

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15789331
	Filing Date		2017-10-20
	First Named Inventor	William Dunn	
	Art Unit	2871	
	Examiner Name	Gandhi, Jayprakash N.	
	Attorney Docket Number	MAN2241-045P	

	4	20020065046	A1	2002-05-30	Mankins et al.	
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	2	JPH08305301	JP	A	1996-11-22	Sony Corp		☒

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3	JP2007293105	JP	A	2007-11-08	Sony Corp	☒
4	WO2007116116	WO	A1	2007-10-18	Symbicon Oy	☐
5	JP2006163217	JP	A	2006-06-22	Nagayama et al.	☒
6	JPH09246766	JP	A	1997-09-19	Fanuc Ltd.	☒
7	KR200366674	KR	Y1	2004-11-06	Sook	☒
8	KR200401354	KR	Y1	2005-11-15	Unknown	☒

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	1	CIVIQ, Invalidity Contentions, January 24, 2018, 51 pages	
	2	CIVIQ, Invalidity Claim Chart, Appendix I, March 22, 2018, 4 pages	
	3	CIVIQ, Invalidity Claim Charts, Appendix A - Appendix D, January 24, 2018, 51 pages	

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4	BUREAU OF SHIPS NAVY DEPARTMENT, Guide Manual of Cooling methods for Electronic Equipment, March 31, 1955, 212 pages
5	WANKHEDE, Evaluation of Cooling Solutions for Outdoor Electronics, September 17-19, 2007, 6 pages
6	SCOTT, Cooling of Electronic Equipment, April 4, 1947, 119 pages
7	SERGEANT, Thermal Management Handbook for Electronic Assemblies, August 14, 1998, 190 pages
8	STEINBERG, Cooling Techniques for Electronic Equipment First Edition, 1980, 255 pages
9	STEINBERG, Cooling Techniques for Electronic Equipment Second Edition, 1991, 299 pages
10	YEH, Thermal Management of Microelectronic Equipment, October 15, 2002, 148 pages
11	CIVIQ, Invalidity Claim Charts, Appendix F to H, March 22, 2018, 18 pages
12	YUNG, Using Metal Core Printed Circuit Board as a Solution for Thermal Management article, 2007, 5 pages
13	CIVIQ SMARTSCAPES LLC. V MANUFACTURING RESOURCES INTERNATIONAL, INC., Petition for Inter Partes Review of U.S. Patent No. 8,854,572 including Declaration of Greg Blonder in Support of Petition, Curriculum Vitae of Greg Blonder and Prosecution History of U.S. Patent No. 8,854,572, Petition filed March 14, 2018, 427 pages.
14	MENTLEY, DAVID E., State of Flat-Panel Display Technology and Future Trends, Proceedings of the IEEE, April 2002, Vol. 90, No. 4, pp. 453-459.

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Eric M. Gayan/	Date (YYYY-MM-DD)	2018-04-26
Name/Print	Eric M. Gayan	Registration Number	46103

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CLAIMS

[Claims]

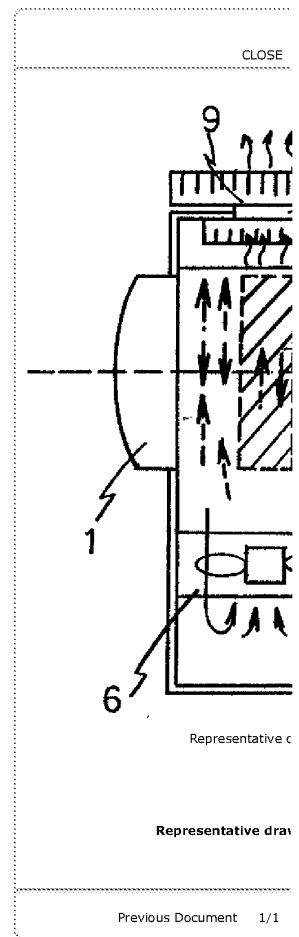
[Claim 1]A liquid crystal condensator of a liquid crystal projector characterized by comprising the following.

A liquid crystal panel.

A container of an encapsulated type which stored this liquid crystal panel and with which it filled up with a refrigerant.

A fan which can provide in this container and circulates through ** and a refrigerant.

A thermoelectric-cooling unit using a Peltier effect which is provided by one side face of a container and performs heat exchange with a refrigerant and the open air.



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DETAILED DESCRIPTION

[Detailed explanation of the device]

[0001]

[Industrial Application]

This design is related with the cooling system of the projection type display which used the liquid crystal display panel.

[0002]

[Description of the Prior Art]

Temperature rise is caused, in order to absorb the part and to change to heat, when the light emitted from the light source in the liquid crystal projector passes a polarizing plate and a liquid crystal panel. thereby -- degradation of a polarizing plate and operation of a liquid crystal panel, or it breaks and ***** arises.

[0003]

In order to prevent this, the air system which adopts in a housing the open air which is one of the prior arts is used, but an air filter is needed in order to avoid that the garbage mixed with the open air in this case adheres to a liquid crystal panel etc. Although mixing of a great portion of garbage is avoidable with this air filter, microparticulate garbage, for example, smoke, dust, etc. of a cigarette, can hardly be caught, although based also on the relation between the collection performance of an air filter, and pressure loss. Suction of the open air becomes difficult, as a result, internal temperature rise is caused, and parts break, or the air filter to which a great portion of garbage was made to adhere causes ignition.

[0004]

As measures against adhesion, such as smoke of such a cigarette, and dust, stir an internal gas with a circulating fan by making the case of a liquid crystal projector into sealed structure, and. Radiate heat from the cooling system which provided besides the case the heat which occurred with the light source via the endothermic body and conductor which were provided to the light source periphery, or. Immersing [(for example, a JP H2 - 130542A), a liquid crystal panel, and a polarizing plate]-in Paris Rex glass containers etc. with which cooling fluid, such as ethylene glycol aqueous solution, was filled up idea ***** (for example, JP,63-67979,A, a JP H1 - 302386A). [0005]

As a cooling system of a liquid crystal panel, the cooling system by refrigerants, such as Freon and water, is stuck to a liquid crystal panel. Circulate this refrigerant with a fluid pump, or compress with a compressor, and radiate heat from a radiator, or. Space surrounded with (for example, JP,1-159684,A and the No. 1-314287 gazette), the liquid crystal panel, the condenser, and the radiator is filled up with the cooling fluid consisting of ethylene glycol, glycerin, etc., Cool this radiator with a cooling fan (for example, JP,2-204682,A, the No. 91716 [three to] gazette), or, Attach to the side surface of the cooling container which sealed the liquid crystal panel and the refrigerant, and it connects a plurality of liquid crystal display units [**** / (for example, JP H1 - 92635U) / cooling this refrigerant by the electronic cooling element using a Peltier effect] to air supply and an exhaust duct, A heat pipe type heat exchanger and an air blower are provided to this air supply and the upper and lower sides of an exhaust duct, and it considers cooling the liquid crystal panel of a liquid crystal display unit (for example, JP,63-271490,A, the No. 271491 [63 to] gazette).

[0006]

[Problem(s) to be Solved by the Device]

In order to solve each problem by the garbage of the liquid crystal projector which added the air filter in the above-mentioned, the open air is not adopted to a housing but a liquid crystal projector with the condenser which performs only a heat transfer is provided with the open air.

[0007]

[Means for solving problem]

Therefore, the container of the encapsulated type which stored a liquid crystal panel and this liquid crystal panel and with which it filled up with the refrigerant in order that this design might achieve the above-mentioned object, It has a thermoelectric-cooling unit using the Peltier effect which is provided by the fan which is provided in this container and circulates through a refrigerant, and the one side face of a container, and performs heat exchange with a refrigerant and the open air.

[0008]

[Working example]

Fig.1 and Fig.2 show the Example of the liquid crystal condenser in a liquid crystal projector.

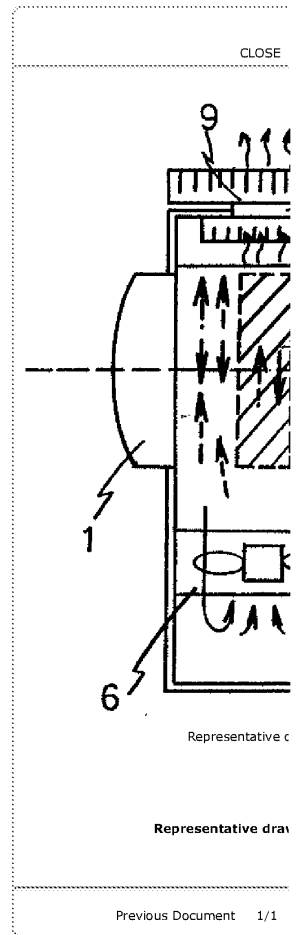
In Fig.1, the refrigeration unit 9 which consists of the endothermic fin 3, the radiation fin 4, and the thermoelectric-cooling unit 5 was attached to the box 10 which secured the optical path systems of light with the condenser 1 and the polarizing plate 2. The medium 7 in a box is circulated with the fan 6, and after making the heat which occurred in the liquid crystal panel 8 and the polarizing plate 2 transmit to the medium 7, the refrigeration unit 9 performs an endothermic and heat dissipation to outside.

Fig.2 is the figure at the time of seeing Fig.1 from a transverse plane.

[0009]

[Effect of the Device]

Since this design is a condenser which does not adopt the open air like the cooling system of the conventional liquid crystal projector as described above, there are no worries about problems, such as loading of the garbage of an air filter and mixing of microparticulate garbage.



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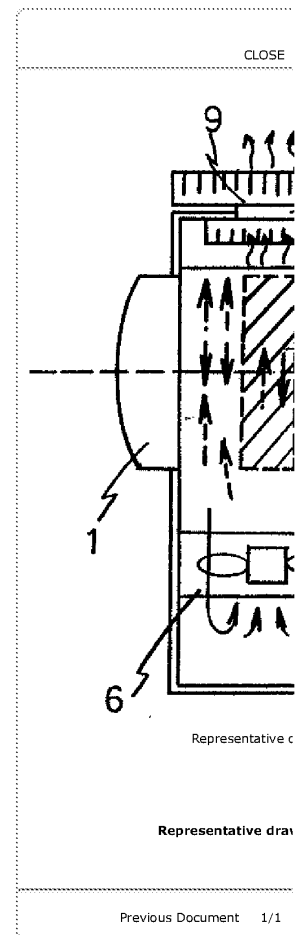
[Brief Description of the Drawings]

A [FIG. 1] It is an abbreviated cross sectional view showing the Example of this design.

A [FIG. 2] It is the abbreviated cross sectional view concerning Fig.1 seen from the transverse plane.

[Explanations of letters or numerals]

- 1 Condenser
- 2 Polarizing plate
- 3 Endothermic fin
- 4 Radiation fin
- 5 Electronic cooling element
- 6 Fan
- 7 Medium
- 8 Liquid crystal panel
- 9 Refrigeration unit
- 10 Box
- 11 Partition plate

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(19)日本特許庁(J P)

(12) 公開実用新案公報 (U)

(11)実用新案出願公開番号

実開平6-2337

(43)公開日 平成6年(1994)1月14日

(51)Int.Cl. ⁵	識別記号	序内整理番号	F I	技術表示箇所
G 0 2 F 1/13	5 0 5	7348-2K		
	1/133	9226-2K		
G 0 3 B 21/16		7316-2K		
G 0 9 F 9/00		6447-5G		
H 0 4 N 5/74		9068-5C		

審査請求 未請求 請求項の数 1 (全 2 頁)

(21)出願番号 実願平4-42030

(22)出願日 平成4年(1992)6月18日

(71)出願人 000001937

日本電気ホームエレクトロニクス株式会社
大阪府大阪市中央区城見一丁目4番24号

(72)考案者 加藤 幹雄

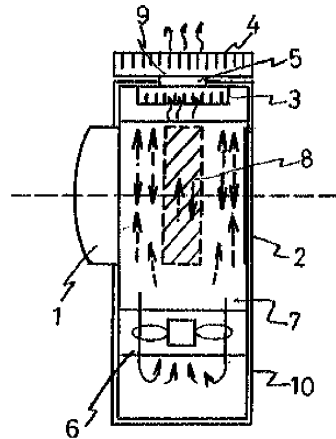
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本電気ホームエレクトロニクス株式会社内

(54)【考案の名称】 液晶プロジェクトの液晶冷却器

(57)【要約】

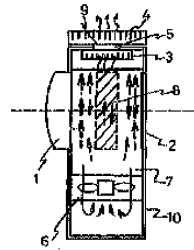
【目的】 従来の液晶プロジェクトにおいて、エアフィルターを付加する空冷方式の場合にエアフィルターのゴミの目づまりにより、筐体内の温度上昇があり、内部部品の壊れ、発火などの原因ともなるので、外気を取り入れずに熱のみを筐体外に排出するエアフィルターを必要としない液晶冷却器を提案する。

【構成】 集光レンズと偏光板とにより、光の光路系を確保した箱内に液晶パネルがあり、ファンにより液晶パネル周辺の媒体を対流させる。光源からの光が、液晶パネルと偏光板で熱に変換された後、対流する媒体に熱を伝え、放熱フィンと電子冷却素子よりなる冷却ユニットで媒体の熱を外部へ排出する。

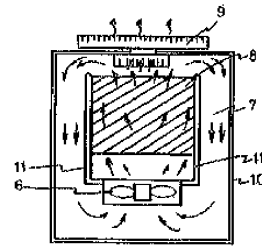


- 【実用新案登録請求の範囲】
- 【請求項1】 液晶パネルと、この液晶パネルを収納し、且つ冷媒が充填された密閉型の容器と、この容器の中に設けられ、且つ冷媒を循環するファンと、容器の一側面に設けられ、且つ冷媒と外気との熱交換を行なうペルチェ効果を利用した電子冷却ユニットとを備えたことを特徴とする液晶プロジェクタの液晶冷却器。
- 【図面の簡単な説明】
- 【図1】 本考案の実施例を示す略断面図である。
- 【図2】 図1に係わる、正面から見た略断面図である。
- 【符号の説明】
- * 1 集光レンズ
 - 2 偏光板
 - 3 吸熱フィン
 - 4 放熱フィン
 - 5 電子冷却素子
 - 6 ファン
 - 7 媒体
 - 8 液晶パネル
 - 9 冷却ユニット
 - 10 箱
 - * 11 仕切り板

【図1】



【図2】



【考案の詳細な説明】

【0001】

【産業上の利用分野】

本考案は、液晶表示パネルを用いた投写型表示装置の冷却装置に関する。

【0002】

【従来の技術】

液晶プロジェクタ内において、光源より出射された光が、偏光板及び液晶パネルを通過する時に、その一部が吸収され、熱に変わるため、温度上昇を招く。これにより、偏光板の劣化や液晶パネルの動作不順あるいは、こわれといった問題が生じてくる。

【0003】

これを防ぐために従来技術の一つである外気を筐体内に取り入れる空冷方式を用いているが、この場合、外気と共に混入するゴミが液晶パネル等に付着するのをさけるため、エアフィルターを必要とする。このエアフィルターにより大部分のゴミの混入をさけることができるが、微粒状のゴミ、例えば煙草の煙や塵埃等はエアフィルターの捕集性能と圧力損失との関係にもよるがほとんど捕集することができない。さらに、大部分のゴミを付着させたエアフィルターは、外気の吸引が困難となり、その結果、内部の温度上昇を起こし、部品のこわれ、あるいは発火の原因ともなる。

【0004】

この様な煙草の煙や塵埃等の付着対策として、液晶プロジェクタのケースを密閉構造として、内部の気体を循環ファンで攪拌すると共に、光源で発生した熱を光源周辺部に設けた吸熱体と熱伝導体を介してケースの外に設けた冷却装置から放熱したり（例えば、特開平2-130542号公報）、液晶パネル及び偏光板をエチレングリコール水溶液などの冷却液が充填されたバリレックスガラス製の容器などに浸漬すること考えられている（例えば、特開昭63-67979、特開平1-302386号公報）。

【0005】

尚、液晶パネルの冷却装置としては、液晶パネルにフロンや水などの冷媒に

よる冷却装置を密着させ、この冷媒を流体ポンプで循環させたり、圧縮機で圧縮して放熱器から放熱したり（例えば、特開平1-159684、1-314287号公報）、液晶パネルと集光レンズと放熱器で囲まれた空間をエチレングリコールとグリセリンなどからなる冷却液で充填して、この放熱器を冷却ファンで冷却したり（例えば、特開平2-204682、3-91716号公報）、液晶パネルと冷媒を密閉した冷却容器の側面に取付け、この冷媒をバルチェ効果を利用した電子冷却素子で冷却したり（例えば、実開平1-92635号公報）、複数の液晶表示ユニットを給気及び排気ダクトに接続して、この給気及び排気ダクトの上下にヒートパイプ式熱交換器と送風機とを設け、液晶表示ユニットの液晶パネルを冷却することが考えられている（例えば、特開昭63-271490、63-271491号公報）。

【0006】

【考案が解決しようとする課題】

前述におけるエアフィルターを付加した液晶プロジェクタのゴミによる個々の問題を解決するため、外気を筐体に取り入れず、外気とは、熱の移動だけを行なう冷却器をもつ液晶プロジェクタを提供する。

【0007】

【課題を解決するための手段】

従って、本考案は、上述の目的を達成するために、液晶パネルと、この液晶パネルを収納し、且つ冷媒が充填された密閉型の容器と、この容器の中に設けられ、且つ冷媒を循環するファンと、容器の一側面に設けられ、且つ冷媒と外気との熱交換を行なうバルチェ効果を利用した電子冷却ユニットとを備えたものである。

【0008】

【実施例】

図1、図2は、液晶プロジェクタ内の液晶冷却器の実施例を示したものである。

図1において、集光レンズ1と偏光板2とで光の光路系を確保した箱10に吸熱フィン3と放熱フィン4と電子冷却ユニット5からなる冷却ユニット9を取付け

た。箱内の媒体7は、ファン6によって対流させ、液晶パネル8と偏光板2に発生した熱を媒体7に伝達させた後、冷却ユニット9により、吸熱及び外部への放熱を行なう。

図2は、図1を正面から見た場合の図である。

【0009】

【考案の効果】

以上説明したように本考案は、従来の液晶プロジェクタの冷却方式のように外気を取り入れることがない冷却器なので、エアフィルターのゴミの目づまり、微粒状のゴミの混入などの問題の心配がない。



Espacenet

Bibliographic data: JPH08305301 (A) — 1996-11-22

LIQUID CRYSTAL DISPLAY DEVICE

Inventor(s): YAMADA NAOKI ± (YAMADA NAOKI)

Applicant(s): SONY CORP ± (SONY CORP)

Classification: - international: *F21V8/00; G02F1/1335; G02F1/13357; G09F9/00; G09F9/40*; (IPC1-7): F21V8/00; G02F1/1335; G09F9/00; G09F9/40

- cooperative:

Application number: JP19950111905 19950510

Priority number (s): JP19950111905 19950510

Abstract of JPH08305301 (A)

PURPOSE: To provide a liquid crystal display device which is small in size, is short in viewing distance, is light in weight and is preferably hardly affected by reflection of external light, etc. **CONSTITUTION:** A liquid crystal display having opposed two faces is illustrated as the liquid crystal display device. The liquid crystal display having the opposed two faces is constituted by disposing a front surface liquid crystal display device 11C and rear surface liquid crystal display device 12C respectively having plural liquid crystal display devices back to back in such a manner that the display contents are visible from both opposite sides and disposing back lights 113, 123 for making parallel beams incident on the respective liquid crystal display parts between these liquid crystal display parts. More preferably, the liquid crystal display device is provided with cooling means consisting of radiating fins 114, 124 and a cooling fan 22 for cooling the heat released from these back light means.

