 8 is contained into the bag 4, so as to expose the display area of the display panel 1. In this case, the bag 4 need not be transparent.

[0107] Otherwise, a slit may be made in one of the shaped resins 9. In this case, after the semi-finished product 8 is fixed between the pair of shaped resins 9, the one of the shaped resins 9 may be torn at the slit so as to expose the display area of the display panel 1. Because the semi-finished product 8 is sandwiched between the pair of shaped resins 9, the area of the slit needs to be set smaller than the area of the display panel 1. In this case, the shaped resins 9 need not be transparent.

[0108] The one of the shaped resins 9 may include a window for exposing the area of the display panel 1 for displaying letters, image, etc. Because the semi-finished product 8 is sandwiched between the pair of shaped resins 9 so as to fixed therebetween, the size of the window is set smaller than the area of the display panel 1. In this case, the shaped resins 9 need not be transparent.

[0109] Various embodiments and changes may be made thereonto without departing from the broad spirit and scope of the invention. The above-described embodiments are intended to illustrate the present invention, not to limit the scope of the present invention. The scope of the present invention is shown by the attached claims rather than the embodiment. Various modifications made within the meaning of an equivalent of the claims of the invention and within the claims are to be regarded to be in the scope of the present invention.

[0110] This application is based on Japanese Patent Application No. 2000-020414 filed on Jan. 28, 2000, and including specification, claims, drawings and summary. The disclosure of the above Japanese Patent Application is incorporated herein by reference in its entirety.

What is claimed is:

1. A display module comprising:

a liquid crystal panel which includes a display area for displaying an image, and displays a predetermined image;

a light emitter which is arranged on said liquid crystal panel, and emits light for displaying an image; and

a resin member which contains and fixes said liquid crystal panel and said light emitter, and includes at least an area through which the display area can externally be seen.

2. The display module according to claim 1, wherein said resin member is a bag having an opening which is closed.

3. The display module according to claim 2, wherein an inside of said resin member is retained in a low-pressure atmosphere.

4. The display module according to claim 3, further comprising a connector for supplying a signal and power source for displaying a predetermined image, and

wherein said resin member has a lead-through hole for taking out said connector, and a peripheral section of said lead-through hole is sealed up.

5. The display module according to claim 4, wherein said resin member includes a mounting hole for mounting said display module into another device, on a corner thereof.

6. The display module according to claim 5, wherein a peripheral section of the mounting hole is sealed up.

7. The display module according to claim 5, wherein the peripheral section of the mounting hole is reinforced with a reinforcing member.

8. The display module according to claim 5, wherein said resin member is formed from a transparent member.

9. The display module according to claim 5, wherein said light emitter is larger in size than said liquid crystal panel, and includes the mounting hole in an area of said light emitter which sticks out from said liquid crystal panel.

10. The display module according to claim 1, wherein said resin member is a pair of shaped resins which are formed in

an inward shape which is substantially same as an outward shape of said liquid panel and said light emitter which are joined together.

11. The display module according to claim 10, wherein said resin member has a mounting hole for mounting said display module on a corner of said resin member.

12. The display module according to claim 11, wherein a peripheral section of the mounting hole is reinforced with a reinforcing member.

13. The display module according to claim 11, wherein said light emitter is larger in size than said liquid crystal panel, and includes the mounting hole in an area of said light emitter which sticks out from said liquid crystal panel.

14. The display module according to claim 11, wherein said resin member is formed from a transparent member.

15. A method for manufacturing a display module, comprising:

forming a semi-finished product by putting a liquid crystal panel, which has a display area for displaying an image and displays a predetermined image, together with a light emitter, which emits light for displaying an image;

inserting the semi-finished product into a resin member including an area through which at least the display area can externally be seen; and

fixing the semi-finished product inside the resin member.

16. The method for manufacturing a module according to claim 15, wherein:

the resin member is a bag; and

said fixing includes removing air or gas from the resin member, thereby hermetically connecting the resin member with the semi-finished product.

17. The method for manufacturing a display module according to claim 16, wherein the display panel includes a connector for supplying a signal and power source for displaying a predetermined image, and said method further comprising

forming a lead-through hole for taking out the connector, after the semi-finished product is fixed inside the resin member.

