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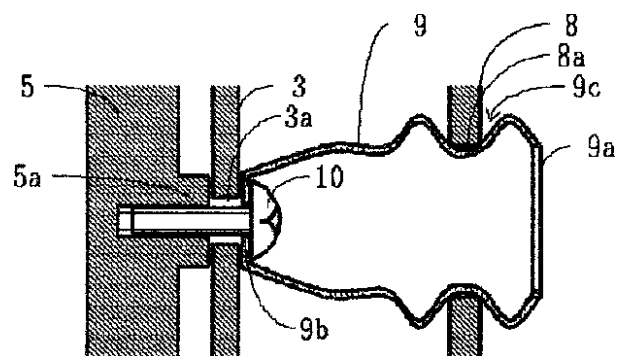
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Takatsu-ku, Kawasaki-shi(54) **【Title of the invention】** Heat dissipation structure for electronics(57) **【Abstract】**

【Problem】 The objective is to provide a heat dissipation structure for electronics that can prevent air leakage even if a through-hole is provided in the air guide plate.

【Means for solving】 By providing a through-hole 8a corresponding to an insertion hole 3a of a substrate 3 in an air guide plate 8; providing this through-hole with an air leak prevention part 9 consisting of a hollow body having an opening 9a and an insertion hole 9b formed in the base thereof for the insertion of a screw 10; and inserting the aforesaid substrate attachment screw through the opening in this air leak prevention part and threading it onto the aforesaid screw hole via the insertion hole in the aforesaid substrate, thereby fastening the aforesaid substrate, air leakage from the through-hole formed in the air guide plate can be prevented, and in the event of maintenance or

inspection, the substrate mounting screw can be removed from the opening in the aforesaid air leak prevention part without needing to remove the air guide, thereby making it possible to unmount the substrate by moving it downward.



【Scope of patent claims】

【Claim 1】 Heat dissipation structure for electronics in which an attachment screw hole is provided on the rear of a partition plate that divides the front part of the housing for mounting display components, which has an air exhaust located at the rear of the top surface and is open on at least the back side, from the back part for mounting substrates including the control board and the power board for mounting heat-emitting components; the substrates are fastened by threading a substrate attachment screw through a through-hole provided in each of the aforesaid substrates and thereby into this attachment screw hole, and a ventilation fan is fastened to the fan attachment part formed at the top thereof near the aforesaid air exhaust; whereas on the rear of the aforesaid housing, a rear cover with a rear air inlet near the bottom thereof is fastened in such a way that air inspired through the rear air inlet travels along an air guide plate formed into a thick sheet shape as it travels the distance from said rear air inlet to the ventilation fan, capturing heat from the substrates along the way, and the ventilation fan blows this heated air to the exterior through the air exhaust; characterized in that a through-hole is provided on the aforesaid air guide plate in a location corresponding to the aforesaid insertion hole, which through-hole is provided with an air leak prevention part consisting of a hollow body having an open end and an insertion hole formed in the base thereof, such that the aforesaid substrate attachment screw is able to penetrate through the open side of this air leak prevention part, and the aforesaid substrates are fastened by threading this screw through the insertion hole into the aforesaid screw hole via the insertion hole in the aforesaid substrate.

【Claim 2】 The heat dissipation structure for electronics set forth in claim 1, characterized in that the aforesaid air leak prevention part was formed separately, and a concave part that fits into the aforesaid through-hole was formed at the peripheral edge of opening of said air leak prevention part.

【Claim 3】 The heat dissipation structure for electronics set forth in claim 2, characterized in that the aforesaid concave part is formed in a location corresponding to the height from the substrate surface to the air guide plate.

【Claim 4】 The heat dissipation structure for electronics set forth in claim 2, characterized in that the width of the aforesaid concave section is wider than the thickness of the aforesaid air guide plate, and the depth is slightly larger than the aforesaid through-hole.

【Claim 5】 The heat dissipation structure for electronics set forth in claim 2, characterized in that the aforesaid concave part was formed into a cross-sectional waveform.

【Claim 6】 The heat dissipation structure for electronics set forth in claim 1 or claim 2, characterized in that the aforesaid air leak prevention part is formed of an elastic material.

【Claim 7】 The heat dissipation structure for electronics set forth in Claim 1, characterized in that the aforesaid air leak prevention part is formed integrally with the air guide plate.

【Detailed description of invention】**【0001】**

【Technical field of the invention】 The present invention relates to the heat dissipation structure of electronic devices, and in particular to the prevention of air leakage at the mounting part of the substrate.