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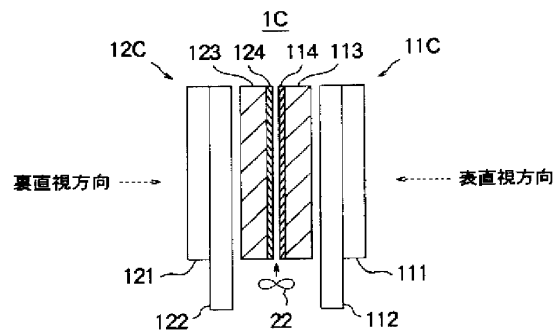
(74) 代理人 弁理士 佐藤 隆久

(54) 【発明の名称】 液晶表示装置

(57) 【要約】

【目的】 小型で、目視距離が短く、軽量で、好適には、外光の反射などの影響を受けにくい液晶表示装置を提供する。

【構成】 液晶表示装置として2面对向液晶表示装置を例示する。2面对向液晶表示装置は、対向する両方の側から表示内容が視認できるように背中合わせに、それぞれ複数の液晶表示デバイスを有する表面液晶表示装置11Cと裏面液晶表示装置12Cを配設し、これら液晶表示部の間にそれぞれの液晶表示部に平行光を入射させるバックライト113、123を配設している。好適には、バックライト手段から放出される熱を冷却する、放熱フィン114、124および冷却ファン22からなる冷却手段を設ける。



【特許請求の範囲】

【請求項1】対向する両方の側から表示内容が視認できるように背中合わせに、それぞれ複数の液晶表示デバイスを有する第1および第2の液晶表示部を配設し、これら液晶表示部の間にそれぞれの液晶表示部に光を入射させるバックライト手段を配設した液晶表示装置。

【請求項2】前記バックライト手段は、第1の液晶表示装置に向けて光を射出する第1のバックライトと、第2の液晶表示装置に向けて光を射出する第2のバックライトとを有する請求項1記載の液晶表示装置。

【請求項3】前記バックライト手段から放出される熱を冷却する冷却手段を設けた請求項2記載の液晶表示装置。

【請求項4】前記冷却手段は、第1のバックライトの照射面と対向する側に装着した第1の冷却フィンと、第2のバックライトの照射面と対向する側に装着した第2の冷却フィンと、これら第1および第2の冷却フィンを冷却する冷却ファンとを有する請求項3記載の液晶表示装置。

【請求項5】前記バックライト手段は、第1の液晶表示装置および第2の液晶表示装置の両側に向けて光を射出する共通のバックライトを有する請求項1記載の液晶表示装置。

【請求項6】前記バックライト手段から放出される熱を冷却する冷却手段を設けた請求項5記載の液晶表示装置。

【請求項7】前記冷却手段は前記バックライト手段およびその近傍を冷却するファンを有する請求項6記載の液晶表示装置。

【請求項8】上下左右の4方向から表示内容が視認できるように、それぞれ、外面に表面液晶表示部、その内面に表面制御基板を組み合わせた、該液晶表示部に複数の液晶表示デバイスを有する表面液晶表示装置を4組設け、4組の表面液晶表示装置のそれぞれの裏面にバックライトまたは4組共通のバックライトを設けた液晶表示装置。

【請求項9】上下左右表裏の6方向から表示内容が視認できるように、それぞれ、外面に表面液晶表示部、その内面に表面制御基板を組み合わせ、該液晶表示部に複数の液晶表示デバイスを有する表面液晶表示装置を立方体を構成するように6組設け、6組の表面液晶表示装置のそれぞれの裏面にバックライトまたは6組共通のバックライトを設けた液晶表示装置。

【請求項10】前記立方体の内腔に冷却ファンを設け、前記立方体の隅部に空気通過穴を設け、前記冷却ファンの回転によって前記前記立方体の一方の

面側の穴から空気を導入し、該一方の面と対向する面側の穴から空気を排出させる請求項9記載の液晶表示装置。

【請求項11】それぞれ、外面に表面液晶表示部、その内面に表面制御基板を組み合わせ、該液晶表示部に複数の液晶表示デバイスを有する表面液晶表示装置を部分的あるいは完全な球面体を構成するように設け、それぞれの表面液晶表示装置のそれぞれの裏面にバックライトまたは共通のバックライトを設けた液晶表示装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は液晶表示装置に関するものであり、特に、2方向以上の向きから1または異なる表示内容を同時に視認可能な多面液晶表示装置、または、立方体、球面体などの多面体構造を有する多面体液晶表示装置に関する。

【0002】

【従来の技術】たとえば、TV会議システムあるいはTV討論会などにおいて、異なる位置に座っている複数の会議出席者が同時に同じ映像またはそれぞれ異なる映像を見たい場合がある。現在、TV討論会などにおいては、それぞれの会議出席者の机（会議卓）に小型のCRT表示装置（CRTモニタ）をTV撮影に目立たないように収容し、かつ、会議卓に相手側の会議出席者の顔を見るのに邪魔にならないように収容し、会議出席者がそれぞれの小型CRT表示装置に現在放映されている映像を表示できるようにしている。

【0003】

【発明が解決しようとする課題】しかしながら、このような表示方式は、会議出席者の分だけ小型CRT表示装置を内蔵した机を準備しないといけないから、価格的に有利ではない。またCRT表示装置の画面に表示された内容は、天井などに配設された蛍光灯などの照明器具からの照明光があると見えにくい（視認しにくい）。そのため、CRT表示装置の画面に光遮蔽板を設けたり、照明器具からの光がCRT表示装置の画面に直接入り込まないようにCRT表示装置の画面の傾きを設定するなどの種々の工夫、複雑な対策が必要になる。それでもTV撮影などにおいては特に照明が強いから、その反射により会議出席者からは表示内容が見にくい場合がある。

【0004】そのような課題を解決する案として、たとえば、会議卓を囲む中央の位置に、複数のCRT表示装置をそれぞれの会議出席者を向くように配設することが考えられる（CRT表示装置群を用いた多面表示）。しかしながら、CRT表示装置は奥行きがあるため、複数のCRT表示装置をそのように配置するとCRT表示装置群の占める空間が大きくなるという問題がある。たとえば、簡単な構成として、オフィスなどにおいて、占有場所の削減を計るためCRT表示装置を2つ背中合わせ

に配設した場合を想定しても、1台のCRT表示装置自体の奥行きが長いから2台のCRT表示装置の合計寸法が大きくなる。加えて、眼の疲労および視認性の観点から眼をCRT画面からある程度距離を離して映像を見る必要がある。その結果、対向する2人の位置する間隔は一層離れてしまう。つまり、CRT表示装置を背中合わせにすると、CRT表示装置自体の占める距離と目視距離との合計距離が大きくなり、2台背中合わせにして空間を削減するという目論見は達成されない。また、CRT表示装置は重いから、2台のCRT表示装置を設置すると相当重くなるという重量的な問題もある。さらに、そのような場合でも、上述した照明に対する視認性の低下の問題は依然として、克服すべき課題として残っている。

【0005】最近では、上述した多面表示に加えて、立体的な表示（多面体表示）の要望も出てきている。このような場合には、CRT表示装置を用いた場合の上述した問題、つまり、奥行きの大きさと視認距離の長さ、重量の重さ、照明に対する視認性の低下は一層顕著になり、CRT表示装置を用いた多面体表示は実質的に困難である。

【0006】本発明の目的は、上述したCRT表示装置を多面表示または多面体表示に利用するしたと仮定した場合の問題を解決し、実用的な種々の多面表示または多面体表示が可能な表示装置を提供することにある。

【0007】

【課題を解決するための手段】本発明においては、基本的に奥行き寸法が短く、目視距離も短く、軽量の液晶表示装置を、目的に応じて組み合わせて多面表示または多面体表示可能な液晶表示装置を構成する。

【0008】本発明の液晶表示装置の多面表示の1例として2面对向液晶表示装置の場合は、対向する両方の側から表示内容が視認できるように背中合わせに、それぞれ複数の液晶表示デバイスを有する第1および第2の液晶表示部を配設し、これら液晶表示部の間にそれぞれの液晶表示部に光を入射させるバックライト手段を配設する。バックライト手段は、(a)第1の液晶表示装置に向けて光を射出する第1のバックライトと、第2の液晶表示装置に向けて光を射出する第2のバックライトとを有してもよいし、(b)第1の液晶表示装置および第2の液晶表示装置の両側に向けて光を射出する共通のバックライトを有してもよい。好適にはバックライト手段から放出される熱を冷却する冷却手段を設ける。

【0009】本発明の液晶表示装置の多面表示の他の例として4方向液晶表示装置の場合は、上下左右の4方向から表示内容が視認できるように、それぞれ、外面に表面液晶表示部、その内面に表面制御基板を組み合わせた、該液晶表示部に複数の液晶表示デバイスを有する表面液晶表示装置を4組設け、4組の表面液晶表示装置のそれぞれの裏面にバックライトまたは4組共通のバック

ライトを設ける。

【0010】本発明の液晶表示装置の多面体表示の1例として6方向液晶表示装置の場合は、上下左右表裏の6方向から表示内容が視認できるように、それぞれ、外面に表面液晶表示部、その内面に表面制御基板を組み合わせた、該液晶表示部に複数の液晶表示デバイスを有する表面液晶表示装置を立方体を構成するように6組設け、6組の表面液晶表示装置のそれぞれの裏面にバックライトまたは6組共通のバックライトを設ける。

【0011】本発明の液晶表示装置の多面体表示の他の例として球面状液晶表示装置の場合は、それぞれ、外面に表面液晶表示部、その内面に表面制御基板を組み合わせた、該液晶表示部に複数の液晶表示デバイスを有する表面液晶表示装置を部分的あるいは完全な球面体を構成するように設け、それぞれの表面液晶表示装置のそれぞれの裏面にバックライトまたは共通のバックライトを設ける。

【0012】

【作用】奥行き寸法が小さく、視認距離の短い液晶表示装置を組み合わせて配設することにより、寸法の小さな多面表示または多面体表示が可能な液晶表示装置が構成できる。液晶表示装置の多面の画面には、それぞれ、同じ映像（画像）または異なる映像を表示でき、それらの映像を多方面から視認できる。

【0013】液晶表示装置を集合させると、バックライトの放熱に伴う多面液晶表示装置の温度上昇が起こるので、冷却手段で適切に冷却する。

【0014】

【実施例】

第1実施例：2面对向（両面視認）液晶表示装置

本発明の液晶表示装置の第1実施例として、図1～図5を参照して、2面对向（両面視認）液晶表示装置の基本構成について述べる。この2面对向液晶表示装置は多面表示液晶表示装置の1例である。図1は2面对向液晶表示装置の共通斜視図であり、図2は図1に図解した2面对向液晶表示装置の第1の分解断面図であり、図3は図1に図解した2面对向液晶表示装置の第2の分解断面図であり、図4は図1に図解した2面对向液晶表示装置の第3の分解断面図であり、図5は図1に図解した2面对向液晶表示装置の第4の分解断面図である。図1に図解したように、2面对向液晶表示装置1は、表示面が表直視方向（第1の方向）を指向している表面液晶表示装置（第1の液晶表示装置）11、および、表示面が裏直視方向（第2の方向）を指向している裏面液晶表示装置（第2の液晶表示装置）12を有する。つまり、2面对向液晶表示装置1は、表面液晶表示装置11と裏面液晶表示装置12とが背中合わせに対向して設けられている。

【0015】図2を参照して、第1形態の2面对向液晶表示装置1Aについて述べる。第1形態の2面对向液晶

表示装置1 Aは、表示面が表直視方向（第1の方向）を向いている表面液晶表示装置（第1の液晶表示装置）1 1 A、および、表示面が裏直視方向（第2の方向）を向いている裏面液晶表示装置（第2の液晶表示装置）1 2 Aを有する。表面液晶表示装置1 1 Aは、複数の液晶表示デバイスがマトリクス状に設けられている表面液晶表示部1 1 1、電圧の印加状態に依存して表面液晶表示部1 1 1内の液晶表示デバイスの位置を制御する表面制御基板1 1 2、表面液晶表示部1 1 1に向けて平行光を射出する表面液晶表示部用バックライト1 1 3が図示の如く配設されている。この表面液晶表示装置1 1 Aにおいては、表面制御基板1 1 2に印加された制御電圧により表面液晶表示部1 1 1の複数の液晶表示デバイスの位置が変化して表面液晶表示部用バックライト1 1 3からの光を透過状態または遮光状態となることにより表示内容が変化する。裏面液晶表示装置1 2 Aも、基本的に、表面液晶表示装置1 1 Aと同じ構成をしている。つまり、裏面液晶表示装置1 2 Aは、複数の液晶表示デバイスがマトリクス状に設けられている裏面液晶表示部1 2 1、裏面制御基板1 2 2、裏面液晶表示部1 2 1に向けて平行光を照射する裏面液晶表示部用バックライト1 2 3が図示の如く配設されている。この裏面液晶表示装置1 2 Aにおいても、表面液晶表示装置1 1 Aと同様、裏面制御基板1 2 2に印加された制御電圧により裏面液晶表示部1 2 1の複数の液晶表示デバイスの位置が変化させられて裏面液晶表示部用バックライト1 2 3からの光を透過状態または遮光状態となることにより表示内容が変化する。表面液晶表示部用バックライト1 1 3および裏面液晶表示部用バックライト1 2 3はそれぞれ、極力発熱が少なく、平行光を射出可能な照明手段、たとえば、蛍光灯と光学系の組合せなどで実現されている。

【0016】表面液晶表示装置1 1 Aの表面液晶表示部1 1 1に表示する内容（画像または映像）と、裏面液晶表示装置1 2 Aの裏面液晶表示部1 2 1に表示する内容とは、表面制御基板1 1 2への制御信号および裏面制御基板1 2 2への制御信号に依存するが、2面対向液晶表示装置1 Aの用途、使用態様に応じて同じ内容でもいいし、異なる内容でもよい。表面液晶表示装置1 1 Aおよび裏面液晶表示装置1 2 Aはそれぞれ奥行きが浅い。したがって、表面液晶表示装置1 1 Aと裏面液晶表示装置1 2 Aとを背中合わせに配設しても全体の長さは短くて済む。CRT表示装置を2台背中合わせに配設した場合に比較すると、相当、長さが短くなる。加えて、液晶表示装置を用いた場合、眼の疲労の程度が少なく、液晶表示面から人間の眼までの距離が短くてもよい。従って、たとえば、2面対向液晶表示装置1 Aをオフィスに適用した場合、対向する2人の椅子の間隔は短くて済む。また、2面対向液晶表示装置1 Aの重量は、2台のCRT表示装置を設けた場合に比較すると、重量が相当軽くなる。さらに2面対向液晶表示装置1 Aは照明の反射など

外光に対して、CRT表示装置ほどの影響を受けない。

【0017】図3を参照して第2形態の2面対向液晶表示装置1 Bについて述べる。第2形態の2面対向液晶表示装置1 Bは、表示面が表直視方向（第1の方向）を向いている表面液晶表示装置（第1の液晶表示装置）1 1 B、表示面が裏直視方向（第2の方向）を向いている裏面液晶表示装置（第2の液晶表示装置）1 2 B、および、共通バックライト2 1を有する。第2形態の2面対向液晶表示装置1 Bは、第1形態の2面対向液晶表示装置1 Aにおける表面液晶表示部用バックライト1 1 3および裏面液晶表示部用バックライト1 2 3を、共通バックライト2 1に代えたものである。共通バックライト2 1が表面液晶表示部1 1 1および裏面液晶表示部1 2 1の両面に平行光を照射する。共通バックライト2 1は、表面液晶表示部用バックライト1 1 3および裏面液晶表示部用バックライト1 2 3と同様、極力発熱が少なく、平行光を射出可能な照明手段、たとえば、蛍光灯と光学系の組合せなどで実現されている。表面液晶表示装置1 1 Aおよび裏面液晶表示装置1 2 Aの動作および利点は、第1形態の2面対向液晶表示装置1 Aと同等である。ただし、第2形態の2面対向液晶表示装置1 Bは、図2に示した表面液晶表示部用バックライト1 1 3とそ裏面液晶表示部用バックライト1 2 3に代えて1枚の共通バックライト2 1を用いているので、その分、合計距離が2面対向液晶表示装置1 Aよりも短くなっている。

【0018】図4を参照して第3形態の2面対向液晶表示装置1 Cについて述べる。第3形態の2面対向液晶表示装置1 Cは、図2に図解した第2形態の2面対向液晶表示装置1 Aを冷却する冷却手段を設けたものである。表面液晶表示装置1 1 Aと裏面液晶表示装置1 2 Aとを接近させると、表面液晶表示部用バックライト1 1 3と裏面液晶表示部用バックライト1 2 3の放熱に伴って表面制御基板1 1 2および表面液晶表示部1 1 1、裏面制御基板1 2 2および裏面液晶表示部1 2 1が加熱する。そこで、第3形態の2面対向液晶表示装置1 Cは、表面液晶表示部用バックライト1 1 3に放熱フィン1 1 4を設けた表面液晶表示装置1 1 Cと、裏面液晶表示部用バックライト1 2 3に放熱フィン1 2 4を設けた裏面液晶表示装置1 2 Cを対向させて配設し、放熱フィン1 1 4と放熱フィン1 2 4の下部に冷却ファン2 2を設けて、放熱フィン1 1 4と放熱フィン1 2 4の対向する通路を下から上に向けて風を通し、強制的に表面液晶表示部用バックライト1 1 3および裏面液晶表示部用バックライト1 2 3を冷却して、2面対向液晶表示装置1 C全体が加熱するのを防止している。つまり、この例では、冷却手段は、放熱フィン1 1 4、放熱フィン1 2 4および冷却ファン2 2で構成されている。図4に図解した2面対向液晶表示装置1 Cの表示内容および方法は、図2に図解した2面対向液晶表示装置1 Aと同じである。

【0019】なお、冷却ファン2 2は連続的に回転させ

てもよいし、2面对向液晶表示装置1Cの適切な位置に温度センサ（図示せず）を設けて、2面对向液晶表示装置1Cの温度を検出し、ある温度以上になったときファン14を動作させて、放熱フィン114および放熱フィン124を介して表面液晶表示部用バックライト113および裏面液晶表示部用バックライト123を冷却させるようにすることが、冷却ファン22の寿命および消費電力の削減の観点から望ましい。

【0020】冷却装置としては、図4に図解した冷却ファン22、放熱フィン114、124に限らず、種々の方法をとることができる。たとえば、冷却媒体として、上記例のように空冷に限らず、冷却ガスを用いてもよい。また、冷却ファン22に代えて、冷却水導通管を放熱フィン114、放熱フィン124に接触させ、その冷却水導通管の中を冷却水を通して、放熱フィン114、放熱フィン124を冷却させてもよい。特に、上記実施例のような2面对向液晶表示装置の2面以上の多面の場合は冷却効果を大きくすることが望ましいので、そのような場合は、水冷などを用いるのが冷却の観点からは望ましい。また、冷却手段としては、放熱フィンに限らず、ヒートパイプなど、冷却効果の大きな部材を用いることができる。

【0021】図5を参照して第4形態の2面对向液晶表示装置1Dについて述べる。第4形態の2面对向液晶表示装置1Dは、図3に図解した第2形態の2面对向液晶表示装置1Bの共通バックライト21の下部に、共通バックライト21を冷却する冷却ファン23を設けたものである。表面液晶表示装置11Bと裏面液晶表示装置12Bとを接近させると、表面液晶表示部用バックライト113と裏面液晶表示部用バックライト123の放熱に伴って、表面制御基板112および表面液晶表示部111、裏面制御基板122および裏面液晶表示部121が加熱する。特に、共通バックライト21は両側に平行光を照射するので電力消費密度が高くなり、第2形態の2面对向液晶表示装置1Aの場合よりも部分的に加熱する可能性が高い。そこで、第4形態の2面对向液晶表示装置1Dにおいても冷却ファン23によって共通バックライト21の下部から上部に向かって、共通バックライト21を強制冷却し、2面对向液晶表示装置1D全体が加熱するのを防止している。図5に図解した2面对向液晶表示装置1Dの表示内容と方法は、図3に図解した2面对向液晶表示装置1Bと同じである。

