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(54) HEAT DISSIPATING STRUCTURE OF LIQUID CRYSTAL DISPLAY

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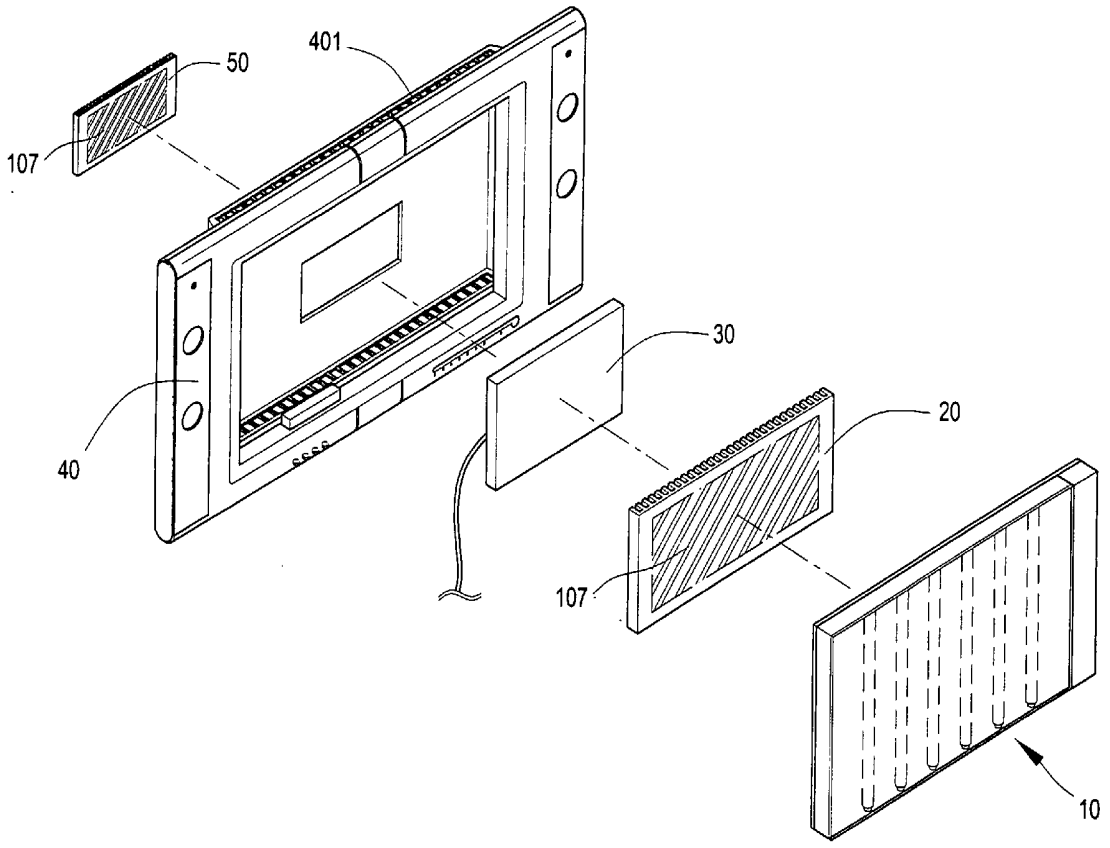
(57) **ABSTRACT**

The invention discloses a heat dissipating structure of liquid crystal display (LCD) having excellent heat dissipation effects and disposed behind a backlight module of the LCD, so as to elevate heat dissipation effects of the LCD. The heat dissipating structure includes a backlight module, a housing, an external heat sink and a plurality of heat dissipating units. An aluminum backboard at a rear portion of the backlight module is fastened to the heat dissipating units using a heat guide adhesive, and has at least a heat sink for conducting thermal energy to the housing. Through the external heat sink at the housing of the LCD, a second heat dissipation is carried out to discharge the thermal energy, thereby accomplishing rapid heat dissipation effects.



