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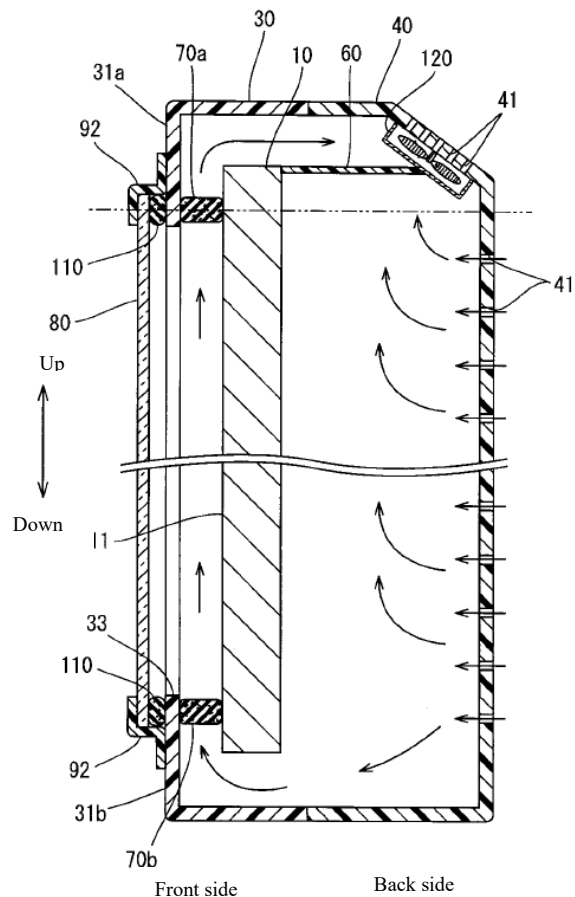
(54) [TITLE OF THE INVENTION] PLASMA TELEVISION AND IMAGE DISPLAY DEVICE

(57) [Overview]

PROBLEM TO BE SOLVED: The structure for cooling the display surface side of the PDP is complicated, where dust and dirt adhere to the display surface of the PDP as a result of the cooling process.

SOLUTION: An open periphery of a space interposed between a display surface 11 of a PDP 10 and an optical filter 80 is sealed by a breathable dustproof filter, so that air circulated in a cabinet can pass the space. As a result, not only a rear side of the PDP 10, the circuits, etc. described above, but also the display surface 11 and the optical filter 80 can be reliably cooled. This also protects a user from high temperatures even when he/she touches the optical filter 80 from the front side of a plasma television 100. The dustproof filter preventing dust and dirt from flowing into the space, while achieving cooling, prevents shortening the product life, that would have reduce the display capability of the PDP 10, if dust and dirt stuck to the display surface 11.

SELECTED DRAWING: FIG. 2



[Scope of Patent Claims]

[Claim 1]

A plasma television, in which the inside of a housing is cooled by passing air between the inside of the housing, housing a plasma display panel, and the outside, characterized in that

ventilation holes are formed at a plurality of places on the rear side of the housing;

a breathable dustproof filter is used to block the vertical direction out of the four directions around the space sandwiched between the display surface of the plasma display panel and the optical filter attached to the front side of the housing, and a non-breathable member is used to seal left and right directions to allow ventilation between the same space and the outside of the same space;

an exhaust fan for discharging the air inside the housing to the outside is provided on the wall surface of the housing near the dustproof filter blocking the space sandwiched between the display surface and the optical filter in the upward direction,

a housing wall surface that is continuous from at least the periphery of the wall surface where the exhaust fan is provided to the wall surface position where the dustproof filter in the upward direction is inscribed has a non-breathable structure;

an enclosed space is formed by a partition plate, a part of the exhaust port, the above-mentioned non-breathable housing wall surface, and the above-mentioned dustproof filter, by extending the partition plate that partitions the exhaust port of the exhaust fan from the inside of the housing so as to reach approximately the exhaust port from the back side of the display surface, and

an intake fan is provided, in which a breathable dustproof filter blocks the air intake of a fan that blows air from the outside to the inside of the housing on the wall surface of the housing near the dustproof filter blocking the space sandwiched between the display surface and the optical filter in the downward direction.