【0022】なお、上述したように、冷却ファン23は連続的に回転させてもよいし、2面对向液晶表示装置1Dの適切な位置に温度センサ（図示せず）を設けて、2面对向液晶表示装置1Dの温度を検出し、ある温度以上になったとき冷却ファン23を動作させて共通バックライト21を冷却させるようにしてもよい。

【0023】冷却装置としては、図5に図解した冷却ファン23による空冷に限らず、冷却ガスを用いてもよ

い。あるいは、冷却手段としては、冷却ファン23に限らず、共通バックライト21の上下にヒートパイプなど、冷却効果の大きな部材を設けることもできる。

【0024】第2実施例：4面液晶表示装置

本発明の多面液晶表示装置の第2実施例として、図6を参照して、4面液晶表示装置について述べる。この4面液晶表示装置は多面液晶表示装置の他の例を示す。4面液晶表示装置は、表示面が表方向を向いた表面液晶表示装置（第1の液晶表示装置）11、表示面が裏方向を向いた裏面液晶表示装置（第2の液晶表示装置）12、表示面が左側面を向いた左側面液晶表示装置（第3の液晶表示装置）13および表示面が右側面を向いた右側面液晶表示装置（第4の液晶表示装置）14を有する。液晶表示装置11～14は基本的に同じ構造をしている。たとえば、図6における表面液晶表示装置11Aと同様、表面液晶表示部111、表面制御基板112および表面液晶表示部用バックライト113を有する。内面に位置する4枚のバックライトを冷却するために共通の冷却ファン24が設けられている。好適には、図4に図解したように表面液晶表示部用バックライト113に放熱フィン114を設けて冷却効果を高めることが望ましい。4面液晶表示装置において、用途に応じて、液晶表示装置11～14にはそれぞれ独立した映像を表示することもできるし、同じ映像を表示することもできる。この4面液晶表示装置によれば4方面から映像をみることができるので、たとえば、TV会議に適用することができる。第1実施例の2面对向液晶表示装置と同様、この液晶表示装置はCRT表示装置を4台用いた場合に比べて、第1実施例と同様、奥行き、短さ、重量の軽さ、目視距離の短さなどの利点を有している。4枚のバックライトに代えて、共通の1台のバックライト装置を用いて、4方向に平行光を放射させる部材を配設してもよい。

【0025】本発明の液晶表示装置における多面液晶表示装置としては、上述した2面对向液晶表示装置および4面液晶表示装置に限らず、5面液晶表示装置、6面液晶表示装置など、多面表示を行う液晶表示装置を構成することができる。たとえば、6人の会議出席者によるTV会議には、6面液晶表示装置を用いて、会議出席者それぞれの面を指向する画面に任意の映像を表示させることができる。このような、多面液晶表示装置は上述した効果、つまり、小型、軽量、視認性などの利点を有している。

【0026】第3実施例：6面液晶表示装置

本発明の液晶表示装置の第3実施例として、図7を参照して6面体（あるいは立方面体）液晶表示装置について述べる。この6面体液晶表示装置は多面体液晶表示装置の1例である。6面体液晶表示装置は、立方体面の6方向のそれぞれの向きを向いた、表面液晶表示装置（第1の液晶表示装置）11、裏面液晶表示装置（第2の液晶表

示装置)12、左側面液晶表示装置(第3の液晶表示装置)13、右側面液晶表示装置(第4の液晶表示装置)14、上側面液晶表示装置(第5の液晶表示装置)15、下側面液晶表示装置(第6の液晶表示装置)16を有する。液晶表示装置11~16は基本的に同じ構造をしている。たとえば、図7における表面液晶表示装置11は、図2に図解した表面液晶表示装置11Aと同様、表面液晶表示部111、表面制御基板112および表面液晶表示部用バックライト113を有する。

【0027】このような6面液晶表示装置において、6枚のバックライトあるいはそれに相当する共通の1台のバックライトによる発熱は、2面対向液晶表示装置および4面液晶表示装置よりも高くなる傾向にある。そこで、内面に位置する6枚のバックライトを冷却するために、立方面体の内腔に共通の冷却ファン25が設けられている。好適には、図4に図解したように、表面液晶表示部用バックライト113に放熱フィン114を設けて冷却効果を高めることが望ましい。なお、冷却ファン25の冷却効果を有効ならしめるために、下面隅の4箇所と上面隅の4箇所に穴を設けておき、冷却ファン25の回転により、下面隅4箇所の穴から空気を立方面体内部(内腔)に引き込んで、上面隅4箇所から加熱空気を放出するように構成することが望ましい。特に、このような6面体液晶表示装置の加熱を防止するためには、上述した第1実施例および第2実施例の記述において述べた水冷を適用することも望ましい。

【0028】6面体液晶表示装置においても、液晶表示装置11~16にはそれぞれ独立した映像を表示することもできるし、同じ映像を表示することもできる。この6面体液晶表示装置によれば、6方面から映像をみることができる。第1実施例の2面対向液晶表示装置と同様、この液晶表示装置はCRT表示装置を6台用いた場合に比べて、第1実施例と同様、奥行き、短さ、重量の軽さ、目視距離の短さなどの利点を有している。

【0029】第4実施例：球面体液晶表示装置

本発明の液晶表示装置の第4実施例として、図8を参照して球面体液晶表示装置について述べる。図8に図解した球面体液晶表示装置は、図7に図解した6面体液晶表示装置を球面体に拡張したものである。つまり、各面に図7に示したある面の液晶表示装置を配置し、全体として、球面体液晶表示装置に構成する。球面体液晶表示装置としては、完全な球面体に構成することもできるし、部分的な球面体、つまり、球面構造にすることもできる。なお、この球面体液晶表示装置において、超小型高精細液晶表示デバイスを用いて球面体液晶表示装置全体として連続した異なる映像を表示することにより、非常に解像度の高い立体的な映像を表示できる。この球面体液晶表示装置においても、6面体液晶表示装置と同様に冷却手段を設ける。

【0030】本発明の液晶表示装置の実施に際しては上

述した例示的な実施例に限定されない。つまり、上述した実施例は例示的な具体例を示しているに過ぎず、本発明は、上述した実施例はもとより、上述した実施例の組合せ、あるいは、当業者が容易に行う変形態様、上記記述から当業者が到達する種々の態様に適用できる。

【0031】

【発明の効果】本発明によれば小型の液晶表示装置が実現できる。また本発明によれば目視距離が短い液晶表示装置が実現できる。さらに本発明によれば軽量の液晶表示装置が実現できる。本発明の液晶表示装置は外光の反射などの影響を受けにくい。

【0032】上述した効果を奏する本発明の液晶表示装置を用いると、多様な表示を行うことができ、多様な用途に適用できる。

【図面の簡単な説明】

【図1】図1は本発明の液晶表示装置の第1実施例としての2面対向(両面視認)液晶表示装置の共通斜視図である。

【図2】図2は図1に図解した2面対向液晶表示装置の第1の形態の分解断面図である。

【図3】図3は図1に図解した2面対向液晶表示装置の第2の形態の分解断面図である。

【図4】図4は図1に図解した2面対向液晶表示装置の第3の形態の分解断面図である。

【図5】図5は図1に図解した2面対向液晶表示装置の第4の形態の分解断面図である。

【図6】図6は本発明の液晶表示装置の第2実施例としての4面液晶表示装置の斜視図である。

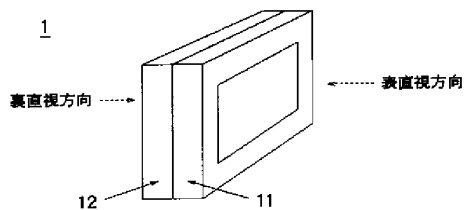
【図7】図7は本発明の液晶表示装置の第3実施例としての6面体液晶表示装置の斜視図である。

【図8】図8は本発明の液晶表示装置の第4実施例としての球面体液晶表示装置の斜視図である。

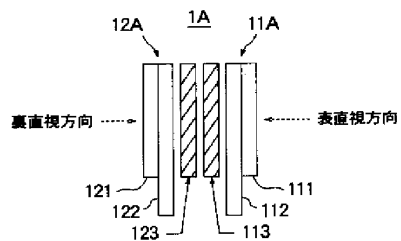
【符号の説明】

1、1A、1B、1C、1D・・・2面対向液晶表示装置
11・・・表面液晶表示装置
111・・・表面液晶表示部
112・・・表面制御基板
113・・・表面液晶表示部用バックライト
114・・・放熱フィン
12・・・裏面液晶表示装置
121・・・裏面液晶表示部
122・・・裏面制御基板
123・・・裏面液晶表示部用バックライト
124・・・放熱フィン
13・・・左側面液晶表示装置
14・・・右側面液晶表示装置
15・・・上側面液晶表示装置
16・・・下側面液晶表示装置
21・・・共通バックライト
22~25・・・冷却ファン

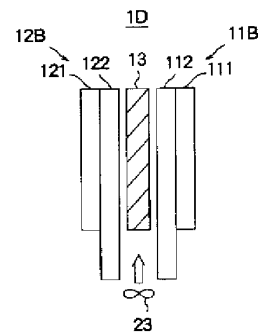
【図1】



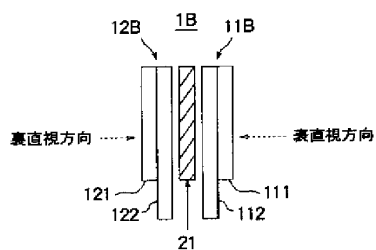
【図2】



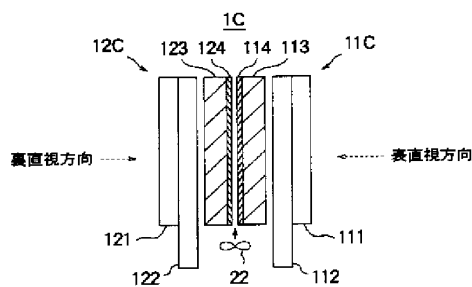
【図5】



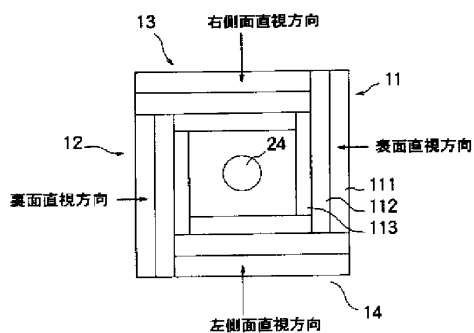
【図3】



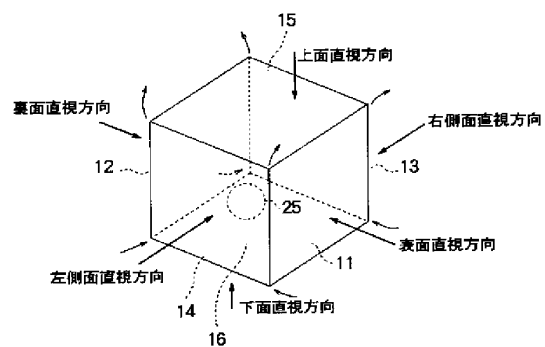
【図4】



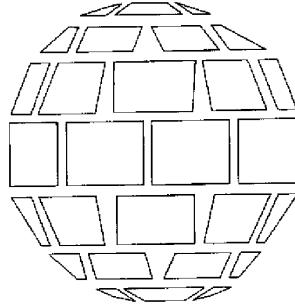
【図6】



【図7】



【図8】





Espacenet

Bibliographic data: JP2007293105 (A) — 2007-11-08

IMAGE DISPLAY DEVICE

Inventor(s): TAKEUCHI YOSHIYUKI; YOSHIHARA TATSUO; KONDO TOSHIKI ± (TAKEUCHI YOSHIYUKI, ; YOSHIHARA TATSUO, ; KONDO TOSHIKI)

Applicant(s): SONY CORP ± (SONY CORP)

Classification: - **international:** *G09F9/00; G02F1/13*
- **cooperative:**

Application number: JP20060122075 20060426 Global Dossier

Priority number (s): JP20060122075 20060426

Abstract of JP2007293105 (A)

PROBLEM TO BE SOLVED: To suppress the temperature rise of an liquid crystal display device equipped with an image display panel even in the case of a use in a special environment where radiation holes are not permitted while coping with such case. ;SOLUTION: The image display device is constituted by being equipped with a panel back chamber 6 formed within a casing so as to cover the back side of the image display panel 5, an exhaust port 6a for exhausting the air from the interior of the panel back chamber 6, an air supply opening 6b for supplying the air into the panel back chamber 6, an air flow passage 8 for cooling disposed to couple the exhaust port 6a and the air supply opening 6b in such a manner that the heat exchange with the outside of the casing can be performed, and an air circulation means 9 for circulating the air between the panel back chamber 6 and the air flow passage 8 for cooling via the exhaust port 6a and the air supply opening 6b. ;COPYRIGHT: (C)2008,JPO&INPIT

(19) 日本国特許庁 (JP)

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Fターム (参考) 2H088 EA03 EA20 EA68 MA20

5G435 AA11 AA12 BB05 BB12 GG44

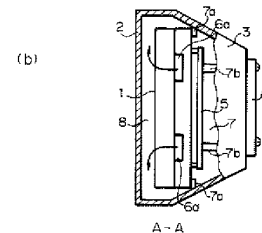
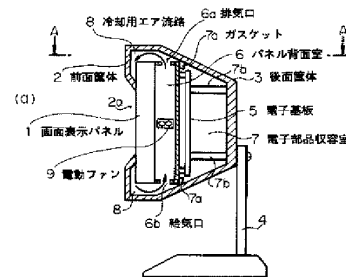
(54) 【発明の名称】 画像表示装置

(57) 【要約】

【課題】画像表示パネルを備えた画像表示装置において、放熱孔が許されない特殊な環境での使用にも対応しつつ、その場合であっても装置内部の温度上昇を抑制できるようにする。

【解決手段】画像表示パネル1の背面側を覆うように筐体内部に形成されたパネル背面室6と、パネル背面室6内からの排気のための排気口6aと、パネル背面室6内への給気のための給気口6bと、排気口6aと給気口6bとを結ぶとともに筐体外部との熱交換を行い得るように配された冷却用エア流路8と、排気口6aおよび給気口6bを介してパネル背面室6内と冷却用エア流路8との間で空気を循環させる空気循環手段9とを備えて、画像表示装置を構成する。

【選択図】図1



【特許請求の範囲】

【請求項1】

画像表示パネルの背面側を覆うように筐体内部に形成されたパネル背面室と、
前記パネル背面室内からの排気のために当該パネル背面室に設けられた排気口と、
前記パネル背面室内への給気のために当該パネル背面室に設けられた給気口と、
前記排気口と前記給気口とを結ぶとともに筐体外部との熱交換を行い得るように配された冷却用エア流路と、
前記排気口および前記給気口を介して前記パネル背面室内と前記冷却用エア流路との間で空気を循環させる空気循環手段と
を備えることを特徴とする画像表示装置。

【請求項2】

前記パネル背面室に加えて、前記画像表示パネルを動作させるための電子部品を収容する電子部品収容室が筐体内部に形成されるとともに、前記パネル背面室と前記電子部品収容室とが機密分離されている
ことを特徴とする請求項1記載の画像表示装置。

【請求項3】

前記電子部品収容室には、前記画像表示パネルよりも動作許容温度の高い電子部品が収容される
ことを特徴とする請求項2記載の画像表示装置。

【請求項4】

前記パネル背面室と前記電子部品収容室との間が、金属部材または金属部材を含んで構成された部材からなるガスケットによって遮蔽されている
ことを特徴とする請求項2記載の画像表示装置。

【請求項5】

前記冷却用エア流路は、筐体外殻に面するように配されており、当該筐体外殻を通じて筐体外部との熱交換を行うものである
ことを特徴とする請求項1記載の画像表示装置。

【請求項6】

前記筐体外殻は、金属部材によって形成されている
ことを特徴とする請求項5記載の画像表示装置。

【請求項7】

前記筐体外殻は、外表面が塗膜で覆われている
ことを特徴とする請求項6記載の画像表示装置。

【発明の詳細な説明】

【技術分野】

【0001】

本発明は、画像表示パネルを備えてなる画像表示装置に関する。

【背景技術】

【0002】

従来、液晶表示パネルや有機EL（エレクトロルミネッセンス）パネル等といった画像表示パネルを備えた、いわゆるFPD（フラット・パネル・ディスプレイ）と呼ばれる画像表示装置が、様々な分野で広く利用されている。例えば、手術室内で用いられる医療用モニタ装置にもFPDが利用されるといった具合である。

【0003】

ところで、医療用モニタ装置のように特殊な環境（例えば患者近傍）で使用される画像表示装置については、装置内冷却のための放熱孔を有していると、その放熱孔から血液や薬液等が装置内に侵入して故障を招いたり、装置内部に堆積した埃等が放熱孔から噴出したりするおそれがある。その一方で、単に放熱孔を廃止したのでは、装置内部の温度が上昇して、画像表示パネルやこれを動作させるための電子部品等に熱的ダメージを与えてしまい、装置寿命が著しく損なわれる可能性がある。

【0004】

これらのことから、画像表示装置の中には、特殊な環境での使用にも適するように、放熱孔や通気孔等を備えておらず、しかもその場合であっても装置内部の温度が上昇してしまうのを防ぐべく、画像表示パネルを熱伝導シートや金属性フレーム等を用いて固定し、その画像表示パネルで発生する熱を金属性フレームへの熱伝達によって逃がすように構成されたものがある（例えば、特許文献1 参照）。

【0005】

【特許文献1】特開2005-338178号公報

【発明の開示】

【発明が解決しようとする課題】

【0006】

しかしながら、近年、画像表示装置に対しては、パネルサイズの大形化や、薄型化のための高密度設計等が強く要求されているが、これらの事項は装置内部温度を上昇させる要因となり得るため、その要求に応えるためには、更なる放熱性能の向上が必要であると考えられる。

【0007】

そこで、本発明は、放熱孔が許されない特殊な環境での使用にも対応しつつ、その場合であっても装置内部の温度上昇を抑制することができ、これにより安定した画像表示性能を長期にわたって維持することのできる画像表示装置を提供することを目的とする。

【課題を解決するための手段】

【0008】

本発明は、上記目的を達成するために案出された画像表示装置で、画像表示パネルの背面側を覆うように筐体内部に形成されたパネル背面室と、前記パネル背面室内からの排気のために当該パネル背面室に設けられた排気口と、前記パネル背面室内への給気のために当該パネル背面室に設けられた給気口と、前記排気口と前記給気口とを結ぶとともに筐体外部との熱交換を行い得るように配された冷却用エア流路と、前記排気口および前記給気口を介して前記パネル背面室内と前記冷却用エア流路との間で空気を循環させる空気循環手段とを備えることを特徴とする。

【0009】

上記構成の画像表示装置では、画像表示パネルがその動作により発熱すると、その画像表示パネルの背面側を覆うパネル背面室内の空気温度が上昇する。ただし、そのパネル背面室内の空気は、空気循環手段が行う空気循環によって、排気口を通じて冷却用エア流路へ排気され、その冷却用エア流路での筐体外部との熱交換によって冷却され、その後給気口を通じて再びパネル背面室内へ給気される。したがって、パネル背面室内と冷却用エア流路との間での空気循環によって、パネル背面室の内部が強制空冷されることになる。つまり、筐体外部への放熱のための放熱孔を要することなく、パネル背面室内の空気温度の上昇を、強制空冷を行うことによって効果的に抑制し得るようになる。