【0002】

【Prior art】 Conventionally, as shown in FIG. 1, the heat dissipation structure of electronic devices such as PDP (plasma display) devices is furnished with an attachment screw hole 5a in the back of a partition plate 5 that divides the front part 2 of the housing 1 for mounting display components such as the PDP (plasma display), which has an air exhaust 1a located at the rear of the top surface and is open on at least the back side, from the back part 4 for the mounting of substrates 3 including the control board and the power board for mounting heat-emitting components; the substrates 3 are fastened by threading a substrate attachment screw 10 through a through-hole 3a provided in each of the aforesaid substrates 3 and into this attachment screw hole 5a, and a ventilation fan 6 is fastened to the fan attachment part 5b formed at the top thereof near the aforesaid air exhaust 1a; whereas on the rear of the aforesaid housing 1, a rear cover 7 with a rear air inlet 7a near the bottom thereof is fastened in such a way that air inspired through the rear air inlet 7a travels along an air guide plate 8 formed into a thick sheet shape as it travels the distance from said rear air inlet 7a to the ventilation fan 6, capturing heat from the substrate 3 along the way, whereupon the ventilation fan 6 blows this heated air to the exterior through the air exhaust 1a. However, in this structure, because the substrates 3 are covered by the air guide plate 8, in order to remove a substrate 3, it is necessary to either remove or lift up the air guide plate 8, which complicates the task of performing maintenance and inspection. In view of this, one conceivable solution, as shown in FIG. 4, would be to provide a through-hole 8a for an attachment screw 10 in a location corresponding to the through-hole 3a in the air guide plate 8 to facilitate removal of the substrates 3. However, in the event that a through-hole 8a is provided, a problem is that cooling efficiency is reduced, as air leakage into the air guide plate 8 via this through-hole 8a causes a reduction in the amount of air aspired into the rear air inlet 7a.

【0003】

【Problem to be solved by the invention】 The objective of the present invention is to provide a heat dissipation structure for electronics that overcomes the problem described above by preventing air leakage even when a through-hole is provided in the air guide plate.

【0004】

【Means for solving the problem】 In order to solve the problem described above, the present invention is a heat dissipation structure for electronics in which an attachment screw hole is provided on the rear of a partition plate that divides the front part of the housing for mounting display components, which has an air exhaust located at the rear of the top surface and is open on at least the back side, from the back part for the mounting of substrates including the control board and the power board for mounting heat-emitting components; the substrates are fastened by threading a

substrate attachment screw through a through-hole provided in each of the aforesaid substrates and thereby into this attachment screw hole, and a ventilation fan is fastened to the fan attachment part formed at the top thereof near the aforesaid air exhaust; whereas on the rear of the aforesaid housing, a rear cover with a rear air inlet near the bottom thereof is fastened in such a way that air inspired through the rear air inlet travels along an air guide plate formed into a thick sheet shape as it travels the distance from said rear air inlet to the ventilation fan, capturing heat from the substrates along the way, and the ventilation fan blows this heated air to the exterior through the air exhaust; characterized in that a through-hole is provided on the aforesaid air guide plate in a location corresponding to the aforesaid insertion hole, which through-hole is provided with an air leak prevention part consisting of a hollow body having an open end and an insertion hole formed in the base thereof, such that the aforesaid substrate attachment screw is able to penetrate through the open side of this air leak prevention part, and the aforesaid substrates are fastened by threading this screw through the insertion hole into the aforesaid screw hole via the insertion hole in the aforesaid substrate.

【0005】 Additionally, a concave part that fits into the aforesaid through-hole is formed at the peripheral edge of the opening of the aforesaid air leak prevention part. Additionally, the aforesaid concave part is formed in a location corresponding to the height from the aforesaid substrate surface to the air guide plate. Additionally, the width of the aforesaid concave part is formed to be wider than the thickness of the aforesaid air guide plate, and the depth of the same is formed to be slightly greater than that of the aforesaid through-hole. Additionally, the aforesaid concave part is formed to have a cross-sectional waveform.

【0006】 Additionally, the aforesaid air leak prevention part is formed of an elastic material. Additionally, the aforesaid air leak prevention part is formed integrally with the air guide plate.

【0007】

【Embodiment of the invention】 As described above, in the heat dissipation structure for electronics of the present invention, a through-hole is provided on the aforesaid air guide plate in a location corresponding to the aforesaid insertion hole, which through-hole is provided with an air leak prevention part consisting of a hollow body having an open end and an insertion hole formed in the base thereof, such that the aforesaid substrate attachment screw is able to penetrate through the open side of this air leak prevention part, and the aforesaid substrates are fastened by threading this screw through the insertion hole into the aforesaid screw hole via the insertion hole in the aforesaid substrate. Consequently, in the event of maintenance or inspection, it is possible to remove the substrate attachment screw from the opening in the aforesaid air leak prevention part without needing to remove the air guide plate, thereby making it possible to unmount the substrate by moving it downward.