[Claim 2]

An image display device, wherein the inside of the housing is cooled by passing air between the inside of the housing containing a panel type display and the outside, characterized in that

ventilation holes are formed at predetermined positions of the housing, and ventilation between the same space and the outside of the same space is allowed by blocking the periphery of the space sandwiched between the display surface of the panel display and the optical filter attached to the front side of the housing with a breathable dustproof filter.

[Claim 3]

The image display device according to claim 2, characterized in that an exhaust fan for discharging air inside the housing to the outside is provided on the wall surface of the housing near the dustproof filter blocking the space in one of the directions surrounding the space sandwiched between the display surface and the optical filter.

[Claim 4]

The image display device according to claim 3, wherein the housing wall surface that is continuous from at least the periphery of the wall surface where the exhaust fan is provided to the wall surface position where the dustproof filter in the vicinity of the exhaust fan is inscribed has a non-breathable structure.

[Claim 5]

The image display device according to claim 4, wherein a partition plate for partitioning a space in the housing is provided so that one end thereof is substantially in contact with an exhaust port of the exhaust fan, and a surrounding space is formed by the partition plate, a part of the exhaust port, the wall surface of the housing having a structure that does not allow ventilation, and the dustproof filter in the vicinity of the above.

[Claim 6]

The image display device according to any one of claims 3 to 5, characterized in that an intake fan that sends air into the housing from the outside is provided on the housing wall surface in the direction opposite to the direction, in which the exhaust fan is provided, among the directions surrounding the space sandwiched between the display surface and the optical filter, and the space sandwiched between the display surface and the optical filter is sealed with a non-breathable member in each direction other than the direction in which the exhaust fan is provided and the direction opposite to the direction in which the exhaust fan is provided.

[Claim 7]

The image display device according to claim 6, characterized in that an intake port of the intake fan is sealed by a breathable dustproof filter.

[Detailed description of the invention]

[Technical field]

[0001]

The present invention relates to a plasma television and an image display device having a structure wherein the inside of the housing is cooled.

[Background of the Invention]

[0002]

A technique has been known conventionally, in which a ventilation space is provided in front of a plasma display panel (PDP), a cooler is disposed behind a circuit board on a rear surface, a blower fan is provided below, and air cooled by the cooler is circulated in the housing by a blower fan, thereby cooling the PDP and the circuit board (see, for example, Patent Document 1).

[Patent document 1] JP H9-307257A

[Disclosure of the Invention]

[Problem to be Solved by the Invention]

[0003]

In the above document, since the space sandwiched between the front of the PDP and the tempered glass on the front of the housing is completely open, although air circulates the same space, dust and dirt also simultaneously pass through it, resulting in the adherence and accumulation of dust and dirt on the front surface of the PDP, which is a problem.

The above document further adopts a structure, in which a cooler is disposed in a housing and is connected to an exhaust heat unit outside the housing, where the structure for cooling the PDP is very complicated.

[0004]

The present invention has been made in view of the above problems, and it is the objective of the present invention to provide a plasma television and an image display device that can prevent a decrease in display capability of a panel type display and efficiently cool the front side of the display with a simple configuration.

[Means for Solving the Problem]

[0005]

In order to achieve the above object, the invention of claim 2 is a structure, wherein ventilation holes are formed at predetermined positions of the housing, and ventilation between the same space and the outside of the same space is allowed by blocking the periphery of the space sandwiched between the display surface of the panel display and the optical filter attached to the front side of the housing with a breathable dustproof filter, in an image display device, where the inside of the housing is cooled by passing air between the inside of the housing containing a panel type display and the outside.

[0006]

In claim 2 configured as above, air passes through the inside and outside of the housing because ventilation holes are formed at predetermined locations on the housing. A breathable dustproof filter is used to block the periphery of space sandwiched between the display surface of the panel display and the optical filter attached to the front side of the housing. Thus, air circulating in the housing passes through the space through the dustproof filter. As a result, it is possible to efficiently cool the display surface that is liable to be heated at the time of activation and an optical filter facing the display surface via a predetermined gap.

It is further possible to prevent dust and dirt from entering into the space sandwiched between the display surface and the optical filter and adhering to the display surface.

[0007]

The invention of claim 3 has a configuration of the image display device according to claim 2, characterized in that an exhaust fan for discharging air inside the housing to the outside is provided on the wall surface of the housing near the dustproof filter blocking the space in one of the directions surrounding the space sandwiched between the display surface and the optical filter.