【発明の効果】

【0010】

本発明によれば、放熱のための放熱孔が不要となるので、例えば医療用モニタ装置のように特殊な環境で使用に適切に対応することができる。しかも、その場合であっても、パネル背面室の内部が強制空冷されるので、装置内部の温度上昇を効果的に抑制することができ、結果として安定した画像表示性能を長期にわたって維持することが可能となる。

【発明を実施するための最良の形態】

【0011】

以下、図面に基づき本発明に係る画像表示装置について説明する。図1は、本発明に係る画像表示装置の概略構成例を示す説明図である。

【0012】

図例のように、ここで説明する画像表示装置は、液晶表示パネルや有機ELパネル等といった画像表示を行う画像表示パネル1が、前面筐体2および後面筐体3からなる筐体の

内部に収納されて構成されている。そして、前面筐体2には、画像表示パネル1における画像表示領域に合わせて開口2aが設けられているとともに、後面筐体3は、固定用スタンド4によって支持されるようになっている。

【0013】

筐体を構成する前面筐体2および後面筐体3、すなわち筐体外殻は、金属部材によって形成されている。さらに、筐体外殻は、その外表面が塗膜で覆われている。ただし、金属部材の種類および塗膜の種類は、特に限定されるものではない。なお、筐体外殻には、装置内冷却のための放熱孔が設けられていない。

【0014】

また、前面筐体2および後面筐体3からなる筐体の内部には、画像表示パネル1に加えて、その画像表示パネル1を動作させるための電子部品が実装された電子基板5が配設されている。この電子基板5上の電子部品によって、画像表示パネル1の駆動回路が構成されるのである。

【0015】

さらに、前面筐体2および後面筐体3からなる筐体の内部には、パネル背面室6と、電子部品収容室7と、冷却用エア流路8とが形成されている。

【0016】

パネル背面室6は、画像表示パネル1の背面側（画像表示面ではない側）を覆うように形成された空間である。このパネル背面室6の形成は、例えば画像表示パネル1および電子基板5を筐体内部に支持固定するための部材、さらに具体的にはこれらの支持固定ブラケットとなる板金部材を利用して行うことが考えられる。また、パネル背面室6には、当該パネル背面室6内からの排気を行うための排気口6aと、当該パネル背面室6内への給気を行うための給気口6bとが設けられているものとする。なお、排気口6aおよび給気口6bの形成数および形成位置は、画像表示パネル1のサイズや筐体形状等に応じて適宜決定すればよく、特に限定されるものではない。

【0017】

電子部品収容室7は、電子基板5を収容するように形成された空間である。ただし、電子部品収容室7は、パネル背面室6と機密分離されているものとする。そのために、パネル背面室6と電子部品収容室7との間、さらに詳しくはパネル背面室6を形成する板金部材と後面筐体3との間は、ガスケット7aが配されており、そのガスケット7aによって遮蔽されている。

【0018】

ガスケット7aは、パネル背面室6と電子部品収容室7との機密分離という機能を実現するために、パネル背面室6を形成する板金部材および後面筐体3の形状に追従する柔軟性を有した部材によって形成されている。しかも、ガスケット7aは、単にパネル背面室6と電子部品収容室7とを機密分離するだけでなく、パネル背面室6と電子部品収容室7とを電氣的に遮蔽する機能をも実現するようになっている。これらの機能を満足する部材としては、例えば真鍮のような硬度の低い金属部材や、金属部材を心材として含んで構成されたスポンジ部材を用いることが考えられる。

【0019】

また、電子部品収容室7内には、後面筐体3と電子基板5とを接した状態にするための熱伝導部材7bが配されている。この熱伝導部材7bは、熱伝達を良好に行い得るものを公知部材の中から選択して用いればよく、金属部材であっても非金属部材であっても構わない。

【0020】

冷却用エア流路8は、パネル背面室6に設けられた排気口6aと給気口6bとを結ぶエア流路からなるものであり、前面筐体2の内部にて画像表示パネル1の周囲を囲うように、かつ、筐体外殻を構成する前面筐体2に面するように配されている。そして、冷却用エア流路8を通過する空気が、筐体外部との熱交換を行い得るよう構成されている。なお、冷却用エア流路8は、必ずしも画像表示パネル1の周囲を囲う位置に配する必要はなく

、パネル背面室6および電子部品収容室7とは別に配されていれば、筐体内部のいずれの箇所に配しても構わないが、筐体外殻に面するように配することが望ましい。筐体外殻に面していれば、その体外殻を通じて筐体外部との熱交換を行うことが可能となり、筐体外部との熱交換のために熱伝導部材等を必要とすることがないからである。

【0021】

このような冷却用エア流路8またはパネル背面室6の少なくとも一方の内部には、排気口6aおよび給気口6bを介してパネル背面室6の内部と冷却用エア流路8との間で空気を循環させるための空気循環手段として、電動ファン9が配設されている。この電動ファン9は、筐体内部に配された温度センサ（ただし不図示）での検出結果に基づいて、その動作制御が行われるものとする。例えば、温度検出結果が低いときは、ファン回転数を抑えて、電動ファン9による騒音発生を抑制するといった具合である。なお、電動ファン9の配設数および配置位置は、パネル背面室6や冷却用エア流路8の容量や形状等に応じて適宜決定すればよく、特に限定されるものではない。また、空気循環が可能であれば、電動ファン9以外のものを利用しても構わない。

【0022】

以上のように構成された画像表示装置では、画像表示パネル1がその動作により発熱すると、その画像表示パネル1の背面側を覆うパネル背面室6内の空気温度が上昇する。ただし、このとき、電動ファン9を駆動させれば、パネル背面室6内の空気は、その電動ファン9が空気循環手段として機能することによって、排気口6aを通じて冷却用エア流路8へ排気される。冷却用エア流路8へ排気された空気は、冷却用エア流路8内を通過する際に、その冷却用エア流路8での筐体外部との熱交換によって冷却される。そして、冷却された空気は、電動ファン9が空気循環手段として機能しているので、給気口6bを通じて、再び冷却用エア流路8からパネル背面室6内へ給気されることになる。つまり、パネル背面室6内と冷却用エア流路8との間での空気循環によって、パネル背面室6の内部が強制空冷されるのである。したがって、筐体外殻が外部への放熱のための放熱孔を有していなくとも、パネル背面室6内の空気温度の上昇を、強制空冷を行うことによって効果的に抑制し得るようになる。

【0023】

このように、本実施形態で説明した画像表示装置によれば、温度上昇抑制（放熱）のための放熱孔が不要となるので、例えば医療用モニタ装置のように特殊な環境で使用される場合であっても、これに適切に対応することができる。しかも、その場合であっても、パネル背面室6の内部が強制空冷されるので、装置内部の温度上昇を効果的に抑制することができ、結果として安定した画像表示性能を長期にわたって維持することが可能となる。つまり、放熱孔が許されない特殊な環境での使用にも対応しつつ、その場合であっても装置内部の温度上昇を抑制することができ、これにより安定した画像表示性能を長期にわたって維持できるのである。

【0024】

また、本実施形態で説明した画像表示装置では、筐体の内部に、パネル背面室6および冷却用エア流路8に加えて、電子部品収容室7が形成されるとともに、パネル背面室6と電子部品収容室7とが機密分離されている。すなわち、強制空冷によって空気が循環するのは、パネル背面室6と冷却用エア流路8との間のみであり、その強制空冷の影響が電子部品収容室7の内部には及ばない。このように、筐体内部を複数の空間に分け、かつ、冷却対象となる空間を限定すれば、強制空冷による冷却効果を冷却対象となる空間に集中させることが可能となるので、筐体内部の全域を、冷却対象とする場合に比べて効率的に冷却を行うことができ、結果として冷却効果の向上が期待できる。したがって、放熱孔を利用することなく、筐体内部での空気循環によって強制空冷を行う場合に適用して、非常に好適なものであると言える。

【0025】

ところで、一般に、画像表示装置の筐体内部に収容される画像表示パネル1や電子基板5上の電子部品等については、予め動作許容温度が設定されている。例えば、画像表示パ

ネル1は60℃程度であり、電子基板5上の電子部品等は70℃程度である。このように、画像表示パネル1は、発熱量が多く、かつ、動作許容温度が低いのに対し、電子基板5上の電子部品等は比較的熱に強い。

このことから、本実施形態で説明したように、パネル背面室6と電子部品収容室7とを機密分離し、その機密分離された電子部品収容室7の側に画像表示パネル1を動作させるための電子部品が実装された電子基板5を収容すれば、その電子部品収容室7には画像表示パネル1よりも動作許容温度の高い電子部品が収容されることになる。つまり、発熱量が多く、かつ、動作許容温度が低い画像表示パネル1を収容するパネル背面室6の側に、強制空冷による冷却効果を集中させることになる。

したがって、筐体内部に収容される構成部品の動作許容温度によって当該構成部品を区分し、例えば比較的熱に弱い画像表示パネル1とそれ以外といった基準に従いつつ各構成部品を別々に収容すれば、強制空冷による冷却効果を、比較的熱に弱い画像表示パネル1に対して有効に発揮させ得るようになる。つまり、動作許容温度に着目することで、冷却効果の有効性を高められるので、画像表示パネル1が安定した画像表示性能を長期にわたって維持する上で非常に好適なものとなる。

なお、電子基板5上に実装された電子部品については、その電子基板5から熱伝導部材7bを介して後面筐体3へ熱が伝えられ、これにより放熱が行われることになる。すなわち、電子部品収容室7の内部については、従来と同様の手法で冷却される。これは、電子部品収容室7の内部に収容される電子部品は、比較的熱に強いものであるから、従来と同様の手法によっても十分に冷却することができるからである。

【0026】

また、本実施形態で説明したように、パネル背面室6と電子部品収容室7とを機密分離するのにあたり、その間をガスケット7aによって遮蔽すれば、そのガスケット7aの存在により電子部品収容室7の側の熱がパネル背面室6の側に伝わってしまうのを抑制し得るので、この点によっても画像表示パネル1に対する冷却効果の向上が期待できる。しかも、ガスケット7aは、金属部材または金属部材を含んで構成された部材からなるので、熱のみならず電気的な遮蔽（電波ノイズ等の遮蔽）も行いうことができ、画像表示パネル1が電子基板5上の電子部品からノイズ等の悪影響を受けるのを防止し得る。さらに、これら二つの機能は、ガスケット7aが兼ね備えているので、当該二つの機能を実現するのに装置構成が複雑化してしまうといったことがない。

【0027】

また、本実施形態で説明したように、強制空冷を行うための冷却用エア流路8を、筐体外殻に面するように配し、その筐体外殻を通じて冷却用エア流路8が筐体外部との熱交換を行うようにすれば、その筐体外殻を放熱手段として利用することが可能となり、装置構成の複雑化を抑制する上で非常に好適なものとなる。しかも、筐体外殻が放熱手段となるので、その放熱手段がデザインされた形状と一体化されることになり、冷却効果のみならず、意匠的にも優れた画像表示装置を提供することが容易に実現可能となる。

【0028】

特に、本実施形態で説明したように、筐体外殻を金属部材によって形成すれば、冷却用エア流路8内における空気の熱が筐体外殻に伝わり易くなり、さらに筐体外殻に伝わった熱が大気への伝導、表面での対流、赤外輻射等によって装置外部へ放熱され易くなるので、筐体外殻における放熱手段としての確実なものとすることができる。

なお、その場合には、本実施形態で説明したように、筐体外殻の外表面が塗膜で覆うことが望ましい。筐体外殻は、画像表示装置のユーザ等が触れる可能性があることから、塗膜によって熱伝導率を下げて、ユーザ等が熱を感じ難くするためである。

【0029】

なお、本実施形態では、本発明の好適な実施具体例について説明したが、本発明はその内容に限定されるものではなく、その要旨を逸脱しない範囲で適宜変更することが可能である。例えば、本実施形態では、医療用モニタ装置を構成する画像表示装置に適用すると好適である旨を説明したが、本発明は、画像表示パネルを備えてなる画像表示装置であれ

ば、パーソナルコンピュータにおける表示ディスプレイ装置、携帯電話機に代表されるモバイル端末装置、各種測定機器におけるモニタ画面装置等といったように、様々なものに適用することが可能である。

【図面の簡単な説明】

【0030】

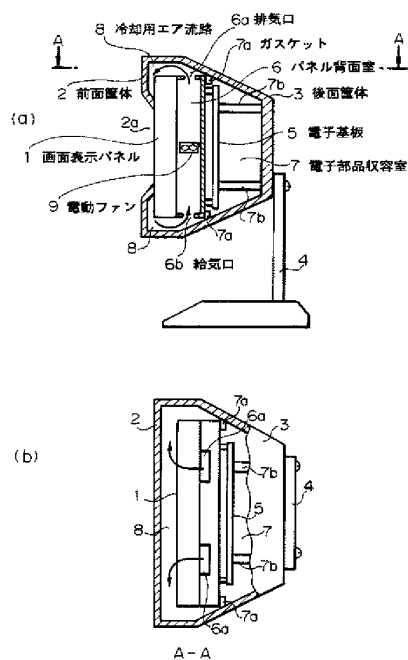
【図1】 本発明に係る画像表示装置の概略構成例を示す説明図であり、(a)はその側断面図、(b)はA-A断面図である。

【符号の説明】

【0031】

1…画像表示パネル、2…前面筐体、3…後面筐体、5…電子基板、6…パネル背面室、6a…排気口、6b…給気口、7…電子部品収容室、7a…ガスケット、8…冷却用エア流路、9…電動ファン

【図1】



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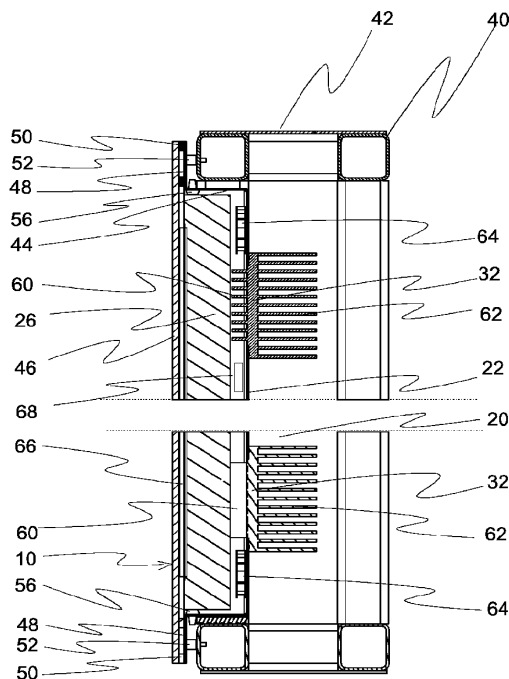
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(54) Title: ELECTRONIC INFORMATION BOARD



(57) Abstract: The invention relates to an electronic in-
formation board comprising a frame (40), a flat display ele-
ment (26), such as a TFT LCD display or plasma display for
presenting information, and electronic equipment for con-
trolling the display element. The information board has a
weatherproof display casing (10) for the display element and
a weatherproof device casing (12) for the electronic equip-
ment needed for controlling the display element. Between
the casings, there is a common cooling space (20) for cool-
ing the devices in the display casing and the device casing.
The display casing and the device casing can be separated
from each other for opening the cooling space for the du-
ration of the updating and maintenance of the information
board. The display casing has a back wall (22) bordered to
the cooling space, having cooling elements for transferring
heat from the display casing to the cooling space. Similarly,
the device casing has a back cover bordered to the cooling
space, having cooling elements for transferring heat from
the device casing to the cooling space. On the opposite sides
of the cooling space there are ventilator slots, and inside the
cooling board there are cooling fans for enabling air flow
through the cooling space. There may be vertical or hori-
zontal flow ducts in the cooling space for controlling the air
flow.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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SEC et al. v. MRI
SEC Exhibit 1031.0334
IPR2023-00254

Electronic information board

The invention relates to an electronic information board comprising a frame, a flat display element for presenting information and electronic equipment for controlling the display element.

The conventional means used by advertisers to pass on information are illuminated advertisement boards containing a paper poster, which are updated by replacing the poster with a new one. Replacing the poster is laborious, and it may take place at intervals of several days or even weeks. New posters have to be printed, transported, replaced and finally disposed of. The changing of the posters thus causes unnecessary stress on the environment and costs. The problems entailed by paper posters are avoided by using electronic information boards instead of them.

The display of an electronic information board can be implemented by using any prior art display device technology. For the present, the most advantageous display technology for display devices of a few square metres and less is the TFT LCD technology, which provides the advantages of a large viewing angle, a short response time, good contrast and reliability of the display. In addition to TFT LCD displays, other electronic display solutions, such as plasma displays, can be used in information boards.

TFT LCD displays are used to some extent in the implementation of public electronic information boards. The problem is that when used in environments having high temperatures, the temperatures of the display devices easily rise too high. On the other hand, in cold environments there is the danger that the temperatures of the display devices fall too low. In both situations it is important that the temperatures at different points inside the display device can be kept as constant as possible. Then the display device operates in the widest possible range of operating temperatures, and local temperatures do not cause exceeding of the specifications given to the display element.

In the present devices, the warming of the display in cold conditions has often been solved by a transparent warming resistor fastened to the transparent window of the device. In this solution, the problem is the high price of components, because the manufacture of a transparent warming element requires special solutions. Also, the supply of electricity to the warming element attached to the glass

CIVIQ0003946

SEC et al. v. MRI
SEC Exhibit 1031.0335
IPR2023-00254

generally requires the use of a low voltage and a so-called SELV connection device because of the risk of the glass being broken. Providing a SELV low voltage causes power losses and increases the costs when the number of power supplies increases. A transparent warming element fastened to the glass only heats the display on the front side, and the fluorescent tubes inside the display operate in considerably colder conditions than the TFT LCD matrix. The efficiency of fluorescent tubes used in connection with display devices generally weakens radically when the temperature falls, and therefore the brightness of the display may be significantly reduced in cold conditions.

Another solution for warming the display device is to heat it from behind by various warming resistors and corresponding arrangements. These solutions, again, entail the problem that the TFT LCD matrix on the front surface of the display may then operate in too cold conditions, whereby the response time of the display increases. In the worst case, the temperature of the TFT LCD matrix may fall below the storage temperature allowed for the display.

With regard to the cooling of information boards, the prior art solutions have the drawback that the displays are cooled by forced convection only from behind. However, the display elements produce heat in every direction. Most of the heat in plasma displays is generated on the side of the visible surface of the display. Therefore, the present display casings having a transparent window result in a significant rise of temperature in the upper parts of the display especially on the visible side of the display. In addition, the present solutions have the problem of temperature control caused by the integration of the electronics controlling the display and the actual display. As a result, there are often situations in which heat is cumulated in certain parts of the device when components that are warming increase the temperatures of each other. If the design has not been critically checked, temperatures may become too high locally.

Because of the inadequate cooling and warming solutions, the operating life of electronic information boards remains shorter than normal, or they are unnecessarily damaged. For example, the LCD matrix of TFT LCD display elements becomes inoperative already at the temperature of 70°C. If the temperatures cannot be made constant in different parts of the display element, the temperatures of the upper parts set a limit to the highest possible operating temperature allowed for the whole display device. The probability of the electronics of the device getting damaged in the hottest parts of the device also increases significantly. Because of

the problems related to the temperature control of electronic information boards, they are poorly suited for use in variable conditions, such as outdoors, where the differences of temperature at day and night and especially at different times of the year are very high. Because of this, electronic information boards are hardly ever
5 used outdoors, but the conventional illuminated boards containing a paper poster are used instead.

It is an objective of the invention to provide an electronic information board, by which the drawbacks and shortcomings related to the temperature control of the
10 prior art electronic information boards can be significantly reduced. Another objective of the invention is to provide an electronic information board, which tolerates well external variations of temperature and is thereby suitable for installation outdoors. In addition, it is an objective of the invention to provide an electronic information board, by which a conventional illuminated board containing a paper poster
15 can be replaced.