【0008】 Additionally, because a concave part that fits into the aforesaid through-hole is formed at the peripheral edge of the opening of the aforesaid air leak prevention part, it is easy to fit the air leak prevention part into the through-hole, and it

is also possible to reliably prevent air leakage. Additionally, because the aforesaid concave part is formed in a location corresponding to the height from the aforesaid substrate surface to the air guide plate, gaps are eliminated. Furthermore, because the width of the aforesaid concave part is made to be wider than the thickness of the aforesaid air guide plate, and the depth thereof is made to be slightly greater than that of the aforesaid through-hole, and the aforesaid concave part is formed into a cross-sectional waveform, air leakage can be reliably prevented.

【0009】 Additionally, because the aforesaid air leak prevention part is formed from an elastic material, it is easy to fit, and air leakage can be reliably prevented. Additionally, because the air leak prevention part is formed integrally with the air guide plate, costs can be reduced.

【0010】

【Embodiment examples】 The heat dissipation structure for electronics according to the present invention will be described in detail below based on the drawings. FIG. 1 is a diagram illustrating the heat dissipation structure of conventional electronics; FIG. 1-(A) is a plan view taken from the back; FIG. 1-(B) is a cross-sectional view along line A-A in FIG. (A); FIG. 2 is a diagram illustrating one embodiment of the heat dissipation structure for electronics according to the present invention; and the c part of FIG. 1 is an enlarged cross-sectional view of the key components thereof. In the drawings, the same symbols are used to represent the same functionality, and FIG. 1 is not described, as it was described in the prior art section. 9 is the air leak prevention part that is fitted to the aforesaid through-hole 8a, which is formed into a hollow body having, as shown in FIG. 2, an opening 9a corresponding to the aforesaid through-hole 8a; an insertion hole 9b for insertion of the substrate attachment screw 10 formed in the base thereof; and a concave part 9c that fits into the aforesaid through-hole 8a formed at the peripheral edge of the opening 9a thereof. This concave part 9c is formed as shown below to improve mating to the through-hole 8a and to ensure that air leakage is prevented. First, a concave part 9c is formed in a location corresponding to a height from the aforesaid substrate 3 surface to the air guide plate 8. Additionally, the width of the aforesaid concave part 9c is made to be wider than the thickness of the aforesaid air guide plate 8, and the depth thereof is formed to be slightly greater than that of the aforesaid through-hole 8a. Additionally, the aforesaid concave part 9c is formed into a cross-sectional waveform.

【0011】 FIG. 3 is a cross-sectional view of the key components of another embodiment example of the heat dissipation structure for electronics according to the present invention. In the present embodiment example, the aforesaid air leak prevention part 9 is integrally formed with the aforesaid air guide plate 8, and, as shown in the drawings, a tubular recess 8b is formed in the air guide plate 8, thereby forming an opening 8c, and an insertion hole 8d is formed in the base of the same recess 8b. Additionally, a thin section 8e is provided at the top of the air guide plate 8, which thin section 8e enables the air guide plate 8 rotate.

【0012】 Next, the assembly procedure for the above-described configuration will be described. First, after

attaching the air guide plate 8 to the partition plate 5 with screws, etc., the substrate 3 is inserted from below the air guide plate 8. Next, in the case of the embodiment example in FIG. 2, the air leak prevention part 9 is fitted into the through-hole 8a provided in the air guide plate 8, and the screw 10 is inserted through the opening 9a in this air leak prevention part 9 and threaded through the attachment screw hole 5a in the partition plate 5 via the insertion hole 9b and the insertion hole 3a in the substrate 3, thereby fastening the substrate 3 to the partition plate 5. In the case of the embodiment example in FIG. 3, the thin section 8e formed at the top of the air guide plate 8 is rotated, the air guide plate 8 is lifted up, and the substrate 3 is inserted to the designated position, after which the air guide plate 8 is placed on the substrate 3, and the mounting screw 10 is inserted into the recess 8b via the opening 8c, whereupon it passes through the insertion hole 3a in the substrate 3 via the insertion hole 8d provided in the base of this recess 8b, and is threaded into the attachment screw hole 5a in the partition plate 5, thereby fastening the substrate 3 to the partition plate 5. Finally, the rear cover 7 is placed on the back of the housing 1.

【0013】 Contrary to the above, the board 3 can be removed from the partition plate 5 by removing the back cover 7 from the back of the housing 1 and removing the mounting screws 10.