[0008]

By providing an exhaust fan on the wall surface of the housing near the dustproof filter blocking the space in one of the directions, among the up, down, left, and right directions surrounding the space sandwiched between the display surface and the optical filter, it is possible to allow air to pass from the space to the outside through this one dustproof filter and be exhausted to the outside of the housing. This forms an air circulation path to some extent in the housing also including the above space, improving the cooling efficiency.

[0009]

The invention of claim 4 has a configuration of the image display device according to claim 3, wherein the wall surface of the housing, which is continuous from at least the vicinity of the wall surface provided with the exhaust fan, to the wall surface position in which the dustproof filter in the vicinity of the exhaust fan is inscribed, has a non-breathable structure.

In this way, the wall surface of the housing around the exhaust fan and the dustproof filter in the vicinity of the exhaust fan is made non-breathable by not forming any vent hole, or the like. As a result, air that has passed through the dustproof filter in the vicinity is easily discharged to the outside of the housing by the exhaust fan. In other words, the air that has passed through the above space and has increased in temperature can be quickly discharged outside the housing, further increasing the cooling efficiency in the housing.

[0010]

The invention of claim 5 has a configuration of the image display device according to claim 4, wherein a partition plate for partitioning a space in the housing is provided so that one end thereof is substantially in contact with an exhaust port of the exhaust fan, and an enclosed space is formed by the partition plate, a part of the exhaust port, the wall surface of the housing having a structure that does not allow ventilation, and the dustproof filter in the vicinity of the above. Creating such a space provides no place for the air that has passed through the dustproof filter near the above to escape except for a part of the exhaust port of the exhaust fan. This, therefore, establishes an air circulation path, in which the air that has passed through the space above and whose temperature has risen is immediately discharged to the outside of the housing.

[0011]

The invention of claim 6 has a configuration of the image display device according to any one of claims 3 to 5, characterized in that an intake fan that sends air into the housing from the outside is provided on the housing wall surface in the direction opposite to the direction in which the exhaust fan is provided, among the directions surrounding the space sandwiched between the display surface and the optical filter, and the space sandwiched between the display surface and the optical filter is sealed with a non-breathable member in each direction other than the direction in which the exhaust fan is provided and the direction opposite to the direction in which the exhaust fan is provided.

[0012]

An exhaust fan is provided on one side, and an intake fan is provided on the other side of the wall surface of the housing near each of the two dustproof filters provided in opposite directions, vertically or horizontally, in the space sandwiched between the display surface and the optical filter. A non-breathable member blocks the above space in directions other than the direction in which the exhaust fan is installed and the direction opposite to the direction in which the exhaust fan is installed. As a result, a flow of air passing vertically or horizontally through the space sandwiched between the display surface and the optical filter is reliably formed inside the housing, making it possible to efficiently cool the display surface and optical filter.

[0013]

The invention of claim 7 has a configuration of the image display device according to claim 6, characterized in that an intake port of the intake fan is sealed by a breathable dustproof filter. Also covering the air intake itself with a dustproof filter can greatly cut off the dust and dirt that flow into the housing, suppressing the deterioration of the panel type display, and extending the product life.

[0014]

Based on the above configuration, the invention of claim 1 has a configuration, in which in a plasma television where the inside of the housing is cooled by passing air between the inside of the housing that houses the PDP and the outside, ventilation holes are formed in multiple places on the back side of the above housing; a breathable dustproof filter seals the vertical directions of the four directions around the space sandwiched between the display surface of the PDP and the optical filter attached to the front side of the housing, and a non-breathable member seals the horizontal directions, thereby allowing ventilation between the same space and the outside of the same space; an exhaust fan for discharging the air inside the housing to the outside is installed on the housing wall near the dustproof filter blocking the space between the display surface and the optical filter in the upward direction; the wall surface of the housing that is continuous from the periphery of the wall surface where the exhaust fan is installed to the wall surface position where the above dustproof filter is inscribed has a non-breathable structure; a partition plate, a part of the exhaust port, the wall surface with the non-breathable housing, and the upper dustproof filter form an enclosed space by extending a partition plate that partitions the exhaust port of the exhaust fan from the inside of the housing so as to substantially reach the exhaust port from the back side of the display surface; and the

housing wall near the dustproof filter blocking the space below the space sandwiched between the display surface and the optical filter is equipped with an intake fan, which is a fan that blows air into the housing from the outside, where the air intake was sealed with a breathable dustproof filter.