The objectives of the invention are achieved by an electronic information board, which is characterized in what is set forth in the independent claims. Some preferred embodiments of the invention are presented in the dependent claims.
20

The invention relates to an electronic information board comprising a frame, a flat display element, such as a TFT LCD display or plasma display for displaying information, and electronic equipment for controlling the display element. The basic idea of the invention is that the display element and the electronics required for
25 controlling the display are located separately from each other for facilitating the arrangements for temperature control and cooling of the information board. As a result, the information board has a modular structure, which also facilitates the maintenance and updating of the device. The information board has its own display casing for the display element and a device casing for the electronic equipment needed for controlling the display element. Cooling elements have also been
30 arranged in the display casing for transferring heat from the display casing to the outside of the display casing. Preferably, the device casing contains at least the control unit of the information board, the power supply of the control unit and the power supply of the background light of the display.

35 In a preferred embodiment of the invention, there is a common cooling space between the display casing and the device casing, whereby the required cooling is provided both for the display element and the devices in the device casing. The

display casing and the device casing can preferably be separated from each other for opening the cooling space in order to perform updating and maintenance measures. Preferably, the information board has an openable cover, in which case the device casing has been installed in the cover.

5

In another preferred embodiment of the invention, the display casing and the device casing have been made weatherproof for enabling the performance of updating and maintenance measures outdoors.

- 10 In a third preferred embodiment of the invention, the display casing has a back wall bordered to the cooling space, and the cooling elements have been arranged in the back wall for transferring heat from the display casing to the cooling space. Preferably, there is a back cover bordered to the cooling space in the device casing, and cooling elements have been arranged in the back cover for transferring
- 15 heat from the device casing to the cooling space. Preferably, the cooling elements have a first heat transfer part extending to the inside of the display casing and/or the device casing, and a second heat transfer part extending to the cooling space.

- 20 In a fourth preferred embodiment of the invention, there are ventilator slots or holes on the opposite sides of the cooling space for enabling air flow from the outside of the information board to the cooling space and from the cooling space back to the outside of the information board. In the cooling space there is preferably at least one cooling fan for circulating air through the cooling space.

- 25 In a fifth preferred embodiment of the invention, the display casing comprises a transparent front plate and an edge part. The front plate is preferably made of shock-resistant glass.

- 30 In a sixth preferred embodiment of the invention, the display element is supported at its edges to the edge part of the display casing by support elements so as to form a gap enabling the circulation of air between the walls of the display casing and the outer surface of the display element. Preferably, there are fans inside the display casing for circulating air in the space between the walls of the display element and the display casing, and ducting has been arranged between the walls of
- 35 the casing and the display element for directing the circulation of air around the display element. There may also be electrically operated warming elements in the display casing for increasing the temperature of the display casing.

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In a seventh preferred embodiment of the invention there are air ducts in the cooling space for directing the circulation of air. Preferably, there is at least one heat transfer part of at least one cooling element and at least one cooling fan in the air duct. The air ducts can be in a horizontal, vertical or oblique position.

5

The invention provides the advantage that the cooling and warming of the information board can be implemented very cost-efficiently. It is possible to use low-cost standard warming elements in the display casing, in which case no special warming resistors to be integrated in the glass are required.

10

In addition, the invention has the advantage that the display element of the information board can be easily changed when required, because the temperature control of the display is not based on the conduction of heat from certain physical points of the display.

15

Yet another advantage of the invention is that due to the efficient temperature control, it is possible to use large electronic displays in the information board, the external dimensions of the displays corresponding to the external dimensions of the paper posters used in the illuminated boards. In addition, the total depth of the information board is essentially the same or even smaller than in the illuminated boards. Because the physical size of an information board according to the invention is essentially the same as the size of illuminated paper poster boards, the replacement of a conventional illuminated board by an information board according to the invention does not require new permissions from the authorities and long permission procedures.

20

Furthermore, the invention has the advantage that it can be implemented both as a one-sided and a two-sided information board. A two-sided information board is formed by joining together two one-sided information boards. As an alternative, the other side of the information board can be a conventional, illuminated poster board.

25

Yet another advantage of the invention is that it is suitable for use both outdoors and indoors. The electronic display and the electronics related to the operation of the display device have been placed in their own separate casings, the enclosure class of which enables maintenance measures performed outdoors and easy updating of the device.

30

35

In the following, the invention will be described in detail. Reference will be made to the accompanying drawings, in which

5 Fig. 1 is a perspective drawing of an electronic information board according to the invention, presented as an example.

Fig. 2 is a cross-sectional drawing of an electronic information board according to the invention, presented as an example.

10 Fig. 3 is a perspective drawing of a preferred embodiment of an electronic information board according to the invention, presented as an example, and

Fig. 4 is a cross-sectional drawing of the information board of Fig. 3, presented as an example.

15 In Fig. 1, an electronic information board according to the invention is shown as an example, as depicted obliquely from behind. The information board has a closed display casing 10, to the back wall 22 of which a cover 24 opening on hinges 14 has been connected. The cover is trough-shaped, i.e. it has a flat bottom and
20 edges turned to an angle from the plane of the bottom. A closed device casing 12 has been fastened to the bottom of the cover. The display element 26 of the information board (Fig. 2) has been placed inside the display casing, and the electronic equipment needed in the control of the display element have been placed inside the device casing. Typically, this equipment includes a programmable control unit
25 with its power supply for controlling the display, and the power supplies of the background light of the display. The separation of the display element and control electronics from each other and placing them in their own casings makes it easier to control the temperature of the information board and to arrange the cooling thereof. In this way, the structure of the information board also becomes modular,
30 which makes the manufacture of the device simpler and faster and facilitates the performance of maintenance and updating.

Fig. 1 shows an information board according to the invention in the opened position, in which the cover 24 of the information board has been turned on the hinges
35 so as to be separated from the display casing. In this position it is easy to perform updating and maintenance measures of the information board. The cover has been connected to the display casing by a hold-open device 16, which keeps the cover at a certain angle in relation to the display casing. The enclosure class of the

display casing and the device casing is such that it enables updating and maintenance measures taking place outdoors. The information board according to the invention can be fastened to a wall or a support pole. Fastening to a wall takes place simply by fastening the cover of the information board directly to the surface of the wall by screws, for example.

In normal use, the display casing and the device casing are turned against each other to a closed position and locked to each other by locking means 18 on one side of the casings. In the closed position, there remains a cooling space 20 between the display casing and the device casing, delimited by the cover 24 and the display casing (Fig. 2). In the back wall 22 of the display casing and the back cover 28 of the device casing there are cooling elements 32, by which heat is transferred from the inside of the device casing and the display casing to the cooling air in the cooling space 20. The structure and operation of the cooling elements will be described in more detail in connection with the description of the drawings later in this document. In the first edge of the cover 24 pointed downward and the second edge pointed upward there are ventilator slots 34, which enable the movement of air from the outside of the device to the cooling space and from the cooling space back to the outside of the device. When required, the ventilator slots can be provided with filters in order to prevent the access of impurities to the ventilation space. In the cover 24 there are cooling fans 36, by which the circulation of air through the cooling space is regulated. The temperature and speed of flow of the air in the cooling space and thereby the transfer of heat from the cooling elements to the air is thus regulated with an air flow achieved by means of cooling fans.

In Fig. 2, an example of an electronic information board according to the invention is shown as a cross-sectional drawing. The information board has a frame 40 manufactured of metal piping, to the edge surface of which a lining plate 42 forming the visible outer surface has been fastened. The lining plate is preferably made of aluminium or steel. A display casing 10 comprising a back wall 22, a transparent front plate 46 and an edge part 44 having a flange-like fastening collar 48 running in the direction of the front plate has been fastened to the frame by fastening means 52. Preferably, the back plate and the edge parts have been formed of one plate-like part by some known plate machining method, such as pressing. The transparent front plate has been fastened to the fastening collar of the edge parts by means of flexible, vibration attenuating sealing elements 50 so that the edge parts of the front plate and the back wall form a closed display casing. The front

plate is preferably made of shock-resistant glass, but it is also possible to use other materials.

5 Inside the display casing there is a display element 26, which is supported at its edges by support elements 56 to the edge part of the display casing in a way that there remains a gap enabling the circulation of air between the walls of the display casing and the outer surface of the display element. The display element is preferably a TFT LCD display, which withstands static information significantly better than other display techniques. However, the display element can also be some
10 other suitable, flat electronic display element, such as a plasma display, a LED display or an organic LED display.

In the back wall of the display casing there are cooling elements 32, which have a first heat transfer part 60 extending to the inside of the display casing and a sec-
15 ond heat transfer part 62 extending to the cooling space 20 outside the display casing. The second heat transfer part comprises a number of plate-like cooling fins placed side by side. The operation of the cooling fins is based on the phenomenon that when the cooling air flows between the fins, heat is transferred from the cooling fins to the air of the cooling space. The task of the cooling elements is to trans-
20 fer excess thermal energy from the display casing to the cooling space, from which it is further conducted by the air flow produced by the cooling fans 36 out from the entire device. Instead of the cooling fins or in addition to them, the second heat transfer part 62 of the cooling element 32 may also comprise other elements by which the transfer of heat from the cooling element to the cooling space is imple-
25 mented. In particularly hot conditions, heat transfer based merely on cooling fins may not be sufficiently efficient. In that case, the second heat transfer part of the cooling elements may preferably comprise liquid-cooled elements or components.

The first heat transfer part may comprise cooling fins or conduction elements or
30 both. A conduction element is a fixed body conducting heat well, which is placed so that it touches the heat source, whereby the heat is transferred from the heat source to the cooling element by conduction. Preferably, the conduction element has been fastened to the heat source, such as the surface of the display element, by flexible fastening paste, which fills up the irregularities of the surface of the heat
35 source well and promotes the transfer of heat from the heat source to the conduction element.

The first cooling element 32, in which the first heat transfer part 60 extending to the display casing comprises cooling fins, is shown in the upper part of Fig. 2 by way of example. Inside the display casing on the back wall 22 there are fans 64, which circulate air in the space between the display element and the walls of the display casing. Suitable ducting 66 has been arranged between the display casing and the display element so that an air flow circulating the display element and equalizing the temperatures can be arranged by means of the fans. The fans 64 force the air of the inner casing to flow past the front plate 46 of the device. In cool conditions, the temperature of the front plate is naturally low. When the thermal conductivity of the front plate is selected suitably, the cool surface of the front plate cools the air flowing between the front plate and the display element. The fans circulating the air inside the display casing can be fastened so that when required, they can be easily changed in connection with the maintenance measures. The second cooling element 32, the first heat transfer part of which comprises a conduction element set against the surface of the display element 26, is shown by way of example in the lower part of Fig. 2. The conduction element has been fastened to the surface of the display plate preferably by glueing. Either conduction elements or cooling elements comprising cooling fins, or both, can be used in the display casing according to need. The cooling elements are preferably so-called Peltier elements.

In the display casing there are preferably also electrically operated warming elements 68 for raising the temperature of the display casing. In cold conditions, the warming elements produce heat, by which the effect of the front plate 46, which lowers the temperature inside, is compensated. The heat produced by the warming elements is transferred to the air inside, which is circulated in the display casing by means of an air flow produced by fans. For the above mentioned reasons, the warming elements need not be placed evenly on the area of the whole casing, but only at some points inside the casing. The warm air flow produced by the fans also keeps the front plate frost-free in all temperatures. The temperature of the display casing is measured by temperature sensors (not shown), and the measurement data is transmitted to a control unit located in the device casing. On the basis of the measurement results, the control unit regulates, according to need, the operation of the cooling fans 68 and the fans 64 in the display casing as well as the operation of the cooling fans 36 in the cooling space for achieving a suitable operating temperature in the display casing. A device switch-off function has been arranged in the control unit for making sure that the information board is not damaged in case of a failure of the temperature control system, such as in exception-

ally hot or cold conditions or in connection with power failures. The control unit also comprises means for sending a report to a predetermined control point in connection with a malfunction and automatic switch-off of the device. The report is preferably transmitted by a wireless communication link.

5

By means of the forced circulation of air inside caused by the fan, the temperatures of the inner parts of the display casing can be kept constant, and all the surfaces of the device can be used to transfer heat out from the inside of the display casing. Due to the forced inner circulation of air, the heat produced by a spotlike
10 warming element or other heat source can be distributed efficiently and evenly to the whole inner space of the casing. The circulation of the inside air, implemented by flow ducts, enables cooling of the edges of the display element especially in the upper parts of the display casing. This is important especially in TFT LCD displays with regard to the cooling of the control circuits. The control circuits are located
15 immediately inside the frame of the display element. Without efficient cooling, their temperatures would rise higher than in other parts of the display element. Because the control circuits are complicated microelectronics, even a small reduction of operating temperatures helps to improve their reliability significantly.

20 The warming and cooling of components in the device casing 12 can be implemented by a corresponding cooling solution as described above in connection with the display casing. Then the cooling or warming air flow circulates as forced past all the components becoming warmed. As an alternative, in low-power devices the cooling can be implemented by circulating air merely by cooling elements ar-
25 ranged in the back cover of the device casing without an internal circulation of air in the device casing. This is possible, because the control electronics withstand variations of temperature and high temperatures clearly better than the display element. A control system can be made for controlling the temperatures of the device casing individually, or it can be integrated as a part of the temperature control
30 system of the display casing.

Fig. 3 shows an example of a preferred embodiment of an electronic information board according to the invention as a perspective drawing seen obliquely from behind. The drawing depicts the cooling space of the information board in particular,
35 and the cover of the information board and parts connected to it are not shown in it. Fig. 4 shows the embodiment of Fig. 3 as a cross-sectional drawing. In this preferred embodiment of the invention, one or more flow controllers 70 made of a shaped metal sheet have been fastened to the back wall 22 of the display casing

10. Together with the back wall, the flow controllers fastened to it form one or more essentially horizontal flow ducts 72, inside which the second heat transfer parts 62 of the cooling elements 32 and the cooling fans 36 fastened to the back wall are placed. The number of cooling fans has been designed so that there is at least one cooling fan in each cooling duct. In the vertical side walls of the frame of the information board, at the ends of the flow ducts there have been formed ventilator holes 74, which enable the air flow produced by the cooling fans to pass along the flow duct through the cooling space 20. Circulation of cooling air implemented by horizontal flow ducts can be used in information boards of all sizes, but it is particularly well suited for use in large information boards, in which the temperature otherwise tends to rise high in the upper parts of the cooling space.

In Figs. 3 and 4, the flow ducts have been formed in a horizontal position. It is clear to a person skilled in the art that by applying the same principle, it is also possible to form flow ducts in the cooling space in a vertical or oblique position.

Some preferred embodiments of an electronic information board according to the invention have been described above. The information board can be made according to the user's needs and preferences to the desired size. In particular, the information board can be made to the same size as the prior art illuminated advertisement boards, in which case the physical dimensions of the display element correspond to the dimensions generally used in paper posters. Mechanical fastening of the information boards to the support structures can be implemented at the upper or lower edge of the board, from behind or from the sides of the board.

The invention is not limited to the above described solutions only, but the inventive idea can be applied in numerous ways within the scope defined by the claims.

Claims

1. An electronic information board comprising a frame (40), a flat display element (26) for displaying information and electronic equipment for controlling the display element, **characterized** in that the information board has a display casing (10), inside which the display element has been placed, and a device casing (12), inside which the electronic equipment needed in the control of the display element have been placed, and the display casing comprises cooling elements (32) for transferring heat from the display casing to the outside of the display casing.
2. An information board according to Claim 1, **characterized** in that there is a cooling space (20) between the display casing (10) and the device casing (12).
3. An information board according to Claim 2, **characterized** in that the display casing (10) and the device casing (12) can be separated from each other for performing updating and maintenance measures.
4. An information board according to Claim 3, **characterized** in that it has an openable cover (24) and that the device casing (12) has been installed in the cover.
5. An information board according to any one of the claims 1 to 4, **characterized** in that in the device casing (12) there is at least the control unit of the information board, the power supply of the control unit and the power supply of the background light of the display.
6. An information board according to any one of the claims 3 to 5, **characterized** in that the display casing (10) and the device casing (12) have been made weatherproof for performing updating and maintenance measures outdoors.
7. An information board according to any one of the claims 2 to 6, **characterized** in that the display casing (10) has a back wall (22) delimited by the cooling space (20) and that the cooling elements (32) have been arranged in the back wall for transferring heat from the display casing to the cooling space.
8. An information board according to any one of the claims 1 to 7, **characterized** in that the display casing (12) has a back cover (28) delimited by the cooling

space (20), having cooling elements (32) for transferring heat from the device casing to the cooling space.

- 5 9. An information board according to Claim 7 or 8, **characterized** in that the cooling elements (32) have a first heat transfer part (60) extending to the inside of the display casing (10) and/or the device casing (12) and a second heat transfer part (62) extending to the cooling space (20).
- 10 10. An information board according to Claim 9, **characterized** in that the first heat transfer part (60) of the cooling element (32) comprises cooling fins and/or conduction elements, and the second heat transfer part comprises cooling fins.
- 15 11. An information board according to Claim 10, **characterized** in that the conduction elements of the cooling element have been fastened to the heat source by flexible fastening paste.
- 20 12. An information board according to any one of the claims 2 to 11, **characterized** in that there are ventilator slots (34) or ventilator holes (74) on the opposite sides of the cooling space (20) for enabling an air flow from the outside of the information board to the cooling space and from the cooling space back to the outside of the information board.
- 25 13. An information board according to any one of the claims 2 to 11, **characterized** in that there is at least one cooling fan (36) in the cooling space (20) for circulating air through the cooling space.
- 30 14. An information board according to any one of the claims 1 to 13, **characterized** in that the display casing (10) comprises a transparent front plate (46) and an edge part (44).
- 15 15. An information board according to Claim 14, **characterized** in that the front plate (46) is made of shock-resistant glass.
- 35 16. An information board according to Claim 14 or 15, **characterized** in that the display element (26) is supported at its edges by support elements (56) to the edge part of the display casing so that there is a gap enabling the circulation of air between the walls of the display casing and the outer surface of the display element.

17. An information board according to Claim 16, **characterized** in that there are fans (64) inside the display casing (10) for circulating air in the space between the display element (26) and the walls of the display casing (10).
- 5
18. An information board according to Claim 17, **characterized** in that ducting (66) has been arranged between the walls of the display casing (10) and the display element (26) so as to control the air flow circulating round the display element.
- 10
19. An information board according to any one of the claims 1 to 18, **characterized** in that there are electrically operated warming elements (68) in the display casing (10) for raising the temperature of the display casing.
- 15
20. An information board according to any one of the Claims 1 to 19, **characterized** in that there are flow ducts (72) in the cooling space (20) for controlling the air flow.
- 20
21. An information board according to Claim 20, **characterized** in that in the flow duct (72) there is at least one heat transfer part (62) of at least one cooling element (32) and at least one cooling fan (36).
- 25
22. An information board according to Claim 20 or 21, **characterized** in that the flow ducts (72) have been formed in a horizontal, vertical or oblique position.
- 25
23. An information board according to any one of the claims 1 to 22, **characterized** in that the display element (26) is a TFT LCD display, a plasma display, a LED display or an organic LED display.
- 30
24. An information board according to any one of the Claims 1 to 23, **characterized** in that its depth in the direction of the normal of the front plate is under 25 cm.
- 35
25. An information board according to any one of the claims 1 to 24, **characterized** in that the dimensions of the display element (26) correspond to the size class of paper posters generally used in illuminated advertising boards.