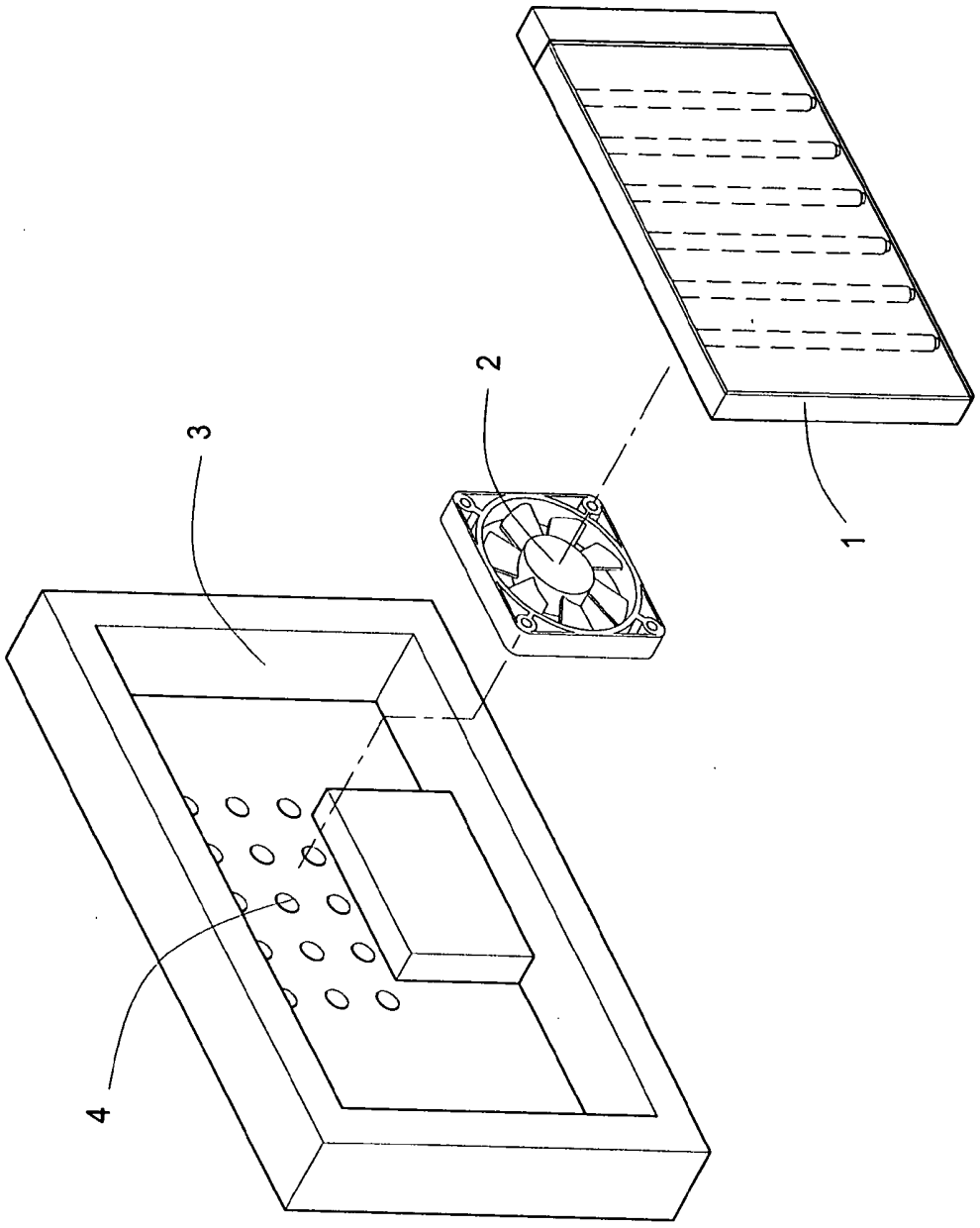


FIG. 1 (PRIOR ART)