[0015]

It goes without saying that the present invention, in a more specific configuration, can achieve the same actions and effects as those of each of the above-described claims 2 to 7.

[Effect of the Invention]

[0016]

As described above, according to the present invention, it is possible to efficiently cool the display surface of a panel type display such as a PDP and an optical filter opposed thereto without including a cooler, or the like, and to prevent dust and dirt from adhering to the display surface. It is also possible to prevent the temperature from becoming high, when the user touches the optical filter from the front side, and to prevent deterioration in the display capability of the display device due to dust, dirt, and the like.

[Best Mode for Carrying Out the Invention]

[0017]

FIG. 1 is a perspective view schematically showing how the plasma television 100 according to the present invention is assembled.

In this figure, an optical filter 80, a front cabinet 30, and a PDP 10 are schematically shown in this order from the front side to the rear side. The front cabinet 30 is a frame-like member including an upper side 31, a lower side 31, a left side 32, and a right side 32, which are members having a predetermined width in the front-rear direction, and houses the PDP 10 in the frame. In addition, the front cabinet 30 forms a television cabinet (hereinafter simply referred to as a cabinet) together with a rear cabinet 40, which will be described later, and houses therein circuits necessary for a plasma television such as a tuner circuit, a power supply circuit, a video/audio processing circuit, a panel drive circuit and the like, which are not shown in the drawing.

[0018]

The optical filter 80 is fixed so as to be pressed from the front side by fixing tools 91, 92 at the top, bottom, left, and right edges on the front side of the front cabinet 30. The optical filter 80 is made of a special glass material having conductivity, and covers the display surface 11 side of the PDP 10, thereby exhibiting an effect (shield effect) of shielding an electromagnetic wave generated from the PDP 10. In addition, in addition to the shielding effect, the optical filter 80 serves to improve the contrast and color reproducibility of the PDP 10.

[0019]

The PDP 10 is housed in the cabinet 30 in a state of being supported by two brackets 20 on the rear side. Specifically, the attachment 50 is fixed at four positions on the upper, lower, left, and right sides of the PDP 10, and each set of the attachment 50 divided into two sets of left and right is fixed to each of the one brackets 20. Each of the two brackets 20 is connected to a stand member (not shown) which stands substantially perpendicular from an installation surface of the plasma television 100, thereby supporting substantially the entire plasma television 100 at a predetermined height.

[0020]

The front cabinet 30 is also fixed to the bracket 20. The bracket 20 is designed such that when connected to the PDP 10 via the attachment 50, the upper and lower ends 22a and 22b of the bracket extend outward beyond the width of the PDP 10 in the vertical direction, and the extended upper and lower ends 22a and 22b and the upper and lower sides 31 and 31 of the front cabinet 30 are respectively fixed. Further, although omitted in FIG. 1, the rear cabinet 40 covering the rear side of the plasma television 100 is also fixed to the bracket 20.

In other words, the front cabinet 30, the PDP 10, and the rear cabinet 40 are all fixed to the bracket 20. As a result, it is possible to prevent the front cabinet 30, the PDP 10, and the rear cabinet 40 from loading each other.

[0021]

FIG. 2 is a cross-sectional view of the plasma television 100 taken along line A-A of FIG. 1.

While the attachment 50 and the bracket 20 are omitted in the same figure, the omitted rear cabinet 40 is shown in FIG. 1.

An exhaust fan 120 is mounted at an upper predetermined position on an inner wall of the rear cabinet 40. The exhaust fan 120 has an exhaust propeller, which is rotated by a predetermined power such as a motor inside an exhaust port 121 provided at substantially the center of the exhaust fan, and discharges the air inside the cabinet to the outside by rotating the propeller. A vent hole 41 penetrating a wall surface is formed on a wall surface of a rear cabinet 40 at a position where an exhaust fan 120 is mounted, and air is discharged to the outside through the vent hole 41 and an exhaust port 121.

Further, the air vent 41 is formed at a plurality of locations in the cabinet in addition to the position at which the exhaust fan 120 is mounted.