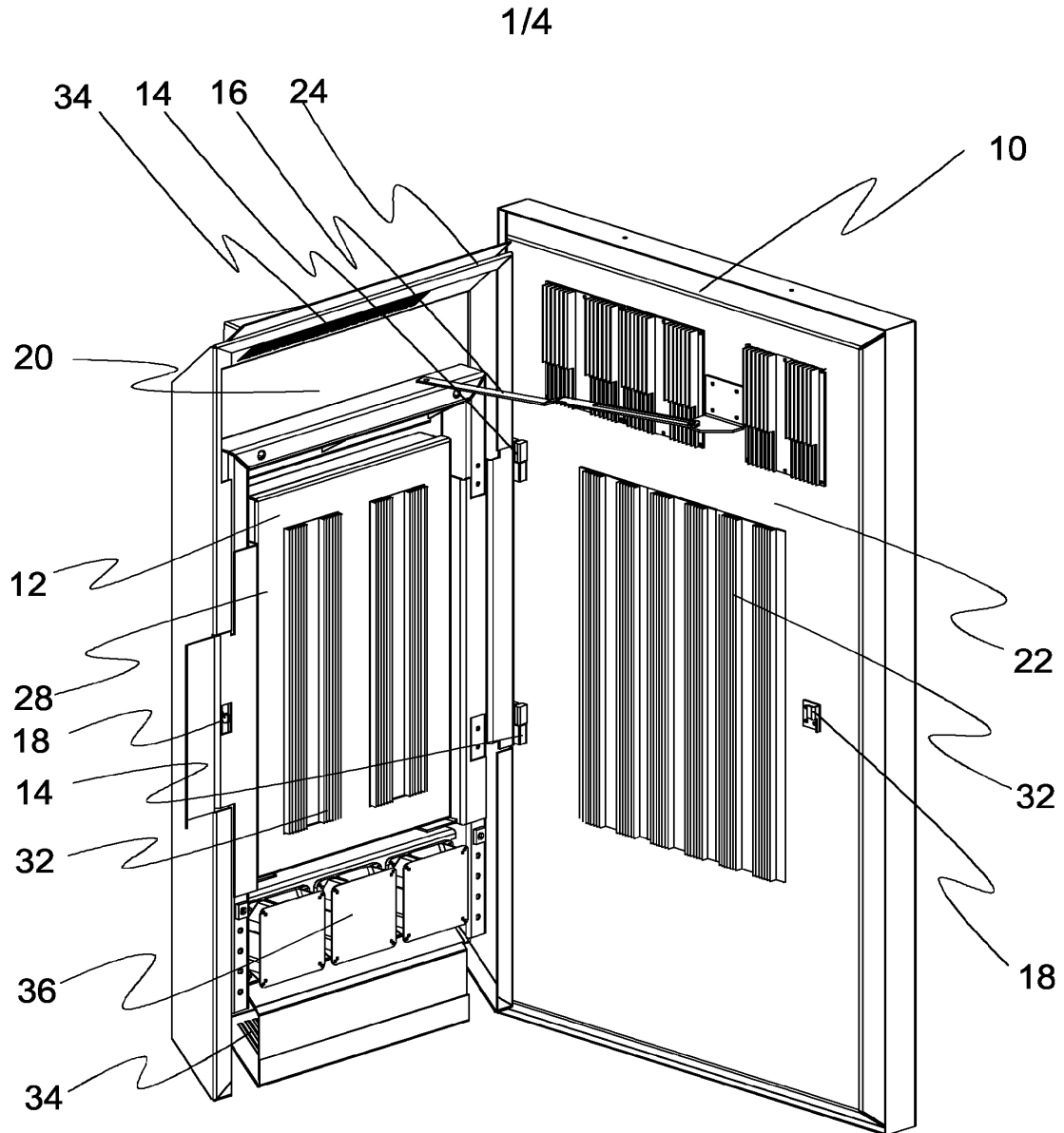


Fig.1

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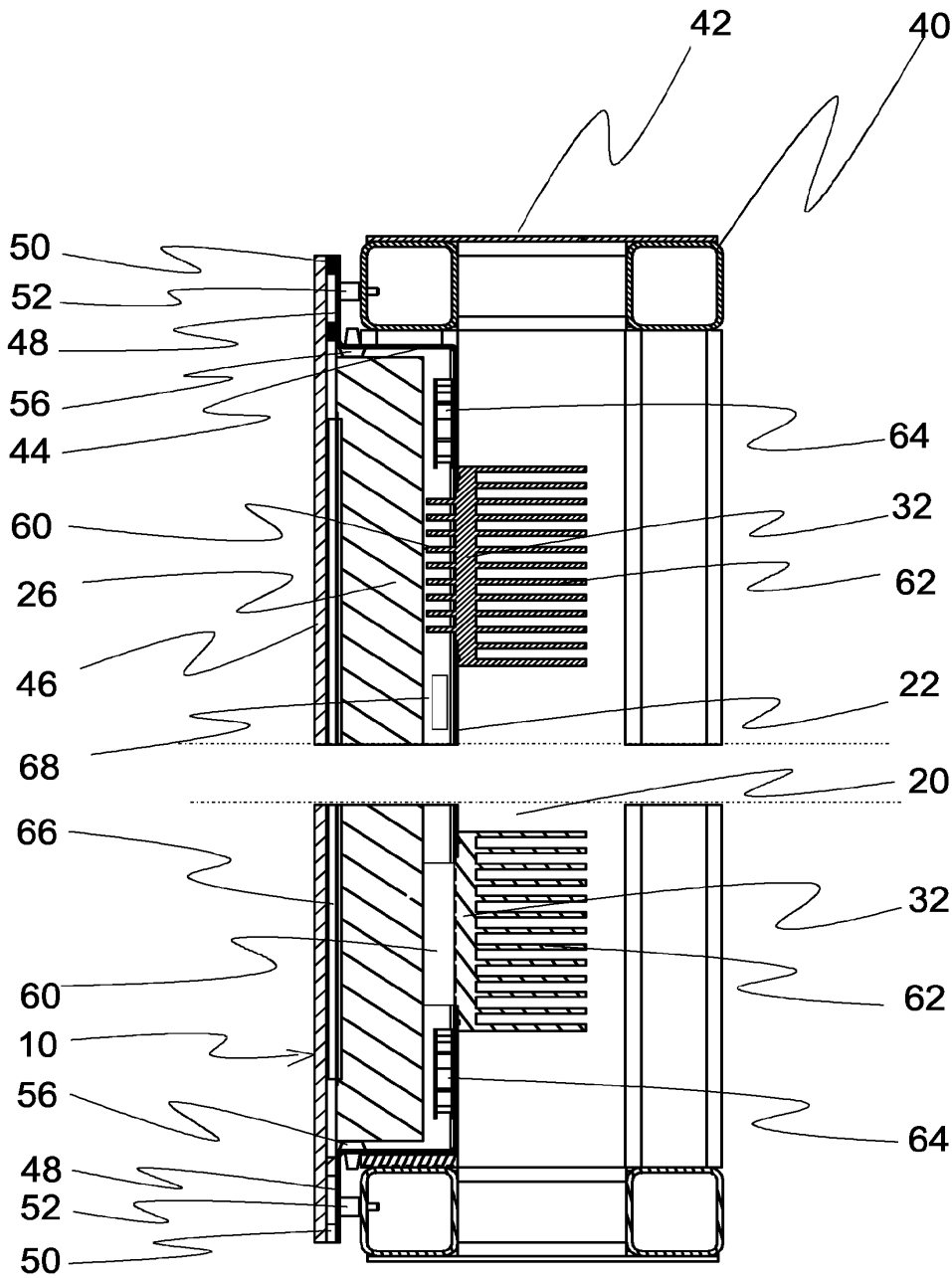


Fig. 2

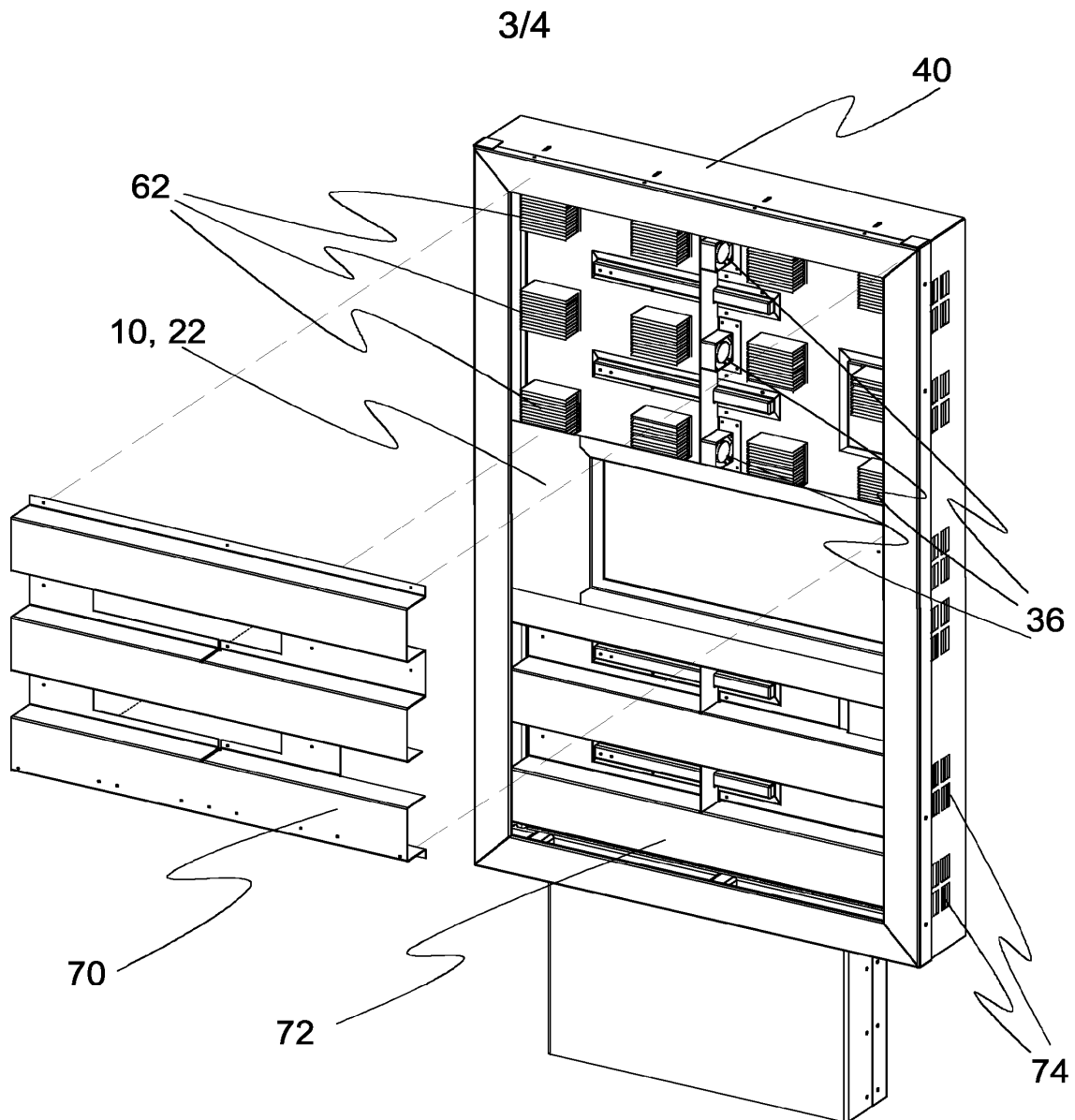


Fig. 3

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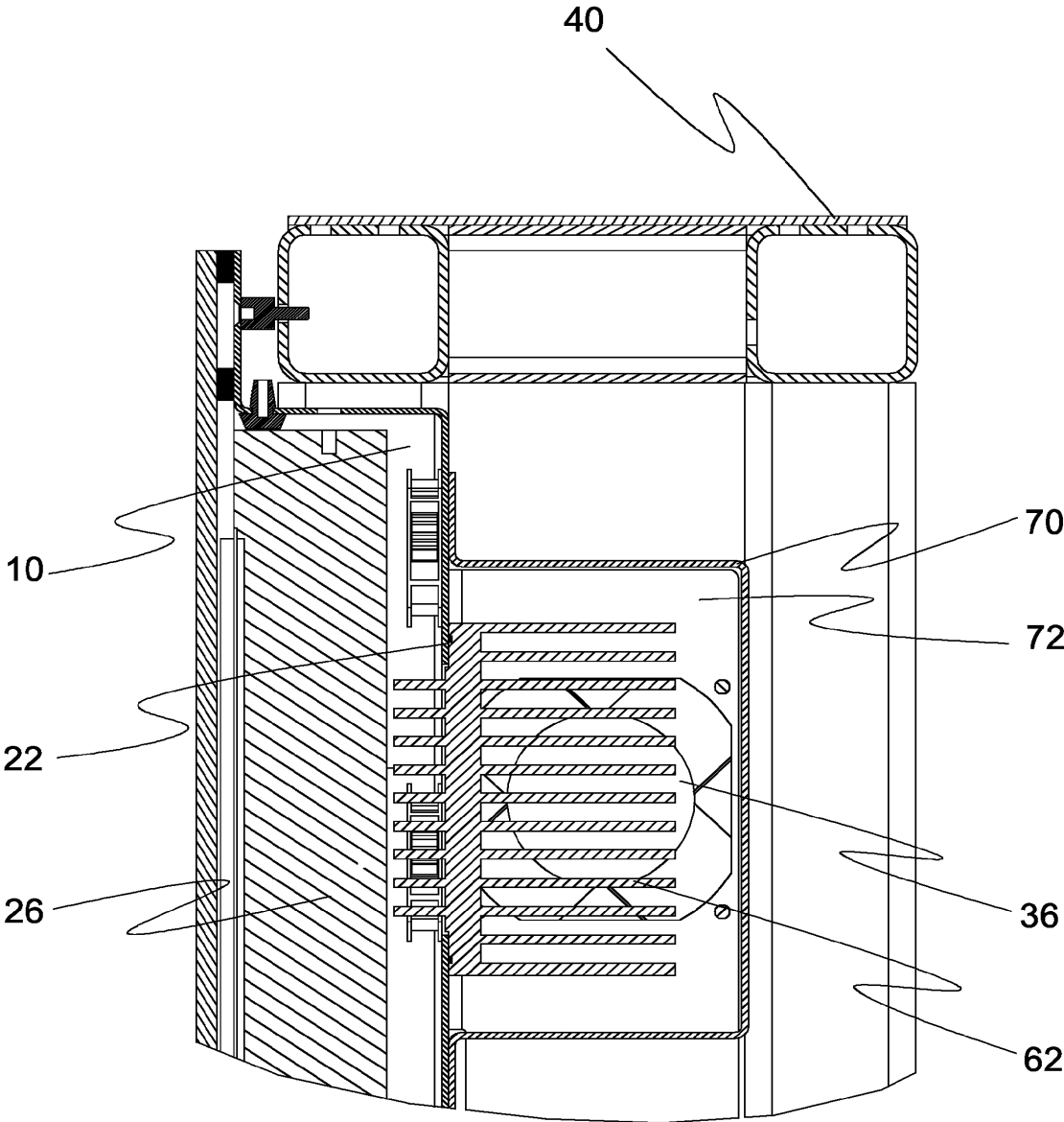


Fig. 4

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2006/050145

A. CLASSIFICATION OF SUBJECT MATTER		
See extra sheet		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
IPC8: G09F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
FI, SE, NO, DK		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
EPO-internal, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2006011314 A (FUJI XEROX CO LTD) 12 January 2006 (12.01.2006)	1, 5, 14, 16 3, 4, 6, 9, 10, 11, 15, 17-22, 24, 25
X Y	& abstract [online] EPOQUENET EPODOC & abstract [online] EPOQUENET WPI & Computer translation, retrieved via the internet from the Japanese Patent Office EPODOC- and WPI-abstracts and paragraphs [0006], [0013], [0031], [0037] and [0043] of the computer translation and figures 6, 7 and 9 JP 2005196000 A (SHARP KK) 21 July 2005 (21.07.2005)	1, 2, 5, 7, 8 12, 13, 23 3, 4, 6, 9, 10, 11, 15, 17-22, 24, 25
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "I," document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
30 November 2006 (30.11.2006)		02 January 2007 (02.01.2007)
Name and mailing address of the ISA/FI		Authorized officer
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CIVIQ0003964

SEC et al. v. MRI
 SEC Exhibit 1031.0353
 IPR2023-00254

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2006/050145

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	& abstract [online] EPOQUENET EPODOC & abstract [online] EPOQUENET WPI & Computer translation, retrieved via the internet from the Japanese Patent Office EPODOC- and WPI-abstracts and paragraphs [0001], [0016], [0017], [0018], [0019], [0020], [0021], [0022] and [0023] of the computer translation JP 2004029290 A (NIPPON LIGHT METAL CO) 29 January 2004 (29.01.2004)	3
Y	& abstract [online] EPOQUENET EPODOC & abstract [online] EPOQUENET WPI & Computer translation, retrieved via the internet from the Japanese Patent Office EPODOC- and WPI-abstracts and paragraphs [0001], [0020], [0023], [0030] and [0039] of the computer translation JP 7319402 A (KOKUSAI ELECTRIC CO LTD) 08 December 1995 (08.12.1995)	4
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Y	JP 2005084270 A (SHARP KK) 31 March 2005 (31.03.2005) & abstract [online] EPOQUENET EPODOC & abstract [online] EPOQUENET WPI & Computer translation, retrieved via the internet from the Japanese Patent Office EPODOC- and WPI-abstracts and paragraphs [0023] and [0024] of the computer translation and figures 18 and 19	9, 10
Y	JP 2005338541 A (NIPPON SEIKI CO LTD) 08 December 2005 (08.12.2005) & abstract [online] EPOQUENET EPODOC & abstract [online] EPOQUENET WPI & Computer translation, retrieved via the internet from the Japanese Patent Office EPODOC- and WPI-abstracts and paragraphs [0018] and [0029] of the computer translation	9, 10, 11

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

CIVIQ0003965

SEC et al. v. MRI
 SEC Exhibit 1031.0354
 IPR2023-00254

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI2006/050145

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	"Going big with TFT LCD" Retrieved from the Internet URL: http://www.hightechfinland.com/2006/communications/software/en_GB/imagon/ [retrived on 2006-11-30] whole document	15, 24, 25
L	Google's cache of http://www.hightechfinland.fi/2006/en_GB/frontpage_14/ as retrieved by Google on 27 Feb 2006 21:32:24 GMT. URL : http://www.google.com/search?q=cache:sZlzlUwQgxMJ:www.hightechfinland.fi/2006/en_GB/frontpage_14/+%22imagon+international%22&hl=en&ct=clnk&cd=39 [retrived on 2006-11-30] contains link to the document "Going big with TFT LCD" demonstrating that the document was available to the public at the latest on February 2006	
Y	EP 1253459 A2 (GILBARCO INC) 30 October 2002 (30.10.2002), paragraphs [0024], [0025]; fig 1	17, 18
Y	FR 2817700 A1 (THOMSON CSF) 07 June 2002 (07.06.2002), claim 1; figures 3 and 4	19
Y	JP 10222076 A (FUJITSU LTD) 21 August 1998 (21.08.1998) & abstract [online] EPOQUENET EPODOC & abstract [online] EPOQUENET WPI & Computer translation, retrieved via the internet from the Japanese Patent Office EPODOC- and WPI-abstracts and paragraphs [0026], [0033] and [0036] of the computer translation	20, 21, 22

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CIVIQ0003966

SEC et al. v. MRI
SEC Exhibit 1031.0355
IPR2023-00254

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/FI2006/050145

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
JP 2006011314 A	12/01/2006	None	
JP 2005196000 A	21/07/2005	None	
JP 2004029290 A	29/01/2004	None	
JP 7319402 A	08/12/1995	None	
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JP 10222076 A	21/08/1998	None	

Form PCT/ISA/210 (patent family annex) (April 2005)

CIVIQ0003967

SEC et al. v. MRI
SEC Exhibit 1031.0356
IPR2023-00254

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2006/050145

CLASSIFICATION OF SUBJECT MATTER

Int.Cl.