18. The method for manufacturing a display module according to claim 17, wherein said forming the lead-through hole includes forming the lead-through hole after a peripheral section of the hole is sealed up.

19. The method for manufacturing a display module according to claim 18, wherein a predetermined area of the resin member is cut off so as to expose the display area.

20. The method for manufacturing a display module, according to claim 18, wherein the light emitter is larger in size than the liquid display panel, and includes a mounting hole in an area of said light emitter which sticks out from said liquid crystal panel, and said method further comprising:

forming a penetrating hole by forming a hole in a position of the resin member which corresponds to a position of the mounting hole, after fixing the semi-finished product inside the resin member.

21. The method for manufacturing a display module according to claim 18, wherein said forming the lead-through hole includes sealing up the peripheral section of the lead-through hole, using a thermocompression technique or adhesive tape.

22. The method for manufacturing a display module according to claim 16, wherein the display panel includes a connector for supplying a signal and power source for displaying a predetermined image, and said method further comprising,

forming a lead-through hole for taking out the connector in the resin member, before fixing the semi-finished product inside the resin member.

23. The method for manufacturing a display module according to claim 22, wherein:

the resin member has an opening for inserting the semi-finished product; and

said fixing the semi-finished product inside the resin member includes removing air or gas from the resin member through the head-through hole, after sealing up the opening.

24. The method for manufacturing a display module according to claim 23, wherein a predetermined area of the resin member is cut off, so as to expose the display area.

25. The method for manufacturing a display module according to claim 23, wherein the light emitter is larger in size than the liquid crystal panel, and includes a mounting hole for mounting said display module into another device in an area of the light emitter which sticks out from the liquid crystal panel, and said method further comprising,

forming a penetrating hole by forming a hole in a position of the resin member which corresponds to a position of the mounting hole, after fixing the semi-finished product inside the resin member.

26. The method for manufacturing a display module according to claim 23, wherein said fixing the semi-finished product includes sealing up the opening using a thermocompression technique or adhesive tape.

27. The method for manufacturing a display module according to claim 15, wherein:

the resin member is a pair of shaped resins which are formed as to have an inward shape which is substantially same as an outward shape of a state of the liquid crystal panel and the light emitter being joined together; and

said fixing the semi-finished product includes

sandwiching the semi-finished product with the pair of shaped resins, and

sealing up peripheral sections of the pair of shaped resins sandwiching the semi-finished product.

28. The method for manufacturing a display module according to claim 27, further comprising cutting off a predetermined area of the resin member, thereby exposing the display area.

29. The method for manufacturing a display module according to claim 27, wherein the light emitter is larger in size than the liquid crystal panel, and includes a mounting hole for mounting said display module into another device in an area of the light emitter which sticks out from the liquid crystal panel, and said method further comprising

forming a penetrating hole by forming a hole in a position of the resin member which corresponds to a position of the mounting hole, after fixing the semi-finished product inside the resin member.

30. The method for manufacturing a display module according to claim 27, wherein said sealing up includes sealing the peripheral sections of the pair of shaped resins using a thermocompression technique or with adhesive tape.

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专利名称(译)	显示模块及其制造方法		
公开(公告)号	US20010010570A1	公开(公告)日	2001-08-02
申请号	US09/768277	申请日	2001-01-25
申请(专利权)人(译)	NEC公司		
当前申请(专利权)人(译)	GOLD CHARM LIMITED		
[标]发明人	NAGASAKI YUTOKU		
发明人	NAGASAKI, YUTOKU		
IPC分类号	G02F1/13 G02F1/1333 G02F1/13357 G09F9/00 G02F1/1335		
CPC分类号	G02F1/133308 G02F2001/133311 G02F2001/133325		
优先权	2000020414 2000-01-28 JP		
其他公开文献	US6429912		
外部链接	Espacenet USPTO		

摘要(译)

一种显示模块，包括：液晶面板，用于显示预定图像；发光器，设置在液晶面板上并发光以显示图像；以及包含和固定液晶显示板和发光器的袋子。该袋包括至少一个区域，通过该区域可以看到液晶面板的图像显示区域。该袋具有密封的开口，其内部保持在低压气氛中。因此，袋子固定液晶面板和光发射器。