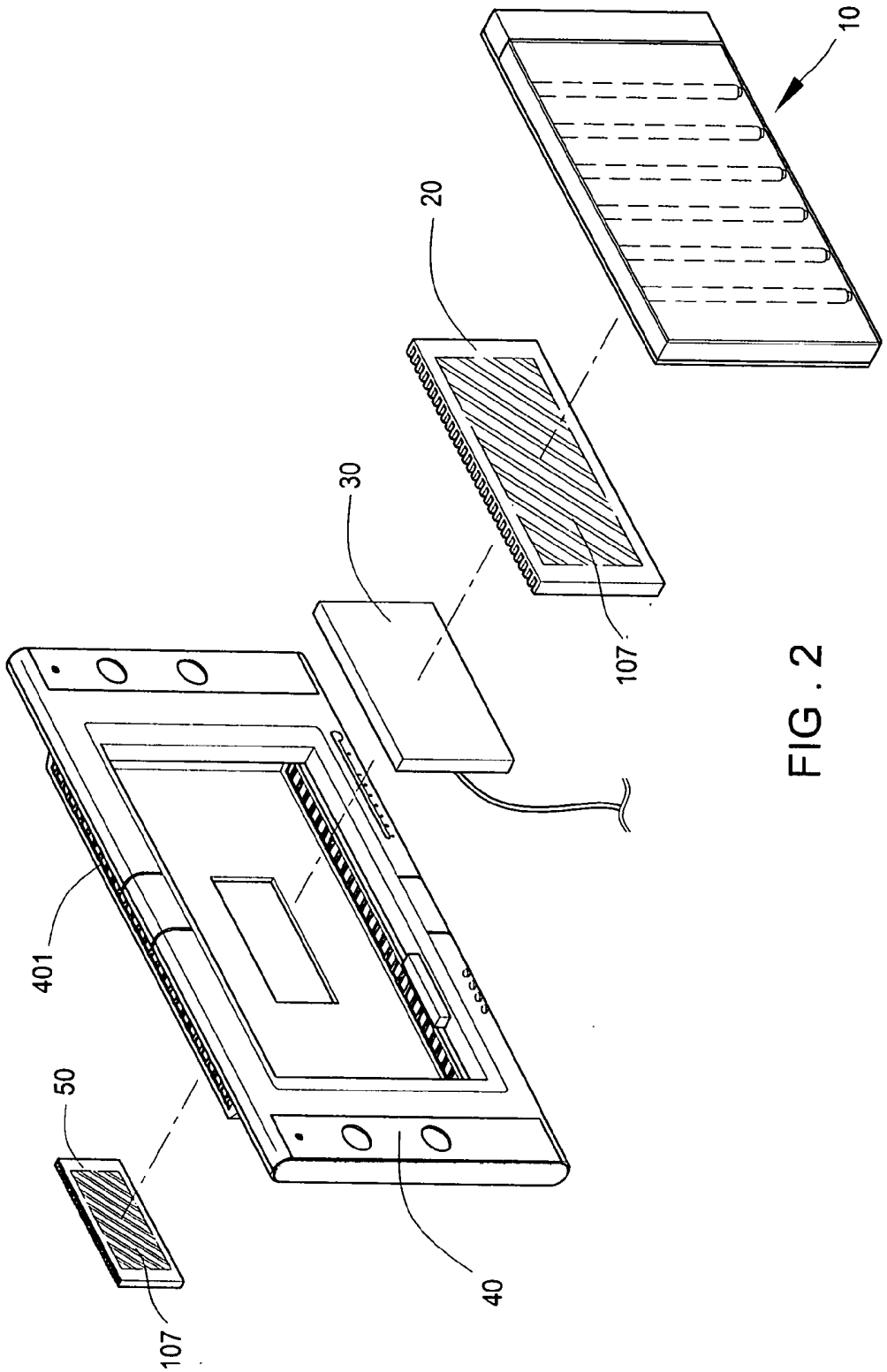


FIG. 2

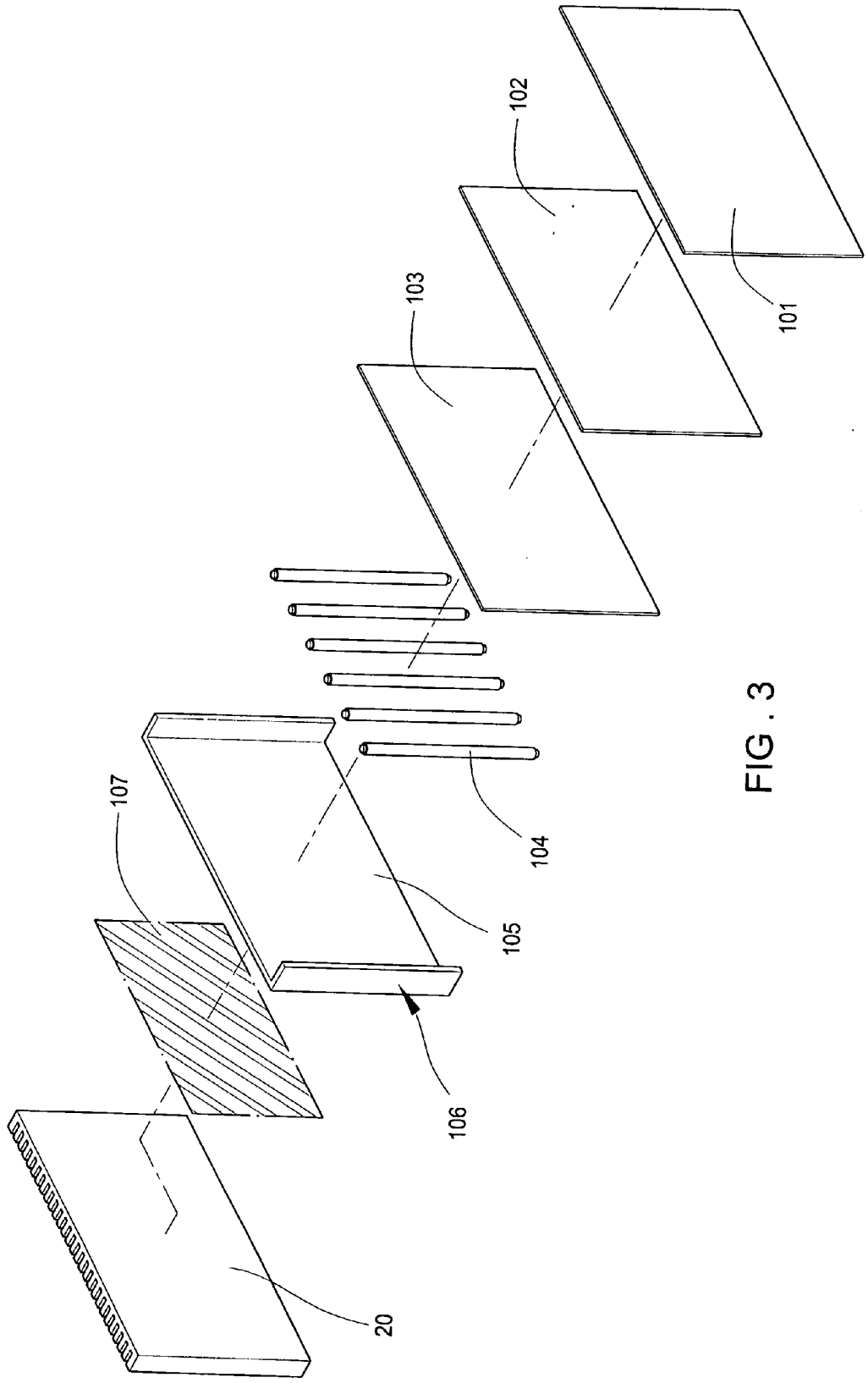


FIG. 3

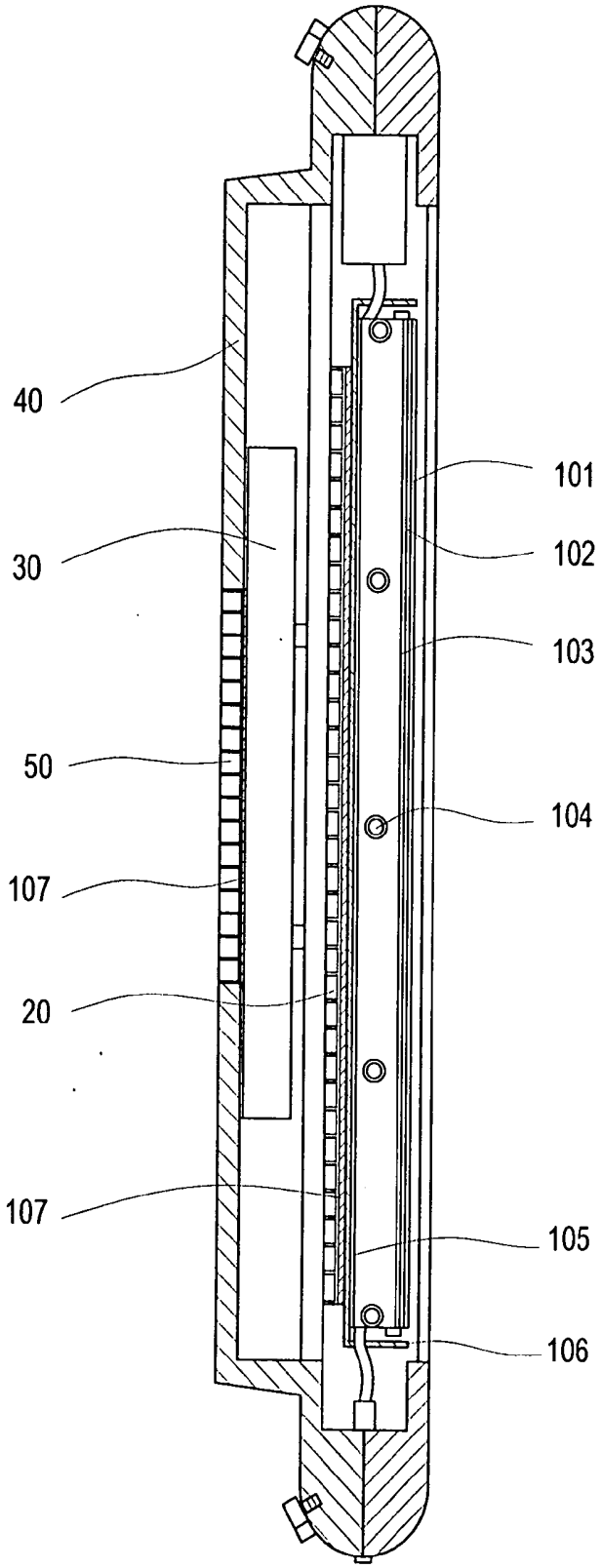


FIG . 4

HEAT DISSIPATING STRUCTURE OF LIQUID CRYSTAL DISPLAY

BACKGROUND OF THE INVENTION

[0001] (a) Field of the Invention

[0002] The invention relates to a heat dissipating structure of liquid crystal display (LCD), in that the heat dissipating structure dissipates excessive heat energy produced from operations of the LCD, thereby maintaining the LCD at an optimum operating status. More particularly, the invention relates to a heat dissipating structure adhered to a backlight module and a housing, so as to prevent a control box in the LCD from damages caused by over-heating.

[0003] (b) Description of the Prior Art

[0004] Liquid crystal displays (LCD) are extensively applied in televisions and personal computers. However, liquid crystals cannot radiate light, and hence an LCD is necessarily disposed with a backlight module for providing a light source. When temperatures produced by the light source exceed powers bearable by a control box and the backlight module in the LCD, malfunctions or damages of devices in the LCD are often resulted. Therefore, it is a vital task as how to reduce operating temperatures of the backlight module without affecting performances of the LCD.