[0022]

The PDP 10 is fixed in the front cabinet 30 by a predetermined fixing means (not shown) with the display surface 11 facing toward the front side. A circuit (not shown), and the like, are disposed on the back side of the PDP 10. As described above, the optical filter 80 is attached to the front cabinet 30 from the front side. In this embodiment, at an upper edge portion 31a that is a part of the upper side 31 and extends inside the opening 33, and the lower edge 31b that is part of the lower side 31 and extends inside the opening 33, when pressing the upper and lower ends of the optical filter 80 with the fixture 92, a gasket 110 is interposed between the optical filter 80 and the upper edge portion 31a and the lower edge portion 31b. The gasket 110 is made of a conductive material such as a metal mesh, and fills the gap between the optical filter 80 and the front side of the front cabinet 30 to exert a shielding effect. The gasket 110 is also sandwiched between the left and right ends of the optical filter 80 and the left and right edges of the front side of the front cabinet 30. The fixtures 91 and 92 are fixed to the front cabinet 30 by screws, or the like.

[0023]

When the PDP 10 and the optical filter 80 are set as described above, a predetermined gap is provided between the optical filter 80 and the display surface 11 with the opening 33 of the front cabinet 30 interposed therebetween. Therefore, in the present invention, a breathable dustproof filter is interposed between the PDP 10 and the optical filter 80, thereby closing the gap. More specifically, a space between an upper end of the display surface 11 and an inside of the upper edge portion 31a is sealed by a dustproof filter 70a, and a space between the lower end of the display surface 11 and the inside of the lower edge portion 31b is sealed by a dustproof filter 70b. Although not shown in the drawing, a dustproof filter is interposed between the left and right end portions of the display surface 11 and the inside of the left and right edge portions on the front side of the front cabinet 30.

[0024]

In other words, blocking the surroundings of the space between the PDP 10 and the optical filter 80 (hereinafter, simply referred to as the space in this case, which means the space sandwiched between the PDP 10 and the optical filter 80.) with a dustproof filter enables the movement of air between the space and the outside, blocking the inflow of dust and dirt accompanying movement of air into the space.

As a result, as indicated by an arrow in the same drawing, in the cabinet, air flowing in from each of the air vents 41 passes through not only the space on the back side of the PDP 10 provided with the circuit, and the like, but also passes through the space, and is discharged to the outside of the cabinet by the exhaust fan 120. Therefore, it is possible to efficiently cool the display surface 11 of the PDP 10 and the optical filter 80, which is easily heated when the plasma television 100 is activated.

[0025]

In the present invention, various measures have been made to increase the circulation efficiency of air in the space.

The wall surface of a cabinet in a predetermined range including a periphery of an exhaust fan 120 and a portion where an upper dustproof filter 70a is inscribed has a sealing structure without providing any gap such as a vent hole except a vent hole 41 at the back of an exhaust port 121. In this embodiment, the wall surface of the cabinet above the two dot chain line shown in FIG. 2 is a closed structure.

This increases the efficiency of collecting air by the exhaust fan 120, allowing the air that has flowed into the space through the lower dust filter or the left and right dust filters to flow out of the space through the upper dustproof filter 70a, and an air flow is formed in which the outflowing air is forcibly discharged from the exhaust fan 120 before diffusing into the cabinet again. In other words, air warmed up through the space is quickly discharged to the outside of the cabinet, so that the cooling efficiency of the circuit, and the like, is improved, starting from the space.

[0026] In addition, a partition plate 60 for partitioning a space may be provided above the cabinet.

In this embodiment, a partition plate 60 is provided so that one end of the partition plate 60 is substantially in contact with an exhaust port 121 of the exhaust fan 120. More specifically, a partition plate 60 is extended from an upper end portion of the back side of the PDP 10 toward the exhaust fan 120, and one end of the partition plate extends substantially to the exhaust fan 120 so as to partition the substantially center of the exhaust port 121 up and down. FIG. 4 shows a state in which one end of the partition plate 60 substantially reaches the exhaust port 121.

As a result, an enclosed space is created by the partition plate 60, a part of the exhaust port 121, a wall surface of the cabinet having a sealed structure as described above, and an upper dustproof filter 70a.