G09F 9/313 (2006.01)

G09F 9/33 (2006.01)

G09F 9/35 (2006.01)

G09F 19/22 (2006.01)

Patents

JP2006163217A



Sign in

Outdoor display device

Abstract

<P>PROBLEM TO BE SOLVED: To provide a display device capable of efficiently radiating the heat generated by a flat panel type display device. **<P>SOLUTION:** In a device box 2, a liquid crystal device 1 is so arranged that a liquid crystal panel 13 of the liquid crystal display device 1 and a transparent plate 23 are not in contact, and a gap (front face air duct AC1) is present between the body. Further, the liquid crystal display device 1 is so arranged that a gap (back face air duct AC2) is present between the back face of the liquid crystal display device 1 on a side opposite from the liquid crystal panel 13 and a wall surface of the device box 2 facing it, and a fan F1, as a means of generating air current in the front air duct AC1, is arranged nearby an opening part below the front air duct AC1, to send air in the front face air duct AC1 from below. **<P>COPYRIGHT:** (C)2006, JPO&NCPPI

Classifications

G02F1/133385 Heating or cooling of liquid crystal cells other than for activation, e.g. circuits or arrangements for temperature control, stabilisation or uniform distribution over the cell with cooling means, e.g. fans

View 3 more classifications

JP2006163217A

JP Application

Find Prior Art

Other languages: Japanese

Inventor: Takahisa Nagayama, Fukuoyoshi Ozumi, Hiroshibu Tsutsumi, Nobuyuki Zumoto, 江原 健, 横好 大豊, 奥久 永山, 佐行 廣本

Original Assignee: Mitsubishi Electric Corp, Sony Electronic Devices Corp, 三菱電機株式会社, 相模電子化学株式会社

Priority date: 2004-12-10

Family: JP (1)

Date	App/Pub Number	Status
2004-12-10	JP2004357682A	Pending
2006-06-22	JP2006163217A	Application

Info: Cited by (28), Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Oriscute

Claims (16)

translated from Japanese

1. A outdoor display apparatus using a flat panel display device,
The flat panel display device is housed in the device box,
The device box,
A transparent plate which is fitted on the wall surface facing the display panel of the flat panel display device,
And a stream generating means for generating an air flow to the front air passage is a gap which is provided at least between the transparent plate and the display panel,
outdoor display.
2. The device box,
If said transparent plate has a window-like protrusions on the upper side of said transparent plate side of the inside side, outdoor display apparatus according to claim 1
3. The device box,
The side of the transparent plate is fitted side is the periphery of the transparent plate form a generally concave shape projecting outward, outdoor display apparatus according to claim 2, wherein.
4. The device box,
A first opening provided in the lower surface of the projecting portion,
A second opening provided on a bottom surface of the device box,
wherein a side where the display panel is provided in the flat panel display device further includes a rear surface of the opposite side, a rear air path is a gap provided between the wall of the device box facing thereto, and outdoor display apparatus according to claim 2.
5. The air flow generating means,
wherein disposed in the vicinity of the lower opening in the front air passage, including a fan for generating updraft by sending air from the lower side to the front air passage, outdoor display apparatus according to claim 4, wherein
6. The air flow generating means,
is disposed in the vicinity of the upper opening of the front air passage, a first fan for generating downdraft by sending air from above the front air passage,
is disposed in the vicinity of the upper opening of the rear air passage, and a second fan for generating downdraft by sending air from above the rear air passage,
display outdoor claim 4, wherein apparatus.
7. The air flow generating means,
It is disposed in the vicinity of the second opening, the second from the opening to forcibly discharge the air to the device box outside the downdraft into the front air passage and the rear air passage It includes a fan for generating an outdoor display apparatus according to claim 4, wherein.
8. The air flow generating means,
The first is disposed in the vicinity of the opening, by incorporating from said first opening to force the air into the device box, generating a downdraft in the front air passage and the rear air passage It includes a fan for an outdoor display apparatus according to claim 4, wherein.

CIVIQ0002648

SEC et al. v. MRI
SEC Exhibit 1031.0358
IPR2023-00254

9. The air flow generating means,
it is disposed in the vicinity of the lower opening portion of the front air passage to generate a downdraft of air in the front air passage in the front air passage by forcibly discharged from the lower opening portion it includes, a fan, an outdoor display apparatus according to claim 4, wherein.
10. The device box,
And back of the side opposite to the side where the display panel is provided in the flat panel display device, a back air passage is a gap provided between the wall of the device box facing thereto,
A first opening provided at a position of the front air duct nearer the central portion of the bottom surface of the device box,
A second opening provided at a position of the rear air path closer,
Extending vertically upward from said bottom surface between said first and second openings, further and a partition wall reaching to the bottom of the flat panel display device,
The air flow generating means,
Wherein disposed in the vicinity of the lower opening in the front air passage, including a fan for generating updraft by sending air from the lower side to the front air passage, outdoor display apparatus according to claim 1.
11. The device box,
And a wave-shaped rear protrusion protruding outwardly at a position corresponding to the opposite side, and the projecting portion to a side where the projecting portion is provided,
A first opening provided in the lower surface of the rear projecting portion,
A second opening provided on a bottom surface of the device box, further comprising a
The air flow generating means,
Wherein disposed in the vicinity of the lower opening in the front air passage, including a fan for generating updraft by sending air from the lower side to the front air passage, outdoor display apparatus according to claim 2, wherein.
12. The flat panel display device includes a liquid crystal display device,
The liquid crystal display device,
A liquid crystal panel corresponding to the display panel,
A backlight disposed to face the back surface of the liquid crystal panel,
And a housing for housing the backlight, outdoor display apparatus according to claim 1.
13. The apparatus box with the front panel surface preheating heater for heating the liquid crystal panel of a liquid crystal display device,
Further comprising a temperature measurement means for measuring the temperature of the liquid crystal panel,
On the basis of the measurement result of the temperature measuring means, to control the air flow generating means and said front panel surface preheating heater, for controlling the temperature of said liquid crystal panel, according to claim 12 outdoor display device according
14. The panel front preheating heater,
is disposed in the vicinity of the upper opening of the front air duct,
The air flow generating means, wherein the front air passage interposed therebetween said front panel surface preheating heaters are disposed on the opposite side,
to discharge the air in the front air passage from the lower opening portion of the front air passage in comprising a fan for generating a downdraft in the front air passage, outdoor display apparatus according to claim 13, wherein.
15. The device box,
Further comprising, claim 13 outdoor display apparatus according to housing preheating heater for heating the housing of the liquid crystal display device.
16. Further comprising, outdoor display apparatus according to claim 1, wherein the photocatalytic film is disposed on the display panel and the facing surfaces of the front and the transparent plate of the display panel.

Description

translated from Japanese

The present invention relates to a display device, particularly to an outdoor display apparatus using a flat panel display device on the display unit.

As traditional advertising media, there may be mentioned printed materials such as posters and stickers, was not necessarily eye-catching because it itself is the display content does not change. Although the light-emitting element such as a light bulb or a light emitting diode is lit or flashing is also a method of eye-catching, there is a problem that power consumption is large.

So was devised is a method of using a liquid crystal display device as an advertising medium. Can be arbitrarily change the display contents in a liquid crystal display device, it is possible to meet demand eye-catching.

As an example, it includes a liquid crystal advertising medium disclosed in Patent Document 1.

In Patent Document 1, a plastic liquid crystal display panel is controlled by ON / OFF driving that does not display an intermediate color, liquid crystal advertising medium which enables pop by combining a pattern layer drawn by printing has been proposed by the static driving.

JP-8-15565 discloses (Fig. 1)

Since the conventional liquid crystal advertising medium is configured as described above, when the equipment is in its outdoor street or the like and touch the liquid surface such as passers-by could crystal panel is broken, the liquid crystal panel as not directly touch, when installing the transparent plate to the liquid crystal panel front is radiated is suppressed from the liquid crystal panel front by a transparent plate, the temperature of the liquid crystal panel is a problem that not function properly increased.

Also, for outdoor use is surrounding the liquid crystal display device in some housing, although rainwater and dust it is necessary to prevent directly reach the liquid crystal display device emits its case, a liquid crystal display device heat to be efficiently dissipated there has been a problem that it is difficult.

Then, such a problem is not limited to a liquid crystal display device was a problem common to a case of using a so-called flat panel type display device such as a plasma display device in outdoor display apparatus.

The present invention has been made to solve the above problems, and an object thereof is to provide a display device capable of dissipating the heat generated by the flat panel display device efficiently.

Outdoor display apparatus according to claim 1, wherein according to the present invention is an outdoor display apparatus using a flat panel display device, the flat panel display device is housed in a device box, the device box, wherein a transparent plate is fitted to the display panel and the facing wall surfaces of the flat panel display device, at least the transparent plate and airflow generating means for generating an air flow to the front air passage is a gap provided between the display panel. It is equipped with a door.

According to outdoor display apparatus according to claim 1, wherein according to the present invention, since to generate airflow in front airflow passage is a gap provided between the transparent plate and the display panel by a gas stream generating means, the display panel by a gas stream. There can be greatly suppress an increase in the temperature of the cooled the display panel.

<A. The first embodiment>

<A-1. Device Configuration>

As the first embodiment of the present invention will be described with reference to FIG. 1 the configuration of the outdoor display apparatus 100 that uses a liquid crystal display device.

As shown in FIG. 1, an outdoor display apparatus 100 includes a liquid crystal display device 1, a device box 2 for housing it is classified roughly into a leg 3 for supporting the apparatus box 2.

Incidentally, comprising a means for moving the legs 3 and casters 31 in FIG. 1, although the horizontal movement of the outdoor display device 100 has a simple configuration, the moving means is not essential.

The liquid crystal display device 1 includes a liquid crystal panel 13 (display panel), and its backlight (e.g. a fluorescent lamp) 12, as well as accommodating the backlight 12, and a casing 11 for housing the driving circuit of the liquid crystal panel 13 by light LB emitted from the backlight 12 is partially transmitted or blocked to liquid crystal panel 13, a desired image is displayed on the liquid crystal panel 13. In the following description deals with lower down direction of the image displayed on the liquid crystal panel 13, the upward direction of the image as the upper.

The length of the aspect ratio of the liquid crystal panel 13 is not limited to the aspect ratio to be used in a so-called television receiver, for example, the aspect ratio of the display of a personal computer, or may be square. In addition, it may be a portrait of shape.

Then, on the wall surface that faces the liquid crystal panel 13 of the apparatus box 2, a transparent plate 23 of polycarbonate is fitted, the image displayed on the liquid crystal panel 13 can be viewed from the outside through the transparent plate 23. Planar size of the transparent plate 23 is of course at the same level as the liquid crystal panel 13. Incidentally, it referred to side surfaces of the transparent plate 23 side provided with the window side 21. As a result of performing a simple test, as the thickness of the polycarbonate plate, 3 mm or more 10mm or less, visibility, it was found that from the viewpoint of impact resistance.

Here, the use of polycarbonate plate, even more than transparency, has a high impact resistance for protecting the liquid crystal panel 13, a high capability in the ultraviolet shielding ability for preventing deterioration of the liquid crystal panel 13. This is because you are. Therefore, it not limited to a polycarbonate plate as long as a material having equivalent performance, also a transparent material having the same impact resistance and polycarbonate plate, be adopted a configuration in which attached an ultraviolet shielding film good. As the material in place of the polycarbonate plate, for example, it is conceivable to use an acrylic plate, may be used those commercially available as UV-shielding film.

Apparatus box 2 surrounds the liquid crystal display device 1, the liquid crystal display device 1 has a configuration to prevent the directly exposed to rainwater and dust. However, when the liquid crystal display device 1 is completely enclosed in the apparatus box 2, since the heat generated from the liquid crystal display device 1 is confined in the apparatus box 2, thus providing a vent. In the example of FIG. 1, as vents, and an opening OP1 (first opening) and OP2 (second opening).

Here, within device box 2, the liquid crystal panel 13 of the liquid crystal display device 1, without contact with the transparent plate 23, the liquid crystal display device 1 is disposed such that a gap exists between them, the gap is referred to as a front air duct AC1.

Further, the opposite side (back) of the liquid crystal panel 13 of the liquid crystal display device 1, has also been a liquid crystal display device 1 is arranged such that there is a gap between the wall of the apparatus box 2 facing thereto, it is referred to as the gap between the rear air passage AC2. Incidentally, cooling fins FN is disposed on the rear surface of the liquid crystal display device 1. Cooling fins FN is may be a plurality of arranged on the rear surface of the liquid crystal display device 1, as shown in FIG. 1, only one of the equivalent area as the back may be disposed.

In the vicinity of the lower opening in the front air passage AC1 is fan F1 is arranged a means for generating an air flow to the front air passage AC1, and is configured to feed air from the bottom to the front airflow path AC1 there. Incidentally, the fan F1 is not limited to one, may be disposed in plurality in parallel along the opening portion of the lower side of the front air duct AC1. Further, the above liquid crystal display device 1 fan F2 is disposed, has a configuration which promotes the inflow of air from the openings OP1. Incidentally, the fan F2 is not limited to one, may be disposed in plurality in parallel along the horizontal extending direction of the liquid crystal display device 1. Moreover, even without a fan F2 if the inflow of air from the opening OP1 is sufficiently obtained may without providing the fan F2.

Here, the window side 21 of the apparatus box 2 protrudes around the transparent plate 23 to the outside, has a generally concave shape, opening OP1 is eaves-like projecting portions on the top side of the transparent plate 23 since is provided on the lower surface 221, in a normal state are configured to be prevented from rainwater from entering. The opening OP2 is provided in the bottom portion of the apparatus box 2, as the opening OP1, in a normal state are configured to be prevented from rainwater from entering.

Here, the protruding portion 221, sunlight inserted into the liquid crystal panel 13, also has a function as eaves to prevent the lowering visibility. Result of the visibility of the confirmation test with respect to the length of the eaves, projecting length of the projecting portion 221 is A, a length between the projecting portion 222 of the lower side of the protrusion 221 and the transparent plate 23 is B. If, a. B = 1: 3 ~ 1: by setting the range of B, was found to be able to ensure the visibility in most conditions.

In the above description, the ambient protrudes outside the transparent plate 23 of the window side 21 of the apparatus box 2, generally it has been described that has a concave shape, eaves-like projecting corresponding to the protrusion 221 parts only may be used as the configuration in which the upper side of the transparent plate 23. In this case also obtained the same effect as described above of course.

<A-2. Cooling operation>

Next, referring to FIG. 1, illustrating the cooling operation of the liquid crystal display device 1 in an outdoor display apparatus 100 with reference to FIG.

As shown in FIG. 1, the light LB emitted from the backlight 12 (s) directly, or, a mirror provided inside the housing 11 (not shown), or diffuse reflection plate (shown not) it is reflected by, and is irradiated to the liquid crystal panel 13. Irradiated light LB forms an image by being a liquid crystal panel 13 partially transmitted or blocked.

Thus, by arranging the backlight 12 so as to face the back surface of the liquid crystal panel 13, by adopting a structure for reflecting the light in the mirror and diffuse reflection plate, it is possible to brighten the display image of the liquid crystal panel 13, display device suitable for display outdoors obtained.

The liquid crystal panel 13 is heated by the heat backlight 12 (e.g. fluorescent) emitted. In a typical liquid crystal display, the heat input to the liquid crystal panel relief to the housing by thermal conduction of the liquid crystal panel, thereby suppressing overheating of the liquid crystal panel. However, the outdoor display apparatus 100, since the

blowing air, and the temperature of the liquid crystal panel 13, thereby suppressing an increase in the impact of panel 13. However, the outdoor display apparatus 100, which is subject to use in bright outdoors, but would increase the brightness of the fluorescent lamp in order to increase the visibility of the display, in which case the increased heat input from the fluorescent lamp, the liquid crystal it may exceed an operable temperature of the panel 13.

Accordingly, the front air duct AC1 be a clearance between the liquid crystal panel 13 and the transparent plate 23 adopts a configuration for cooling the front surface of the liquid crystal panel 13 by sending air to the front air path AC1 by the fan F1.

Fan F1 is rotated from the lower side to pump air into the front air passage AC1, air sent is discharged from the upper opening in the front air duct AC1 becomes rising air, flows from the opening OP1 is cooled mixed with fresh air is fed into the front air duct AC1 again by the fan F1 through the rear air passage AC2. It shows the flow of air by the arrows in FIG.

Thus, although the circulation path of the air in the apparatus box 2 is formed, the air corresponding to the inflow amount from the opening OP1 is discharged to the outside from the opening OP2, it increases the excess air pressure in the apparatus box 2 it is possible to prevent. Therefore, opening OP1 becomes the air inlet, the opening OP2 becomes the air outlet.

Since the air flow to the back air passage AC2 occurs, it increased cooling capacity of air-cooling fins FN provided on the back of the liquid crystal display device 1, the housing 11 can also be efficiently cooled. If the housing 11 is efficiently cooled, heat generated in the back surface (the surface of the backlight 12 side) of the liquid crystal panel 13 tends to flow into the housing 11, leading to suppression of the temperature rise of the liquid crystal panel 13.

<A-3. Effects>

By taking the configuration described above, it can greatly suppress an increase in the temperature of the liquid crystal panel 13 as described below.

Figure 2 is a diagram showing the temperature rise characteristics of the surface of the liquid crystal panel 13, measured on the horizontal axis steps (fixed time interval), the vertical axis represents the temperature ($^{\circ}\text{C}$), when cooling the front surface of the liquid crystal panel 13 the temperature rise characteristics of the panel surface C1, represents the temperature rise characteristics of the panel surface when no cooling front and C2, also the temperature characteristics of the in the apparatus box 2 as C3.

As shown in FIG. 2, the temperature of the case without cooling the liquid crystal panel 13 (panel temperature) is about 65°C . at the maximum, in case of performing cooling is suppressed to about 55°C . at most. Thus, by cooling the front of the panel provided with a front air passage AC1, the panel temperature it can be seen that can be lowered 10°C . or higher.

Incidentally, Sensitive Outdoor display device 100, since provided the fan F1 in the vicinity of the lower opening in the front air duct AC1, the liquid crystal panel 13 high front cooling efficiency, the cooling capacity by adjusting the air velocity it can be adjusted to.

Here, or blowing wind on the back side of the liquid crystal panel 13, not to adopt the direct cooling such blowing wind backlight 12 is electrostatically induced in a backlight 12 is performed directly air-cooled, in air dust is likely adsorbed to the fluorescent lamp, because the life of the backlight 12 lowers the luminance of the backlight 12 in a short time is shortened. Therefore, the housing electronics such as a driving circuit of the backlight 12 and the liquid crystal panel 13 in the housing 11, it is desirable that the housing 11 is closed with such packing or filling material so that there is no gap.

Further, to alleviate the impact caused by outdoor display apparatus 100 fall, it is desirable to adopt a supporting structure sandwiching the cushioning material between the housing 11 and the apparatus box 2 of the inner wall of the liquid crystal display device 1.

Moreover, to improve reliability, the filter provided in the opening OP1 falls air inlet, the dust is prevented from entering the device. At this time, to ensure the maintenance, the possible structure and remove the (surface opposite to the window side 21) the upper surface and the back of the unit box 2, it is desirable that the filter cleaning is facilitated structure.

Further, the connection portion between the transparent plate 23 and the apparatus box 2, arranged a sealing member such as a packing, it is of course to prevent penetration of rain water or dust from the gap.

<A-4. Modification 1>

Outdoor display device 100 shown in FIG. 1, which had adopted a configuration in which the fan F1 in the vicinity of the lower opening in the front air duct AC1, configured as outdoor display device 100A shown in FIG. 3 it may be. In FIG. 3, in the same reference numerals are assigned to the same configuration as outdoor display device 100 shown FIG. 1, redundant description will be omitted.