[0005] Common heat dissipating structures disposed at LCD's are divided into a number of categories. Referring to **FIG. 1** showing a most commonly used heat dissipating structure, the heat dissipating structure comprises a backlight module **1**, a housing **3** and a heat dissipating fan **2**. The operating principle is that the heat dissipating fan **3** is disposed near heat dissipating openings **4** at the housing **3**. Convection of thermal energy produced by operations of the backlight module **1** is accelerated using the heat dissipating fan **2**, and the thermal energy is dissipated into air via the heat dissipating openings **4** at the housing **3**, thereby enhancing heat dissipation effects. Yet, generation of convection is totally relied on high speed rotations of the heat dissipating fan **2**. For instance, suppose the heat dissipating fan **2** is directly disposed at the backlight module **1**, forces produced from rotations thereof inevitably influence normal operations of the backlight module **1**. Again, suppose the heat dissipating fan **2** is disposed at the housing **3**, not only large noises are produced, but also heat dissipation effects are also affected by dust accumulated from static electricity.

SUMMARY OF THE INVENTION

[0006] In the view of the aforesaid drawbacks, the primary object of the invention is to provide a heat dissipating structure of liquid crystal display (LCD), in that the heat dissipating structure enables smoother and faster ventilation within the LCD and eliminates noises produced by a fan, thereby enhancing heat dissipation effects of the LCD.

[0007] A structure according to the invention comprises a backlight module, a housing, an external heat sink and a plurality of heat dissipating units. Wherein, the backlight module has a backlight plate joined with the plurality of heat dissipating units. Using principles of thermal conductance, thermal energy produced by the backlight module is conducted to the housing. The housing has a plurality of draining openings and external heat sinks. The drainage openings are for accomplishing air circulation, and the external heat sinks are disposed at a control box in the LCD, so as to quickly dissipate the thermal energy and thereby achieving rapid heat dissipation effects.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] **FIG. 1** shows a conventional heat dissipating structure of a prior art.

[0009] **FIG. 2** shows an exploded view of a heat dissipating structure according to the invention.

[0010] **FIG. 3** shows an exploded view of a backlight module according to the invention.

[0011] **FIG. 4** shows a sectional view of a liquid crystal display (LCD) according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] To better understand the structure, devices and characteristics of the invention, a preferred embodiment shall be given with the accompanying drawings below.

[0013] Referring to **FIG. 2**, a heat dissipating structure according to the invention comprises a backlight module **10**, a housing **40**, a heat dissipating unit **20**, an external heat sink **50** disposed on the housing **40**, and a control box **30**. The backlight module **10** has a diffuser plate **101**, a prism **102**, a diffuser board **103**, and a plurality of light tubes **104**, a reflecting layer **105** and an aluminum backboard **106** at a rear part of the backlight module **10**. The reflecting layer **105** having the aluminum backboard **106** adhered to a rear side thereof is joined with the heat dissipating unit **20** using a heat guide adhesive **107**. The backlight module **10** is assembled within the housing **40**. The housing has a plurality of drainage openings **401**. The external heat sink **50** is disposed on the housing **40** using the heat guide adhesive **107**. When thermal energy of the backlight module **10** is released via the heat dissipating unit **20**, the housing **40** is filled with thermal energy. The thermal energy is then discharged to the housing **40** using the external heat sink **50**. Through principles of thermal convection, cold airflows are induced from the drainage openings **401** and thereby accomplishing air circulation.

[0014] Referring to **FIG. 3**, a relationship is developed between the backlight module **10** and the heat dissipating unit **20** according to the invention: the light tubes **104** of the backlight module **10** are elements that produce heat; the reflecting layer **105** behind the light tubes **104** has the aluminum backboard **106** at a rear side thereof, and the aluminum backboard **106** conducts the heat source but is incapable of directly dissipating heat. Hence, the aluminum backboard **106** is joined with the plurality of heat dissipating units **20** via the heat guide adhesive **107**, so as to quickly dissipate heat.

[0015] Referring to **FIG. 4** showing heat dissipation effects of an assembled LCD according to the invention, each heat dissipating unit **20** has a plane side thereof fastened to the aluminum backboard **106** using the heat guide adhesive **17**, and the other side thereof formed in zigzag surfaces for expanding available heat dissipating

areas. It is to be noted that the housing **40** has the control box **30** at an interior thereof, and therefore although thermal energy of the backlight module **10** is induced into the housing **40**, in order to prevent over-heating and damages of the control box **30**, the external heat sink **50** is fastened on the housing **40** using the heat guide **107**, and the thermal energy is then guided out of the housing **40** for a second heat dissipation.