[0027] By providing the partition plate 60 as described above, the air flowing out from the space via the dustproof filter 70a on the upper side has no place to escape but from only a part of the exhaust port 121, so that the outflowing air is reliably discharged from the exhaust fan 120 without being diffused again into the cabinet. As a result, an air circulation cycle is established in which air flowing into the space via the lower or right and left dustproof filters flows out from the space via the upper dustproof filter 70a and is exhausted, thereby further increasing the cooling efficiency in the space.

[0028] FIG. 3 is a cross-sectional view of the plasma television 100 taken along line A-A of FIG. 1, and shows a configuration example different from that of FIG. 2. FIG. 3 is different from the cabinet shown in FIG. 2 in that an intake fan 130 is provided mainly at a predetermined position of the front cabinet 30.

As shown in the figure, the intake fan 130 is mounted in contact with the wall surface of the cabinet below the PDP 10, i.e., on the bottom surface of the front cabinet 30. The intake fan 130 has an intake propeller rotated by a predetermined power such as a motor inside an intake port provided substantially at the center of the intake fan, and the air outside the cabinet is fed into the cabinet by rotating the propeller. As in the case where the exhaust fan 120 is mounted, a vent hole 42 penetrating the wall surface is formed on the wall surface of the front cabinet 30 to which the intake fan 130 is attached.

[0029] Providing the air intake fan 130 means sealing the lateral direction of each direction around the space sandwiched between the PDP 10 and the optical filter 80 by a non-breathable member. In other words, the left and right ends of the display surface 11 of the PDP 10 and the inside of the left and right edges on the front side of the front cabinet are closed with non-breathable members instead of dust filters.

This results in an air circulation cycle, where the air sucked into the cabinet by the intake fan 130 passes through the space from bottom to top through the dustproof filter 70b on the lower side and the dustproof filter 70a on the upper side, and the air after the passage is discharged to the outside of the cabinet by the exhaust fan 120. Accordingly, providing the intake fan 130 makes it possible to cool the display surface 11 and the optical filter 80 more efficiently.

[0030] In addition, a dustproof filter may be attached to the intake port of an intake fan 130, if provided. This will prevent dust and dirt from flowing into the cabinet when air is sucked into the cabinet by the intake fan 130.

[0031] Thus, according to the present invention, since the open periphery of the space sandwiched between the display surface 11 of the PDP 10 and the optical filter 80 is blocked by the breathable dustproof filter, the air that circulates inside the cabinet can also pass through this space.

As a result, not only the back side of the PDP 10 and the circuit, but also the display surface 11 and the optical filter 80 can be reliably cooled. Moreover, since the optical filter 80 is cooled, it is possible to prevent high heat when a user touches the optical filter 80 from the front side of the plasma television 100. Further preventing dust and dirt from flowing into the space by the dustproof filter while realizing the above cooling makes it possible to prevent the display performance of the PDP 10 from being deteriorated due to the adhesion of dust and dirt to the display surface 11, thereby preventing the product life from being shortened.

[Brief Description of the Drawings]

[0032]

[FIG. 1] A perspective view showing the assembly of a plasma television.

[FIG. 2] A drawing of longitudinal section of the plasma television according to an example.

[FIG. 3] A drawing of longitudinal section of the plasma television according to other examples.

[FIG. 4] A drawing showing a part of ventilating fan and partition plate.

[Explanation of References]

[0033]