【0014】

【Effect of Invention】 As described above, according to the heat dissipation structure for electronics of the present invention, by providing a through-hole corresponding to an insertion hole in the air guide plate; providing this through-hole with an air leak prevention part consisting of a hollow body having an opening and an insertion hole formed in the base thereof; and inserting the aforesaid substrate attachment screw through the opening in this air leak prevention part, and threading it onto the aforesaid screw hole via the insertion hole in the substrate, thereby fastening the substrate, air leakage from the through-hole formed in the air guide plate can be prevented, and in the event of maintenance or inspection, the substrate mounting screw can be removed from the opening in the air leak prevention part without needing to remove the air guide plate, thereby making it

possible to unmount the substrate by moving it downward.

【Brief description of the drawings】

【Fig. 1】 Schematic structure of conventional electronic equipment, where (A) is a plan view seen from the back, and (B) is a cross-sectional view along line A-A in (A).

【Fig. 2】 Enlarged cross-sectional view of a key components showing one embodiment example of the heat dissipation structure for electronics according to the present invention.

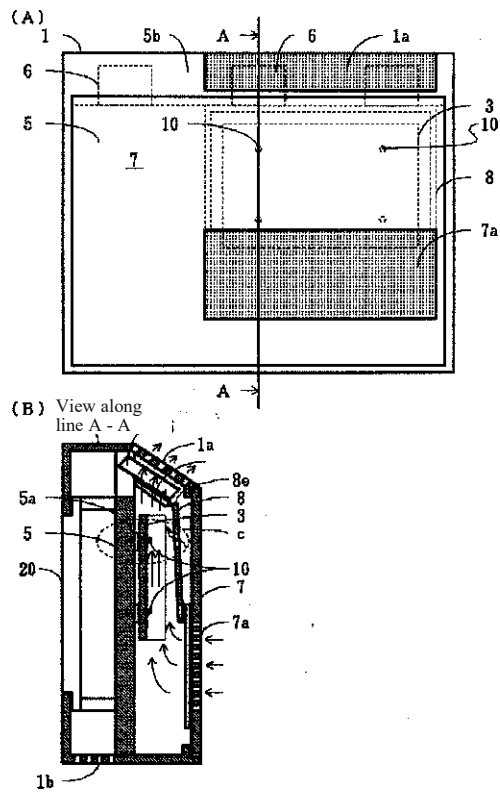
【Fig. 3】 Cross-sectional view of the key components showing another embodiment example of the heat dissipation structure for electronics according to the present invention.

【Figure 4】 Enlarged cross-sectional view of the key components showing the heat dissipation structure of conventional electronic equipment.

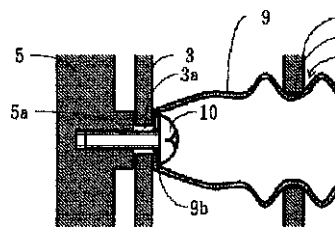
【Description of the symbols】

- 1 Housing
- 1a Air exhaust
- 2 Front
- 3 Substrates
- 3a Insertion hole
- 4 Rear
- 5 Partition plate
- 5a Attachment screw hole
- 5b Fan attachment part
- 6 Ventilation fan
- 7 Back cover
- 7a Back air inlet
- 8 Air guide plate
- 8a Through-hole
- 8b Recess
- 8c Opening
- 8d Insertion hole
- 8e Thin section
- 9 Air leak prevention part
- 9a Opening
- 9b Insertion hole
- 9c Concave part
- 10 Screw

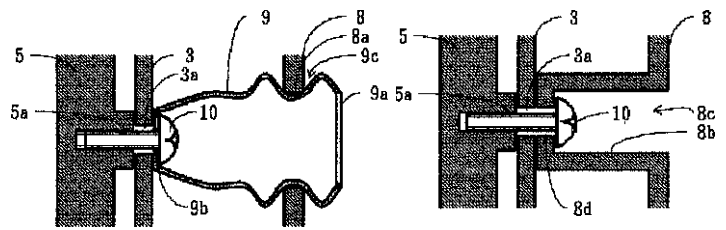
【Figure 1】



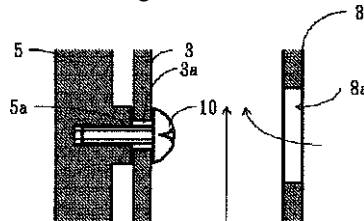
【Figure 2】



【Figure 3】



【Figure 4】

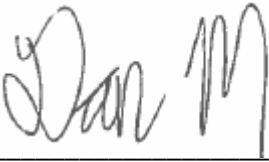


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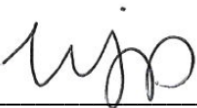
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