[**0016**] The aforesaid heat dissipating units **20** and the external heat sink **50** are made of materials such as aluminum oxide compounds, aluminum nitride and aluminum nitride compounds having high thermal conductance. Each heat dissipating unit **20** and each external heat sink **50** have a planar side thereof fastened to the backlight module **10** and the control box **30**, and the other side as a heat dissipating plane in a fin-like, wave-like or a zigzag shape. The heat dissipating units **20** and the heat sinks **50** may be provided in the number of one or more than one. In addition, the external heat sink **50** fastened to the control box **30** may be a formed integral with the housing **40**.

[**0017**] Conclusive from the above, in the heat dissipating structure of LCD according to the invention, a plurality of heat dissipating units is disposed at a backlight module. Using principles of thermal conductance, thermal energy produced is conducted to a housing having a plurality of drainage openings and external heat sinks. Wherein, the draining openings are for accomplishing air circulation to reduce noises and maintain heat dissipation effects.

[**0018**] It is of course to be understood that the embodiment described herein is merely illustrative of the principles of the invention and that a wide variety of modifications thereto may be effected by persons skilled in the art without departing from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. A heat dissipating structure of liquid crystal display (LCD), comprising:

a backlight module having a display panel, a diffuser plate, a plurality of light tubes and a backlight plate; and

a housing joined with the backlight module; and having a control box at an interior thereof, and a plurality of drainage openings;

wherein, a rear side of a reflecting layer is adhered to an aluminum backboard using a heat guide adhesive, the backlight module is disposed with heat dissipating units at a rear portion thereof, and the housing has external heat sinks.

2. The heat dissipating structure of LCD in accordance with claim 1, wherein a heat dissipating plane of each heat dissipating unit is a fin-like shape.

3. The heat dissipating structure of LCD in accordance with claim 1, wherein a heat dissipating plane of each heat dissipating unit is a wave-like shape.

4. The heat dissipating structure of LCD in accordance with claim 1, wherein a heat dissipating plane of each heat dissipating unit is a zigzag shape.

5. The heat dissipating structure of LCD in accordance with claim 1, wherein a heat dissipating plane of each external heat sink is a fin-like shape.

6. The heat dissipating structure of LCD in accordance with claim 1, wherein a heat dissipating plane of each external heat sink is a wave-like shape.

7. The heat dissipating structure of LCD in accordance with claim 1, wherein a heat dissipating plane of each external heat sink is a zigzag shape.

8. The heat dissipating structure of LCD in accordance with claim 1, wherein the external heat sink is a formed integral with the housing.

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专利名称(译)	液晶显示器的散热结构		
公开(公告)号	US20050073639A1	公开(公告)日	2005-04-07
申请号	US10/678163	申请日	2003-10-06
[标]申请(专利权)人(译)	潘SHIN董先生		
申请(专利权)人(译)	潘SHIN-TUNG		
当前申请(专利权)人(译)	SILAN CORPORATION		
[标]发明人	PAN SHIN TUNG		
发明人	PAN, SHIN-TUNG		
IPC分类号	G02F1/133 G02F1/1333 G02F1/13357		
CPC分类号	G02F1/133382 G02F2202/28 G02F2001/133628 G02F1/133604		
外部链接	Espacenet USPTO		

摘要(译)

本发明公开了一种液晶显示器（LCD）的散热结构，具有良好的散热效果，设置在液晶显示器的背光模块后面，以提高液晶显示器的散热效果。散热结构包括背光模块，壳体，外部散热器和多个散热单元。背光模块后部的铝背板使用导热粘合剂固定在散热单元上，并至少具有散热器，用于将热能传导至壳体。通过LCD外壳上的外部散热器，进行第二次散热以释放热能，从而实现快速散热效果。