10 ... PDP

11 ... Display surface

20 ... Bracket

30 ... Front cabinet

31 ... Upper side, lower side

31a ... Upper edge

31b ... Lower edge

32 ... Left side, right side

33 ... Opening

40 ... Rear cabinet

41, 42 ... Vents

50 ... Attachment

60 ... Partition plate

70a, 70b ... Dustproof filters

80 ... Optical filter

91, 92 ... Fixtures

100 ... Plasma television

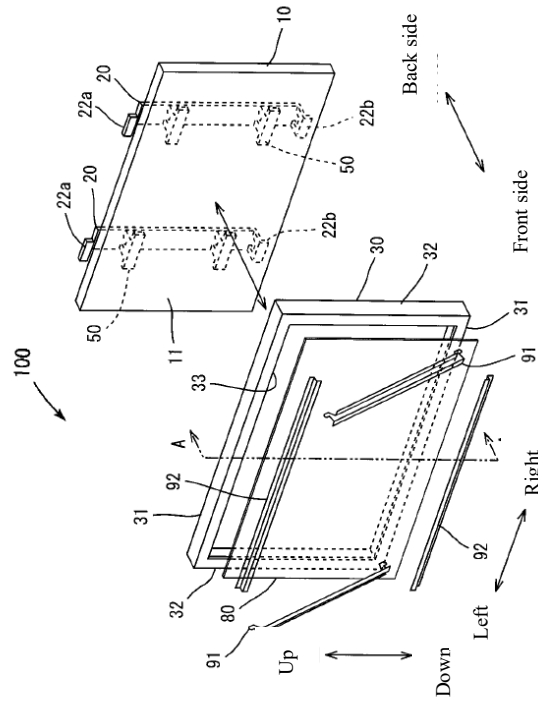
110 ... Gasket

120 ... Ventilating fan

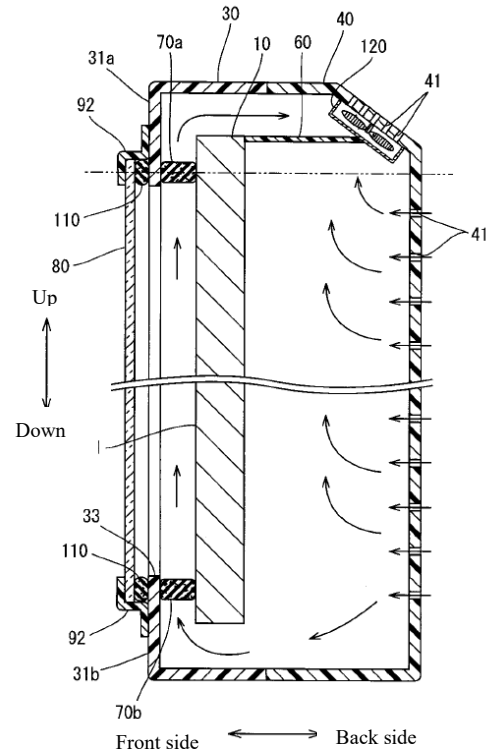
121 ... Exhaust port

130 ... Suction fan

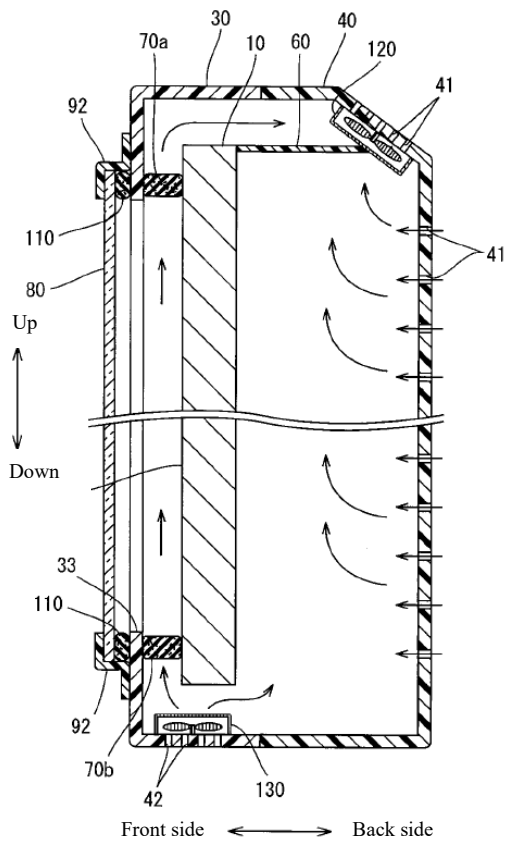
(FIG. 1)



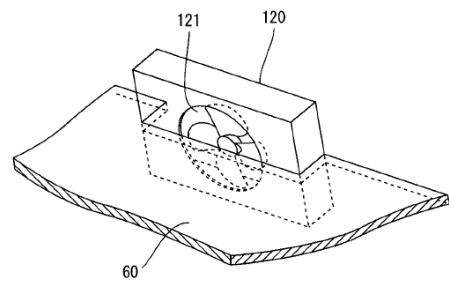
(FIG. 2)



(FIG. 3)



(FIG. 4)



CERTIFICATE OF TRANSLATION

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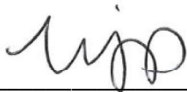
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