As shown in FIG. 3, in the outdoor display devices 100A, is disposed a fan F11 (first fan) in the vicinity of the upper opening in the front air duct AC1, the upper opening of the rear air passage AC2. It is disposed fan F12 (second fan) in the vicinity.

By using this way the disposed a fan F11 and F12, the air flowing from the opening OP1, as well as fed to the front air duct AC1 by the fan F11, also fed to the back air passage AC2 by the fan F12. The air sent is discharged from each of the lower opening in the front air duct AC1 and rear air passage AC2 becomes downward current, and is discharged from the opening OP2 in the bottom of the unit box 2 to the outside.

Here, the fan F11 is mainly because cooling the front surface of the liquid crystal panel 13 can be referred to as the liquid crystal panel cooling fan, fan F12 can be referred to as casing cooling fan so to cool the housing 11.

Thus, by providing a fan F11 and fan F12, it is possible to respectively the front air duct AC1 and rear air passage AC2 not circulate air in the apparatus box 2 independently feeding the air, the liquid crystal panel 13 the front and the housing 11 together can be cooled at a high flow velocity ambient air, it is possible to further improve the cooling efficiency of the liquid crystal panel 13.

<A-5. Modification 2>

In the outdoor display device 100A described above, without circulating the air in the apparatus box 2 has been independent of each other send air in configuration to the front air duct AC1 and rear air passage AC2, to achieve this the display device 100B or outdoor 4, may be configured as outdoor display device 100C shown in FIG. 4 and FIG. 5, in the same reference numerals are assigned to the same configuration as outdoor display device 100 shown FIG. 1, redundant description will be omitted.

Figure in the outdoor display device 100B shown in 4, a fan F21 is airflow generating means is arranged in the vicinity of the opening OP2 of the bottom of the unit box 2, to force the air in the apparatus box 2 from the opening OP2 by rotating the fan F21 to discharge, air is divided to pass through the front air duct AC1 and rear air passage AC2, front air duct AC1 and rear air passage becomes respectively downward current flowing from the opening OP1 air passing through the AC2 is discharged to the outside by the fan F21.

By adopting such a configuration, the front and the housing 11 of the liquid crystal panel 13, can be cooled together with the outside air, it is possible to enhance the cooling efficiency of the liquid crystal panel 13.

Further, the outdoor display device 100D shown in FIG. 6, a fan F31 is airflow generating means is arranged in the vicinity of the opening OP1 provided in the projecting portion 221 of the apparatus box 2, the outside air into the apparatus box 2 by rotating the fan F31 to forcibly capture, air flowing from the opening OP1 is divided so as to pass through the front air duct AC1 and rear air passage AC2, front air duct AC1 and back become respectively downdraft air passing through the air passage AC2 is discharged from the opening OP2 in the bottom of the unit box 2 to the outside.

By adopting such a configuration, the front and the housing 11 of the liquid crystal panel 13, can be cooled together with the outside air, it is possible to enhance the cooling efficiency of the liquid crystal panel 13.

<A-6. Modification 3>

In the first and second modifications of the embodiment described above, the rear surface of the cooling of the liquid crystal panel 13 is cooled by the heat generated by the liquid crystal panel 13 is thermally conducted to the housing 11, air-cooling the housing 11. It was using indirect cooling to, but may be configured as outdoor display device 100D shown in FIG. In FIG. 6, in the same reference numerals are assigned to the same configuration as outdoor display device 100 shown FIG. 1, redundant description will be omitted.

In outdoor display device 100D shown in FIG. 6, the liquid crystal display apparatus 1A has a configuration for feeding the cooling air therein.

That is, the housing 11A of the liquid crystal display device 1A has an opening OP11 on its upper surface, it has an opening OP12 on the bottom. The opening OP11 is covered with HEPA (high efficiency particulate air) high-performance filter HFL possible removal dust μm units, such as filters, in the vicinity of the opening OP12 fan F42 it is arranged. Then, in the vicinity of the lower opening in the front air duct AC1 fan F41 is provided as air flow generating means.

Fan F41 is rotated so as to forcibly discharge the air in the front air passage AC1 from the lower side of the opening, the discharged air is discharged from the opening OP2 in the bottom of the unit box 2 to the outside, new air flowing from the opening OP1 by rotation of the fan F41 is configured to flow into the front air passage AC1, also flows into the housing 11A through a filter HFL by rotation of the fan F42, the back surface of the liquid crystal panel 13 and cooling the backlight 12 directly. Then, it is forcibly discharged to the outside of the housing 11A by the fan F42, it is further discharged from the opening OP2 to the outside.

In this way, by taking directly air-cooled configuration backside and the backlight 12 of the liquid crystal panel 13, it is possible to further improve the cooling efficiency of the liquid crystal panel 13.

The air guided into the housing 11A, since through a high-performance filter HFL, the dust in the air is removed, it is possible to suppress a reduction in the service life of the backlight 12.

In FIG. 6, the cooling fins on the back of the liquid crystal display device 1A does not arranged, also, partition wall PW1 in the apparatus box 2 as the back air passage AC2 no air flows directly from the opening OP1 while indicating provided configuration may be a structure without the partition wall PW1, it may be disposed cooling fins on the rear surface of the liquid crystal display device 1A.

<A-7. Modification 4>

In the first and third modifications of embodiments described above, provided the air inlet to the projecting portion 221 of the apparatus box 2 has shown the configuration in which the air outlet on the bottom of the apparatus box 2, the air inlet the arrangement position is not limited to this, the side surface of the apparatus box 2 may be provided on the back or bottom surface.

Such configuration, the display device 100E or outdoor 7 is conceivable construction, such as outdoor display apparatus 100F shown in FIG. In FIG. 7 and 8, in the same reference numerals are assigned to the same configuration as outdoor display device 100 shown FIG. 1, redundant description will be omitted.

In outdoor display device 100E shown in FIG. 7, the opening OP3 (first opening) is provided than in the central portion of the bottom surface of the apparatus box 2 with the front air duct AC1 closer, the rear air passage AC2 closer opening OP4 (second opening) is provided at the position. Further, between the opening OP3 and OP4, extends vertically upward from the bottom of the unit box 2, partition walls PW2 reaching the bottom surface of the liquid crystal display device 1 is provided. Then, the fan F1 is arranged in the vicinity of the lower opening in the front air duct AC1.

Fan F1 is rotated so as to feed the air from the lower side to the front air passage AC1, the air sent, is discharged from the upper opening in the front air duct AC1, openings OP4 through the rear air passage AC2 it is discharged from.

Although new air through the opening OP3 by rotation of the fan F1 flows, the external air is not supplied to the rear air path AC2 directly by the presence of the partition walls PW2, first, fed to the front air duct AC1, LCD it will cool the front of the panel 13.

By adopting such a configuration, since new external air first cools only the front surface of the liquid crystal panel 13, it is possible to increase the front cooling efficiency of the LCD panel 13.

Further, the opening OP3 is an air intake port formed in a bottom of the unit box 2 in the configuration, increasing the degree of freedom of the installation position of the air intake, there is an advantage that change in the device design is facilitated.

In outdoor display apparatus 100F shown in FIG. 8 has a rear projecting portion 223 which top box back 24 is opposite side protrudes like eaves to the window side 21 of the apparatus box 2, the lower surface of the protrusion 221 opening OP5 (first opening portion) is provided. Thus, the openings OP5 is in a normal state are configured to be prevented from rainwater from entering. Then, the fan F1 is arranged in the vicinity of the lower opening in the front air duct AC1.

Fan F1 is rotated so as to feed the air from the lower side to the front air passage AC1, the air sent, is discharged from the upper opening in the front air duct AC1, and the new air entering from the opening OP5 it is cooled mixed is fed into the front air duct AC1 again by the fan F1 through the rear air passage AC2.

Thus, the openings OP5 comprising an air inlet, because the window side 21 of the apparatus box 2 by providing the opposite side of the box back 24, it is easy to change the design of the window side 21 of the apparatus box 2 there is an advantage.

Incidentally, with the configuration including a front air duct and rear air path, shown in the first and fourth modifications of embodiments, the air inlet, air outlet, and in combinations other than placement of the fan, a liquid crystal display device it is needless to say that performs the cooling efficiently possible.

<B. Embodiment 2>

<B-1. Device Configuration>

As a second embodiment according to the present invention will be described with reference to FIG. 9 the structure of the outdoor display apparatus 200 using the liquid crystal display device. In FIG. 9, in the same reference numerals are assigned to the same configuration as outdoor display device 100 shown FIG. 1, redundant description will be omitted.

In outdoor display device of Embodiment 1 and its modifications of the present invention described with reference to FIGS. 1 to 8, illustrating a configuration in which the perspective of cooling a liquid crystal panel in order to suppress the temperature rise but it was to keep the operating temperature of the liquid crystal panel properly, and if

standing on the viewpoint of reducing the power consumption, as well as cooling, there is a case where heating is also required.

In outdoor display device 200 shown in FIG. 9, the liquid crystal panel front preheating heaters H1 is disposed in the vicinity of the upper opening in the front air duct AC1, the rear surface of the liquid crystal display device 1, a casing preheating heaters H2 is disposed. Then, the temperature sensor TS (temperature measuring means) is attached to the rear surface of the liquid crystal panel 13. The liquid crystal panel front preheating heaters H1 may be a configuration that extends long along the upper side of the opening in the front air duct AC1, it may be configured to dispose a plurality parallel along the opening but, airflow is configured so as to pass through without being attenuated speed.

Further, in the vicinity of the lower opening in the front air duct AC1 fan F71 is provided, in the vicinity of the opening OP2 of the bottom of the unit box 2 fan F72 is arranged.

The liquid crystal panel front preheating heaters H1, casing preheating heater H2, the temperature sensor TS, a fan F71 and F72 are controlled by the liquid crystal panel temperature control board TC. A liquid crystal panel temperature control board TC, a connection relationship between the controlled device shown in FIG. 10.

<B-2. Temperature control operation>

Next, referring to FIG. 9, a description is given of a temperature control operation of the liquid crystal display device 1 in an outdoor display apparatus 200 with reference to FIGS. 11 to 13.

When information regarding the temperature of the liquid crystal panel 13 as measured using a temperature sensor TS which is attached to the rear surface of the liquid crystal panel 13 is applied to the liquid crystal panel temperature control board TC, the liquid crystal panel temperature control board TC will preset temperature controlling the fan F71, F72 and the heater H1, H2 as

Fan F71, upon cooling of the liquid crystal panel 13, because it is used to make the air flow from bottom to top, not the liquid crystal panel front preheating heater H1 is in the way of the air flow at the time of cooling, the liquid crystal panel front preheating heaters H1 cooling efficiency does not decrease be provided. Also, the fan F72 operates when using the front preheating heaters H1, rotated to make the air flow from top to bottom at the time of heating of the liquid crystal panel 13.

<B-2-1. Temperature control by ON / OFF control of the fan>

First, a description will be given of a temperature control by ON / OFF control of the fan.

Figure 11 is a characteristic diagram showing the temperature change in the case of controlling the panel temperature by ON / OFF control of the fan F71.

In Figure 11, the horizontal axis represents time, the vertical axis represents the temperature, and represents ON fan F71, and OFF period, a change in temperature (panel temperature) of the liquid crystal panel 13 in each period. Also, represents the liquid crystal panel operable temperature limit TL, the temperature control set lower limit T0, the temperature control set upper limit T1, the liquid crystal panel operable temperature limit TH.

When you start the liquid crystal display device 1, the panel temperature begins to rise by heat input from a backlight 12. At this stage fan F71 are OFF.

Panel temperature detected by the temperature sensor TS, the temperature information is given to the liquid crystal panel temperature control board TC.

In the liquid crystal panel temperature control board TC, it reaches the temperature T1 panel temperature predetermined cause on the fan F71 (ON).

Start panel temperature is lowered by the operation of the fan F71, it stops the fan F71 drops to temperature T0. If you stop the fan F71, since it begins to rise again panel temperature after reaching the temperature T1 operates the fan F71.

Thus, ON fan F71, by repeating the OFF, it can be kept in a temperature controlled area set the temperature change of the liquid crystal panel 13 in advance (T0 to T1).

Incidentally, the above description when turning ON / OFF control of one fan F71, or it corresponds to a case of simultaneously ON / OFF control of the plurality of fan F71, when using multiple fan F71, each fan F71, by setting the different temperatures ON / OFF conditions, temperature change, thereby enabling more gentle temperature control.

For example, a plurality of fan F71, first, classified into three second and third depending on the operating conditions, the panel temperature starts to rise, at the stage of reaching a temperature T0, first, the first classification to operate the fan F71. Although not reach the point just fan F71 of the first classification lowering the panel temperature, it is possible to increase speed suppressed. When the temperature further reaches between the temperature T0 and T1 rises operates the fan F71 of the second classification. The operation of the fan F71 of the second classification, the temperature rising speed is further suppressed. Then, at the stage of reaching a temperature T1, to operate the fan F71 of the third category.

Although the panel temperature by operation of the third class of the fan F71 starts to decrease, in turn, when it reaches between the temperature T0 and T1 is a fan F71 of the third classification stops, reach the temperature T0 to at stages stops the first and third classification fan F71.

Note that the classification of the plurality of fan F71 is not limited to three, also, ON / OFF condition is also not limited to the above.

Further, to perform stepwise control described above, than configuration in which a plurality of fan F71 is fed directly to the air in front air path AC1, the air reservoir arranged in front of the front air duct AC1, firstly, there a plurality of fans F71 it is desirable to adopt a configuration sending air. By adopting such a configuration, even when sending air from one fan F71, it can be fed evenly air through the front air duct AC1.

<B-2-2. Temperature control by the inverter control of the fan>

Next, a description is given of a temperature control by the inverter control of the fan.

Figure 12 is a characteristic diagram showing the temperature change in the case of controlling the panel temperature by the inverter control of the fan F71.

In Figure 12, has also shown a frequency variation of an inverter used for rotation control of the fan panel temperature change, it represents the frequency of the temperature and the inverter and the vertical axis. Note that the definition of each temperature is the same as FIG. 11.

Began panel temperature rises activates the liquid crystal display device 1 reaches the temperature T0 panel temperature predetermined but starting the fan F71, a frequency control inverter at that time is low, the rotational speed of the fan F71 also low.

Frequency control inverter increases with increasing panel temperature, the cooling efficiency is increased also high rotation speed of the fan F71. Then, also constant frequency control inverter panel temperature becomes constant.

Thus, the rotational speed of the fan F71 By controlling the inverter, a change in the panel temperature can be gently controlled, also, it is possible to maintain a state of maintaining the panel temperature constant.

<B-2-3. Temperature control using a heater>

Next, a description will be given of a temperature control using a heater.

in a state where the outdoors does not use a liquid crystal display device 1, the temperature of the liquid crystal panel 13 is the same extent as outdoor temperature, in cold regions, may be lower than the operable temperature limit.

That case, alone heat input temperature of the liquid crystal panel 13 from the backlight 12, but closer to the temperature control set lower limit T0 by multiplying the time, to use the front of the panel preheating heaters H1 and housing preheating heater H2 in, it can be panel temperature shortens the time to reach the temperature control region defined as the region between the temperature control set lower limit T0 and the temperature control set upper limit T1.

Figure 13 is a characteristic diagram showing the temperature change in the case of controlling the panel temperature using a panel front preheating heater H1.

In Figure 13, the horizontal axis represents time, the vertical axis represents the temperature, ON of the front panel preheating heater H1, and the OFF period, the change in temperature (panel temperature) of the liquid crystal panel 13 in each period it is expressed as a characteristic of the "Yes heater". Also, it indicates a change in panel temperature when not using the front panel surface preheating heaters H1 as a characteristic of the "no heater". Note that the definition of each temperature is the same as FIG. 11.

As shown in FIG. 13, in a state not using the liquid crystal display device 1, but the panel temperature is in a lower state than an operable temperature limit TL, entering from the backlight 12 of the start of the liquid crystal display device 1 panel temperature by the heat begins to rise.

Here, paying attention to the characteristics of the "no heater" is the time t1 of the panel temperature reaches a temperature T0. On the other hand, after the activation of the liquid crystal display device 1, ON Then the panel front preheating heaters H1, as represented in the characteristics of the "Yes heater", increases the rate of increase in panel temperature, the temperature in a shorter time t0 than the time t1 to reach the T0.

After reaching the temperature T0 the temperature rise is followed by only heat input from the backlight 12, the panel front preheating heaters H1 to stop (OFF).

Thus, the panel temperature by using a panel front preheating heater H1 is able to shorten the time to reach the temperature control region, that the panel temperature enters the temperature control area in a short time, the liquid crystal panel operating temperature is maintained properly, operation of the liquid crystal panel 13 can shorten the time to stabilize.

Although in the above description has described the case of using only the front of the panel preheating heaters H1, casing preheating heater H2 also be used in combination, the panel temperature can be further shorten the time before the temperature control region.

Further, the panel temperature After reaching the temperature control region, since the stop panel front preheating heaters H1 and / or the housing preheating heater H2, power consumption can be reduced.

in the above description, alone heat input from the backlight 12 has been described as the panel temperature by applying a time enters the temperature control area, only heat input from the backlight 12 reaches a temperature control region Otherwise, it is considered that the outdoor temperature is very low, if so, even after allowed to reach a temperature control area using the heaters H1 and / or the housing preheating heater H2 panel front preheating, the heater without stopping, the panel temperature can be coped with by adjusting the power of the heater to be constant in a temperature control region.

As described above, by monitoring the panel temperature, fan F71, F 72 based on the panel temperature, the panel by appropriately controlling the operation of the front preheating heaters H1 and housing preheating heaters H2, the panel temperature efficiently it can be controlled, and the like keep the panel temperature constant, it is possible to stabilize a display function, also can reduce power consumption by eliminating unnecessary cooling or heating.

<B-3. Condensation prevention measures>

From cold environments, moving a outdoor display devices, such as indoors, under certain conditions cause condensation on the inner surface of the front or the transparent plate 23, the liquid crystal panel 13, the visibility of the image may be reduced

Therefore, as shown in FIG. 14, by performing a surface treatment on the front of the inner and outer surfaces and the liquid crystal panel 13 of the transparent plate 23, taking thereby suppressing the deterioration of visibility due to condensation.

Shows an excerpt only transparent plate 23 and the liquid crystal display device 1 in FIG. 14, the outer surface coating Z31 on the outer surface of the transparent plate 23, the inner surface coating Z32 is disposed on the inner surface of the transparent plate 23, LCD panel front coating 131 is disposed on the front surface of the liquid crystal panel 13.

The inner surface coating Z32 and the liquid crystal panel front coating 131, is used photocatalytic film and the photocatalyst sheet such as titanium oxide film, it is possible to suppress a decrease in visibility due to condensation by the photocatalytic reaction.

Outer surface of the transparent plate 23, since the diffused reflection minor scratches on the surface in some cases reducing the visibility, as the outer surface coating Z31, or attached high transparent protective sheet hardness, the protective film is applied, visibility reduction due to a scratch may be to suppress by replacing as necessary. Of course, it may also be used photocatalytic film and the photocatalyst sheet, in which case it is possible to suppress a decrease in visibility due to deposition of rain water.

The outdoor display apparatus according to the present invention in the above description has been made assuming that used outdoors, may be used indoors, also in this case, cooling, dust-proof, anti-glare, and the like damage prevention it goes without saying that the same effect.

Note that, standing on the viewpoint of used indoors, it is not necessary to provide the eaves-like projecting portions 221 on the upper side of the transparent plate 23, also when used outdoors, so the visibility somewhat better at the expense well without providing the protrusion 221, if the window side 21 may have a flat structure. In that case, the arrangement position and the vent hole so as rain water or dust from the air vents are not easily penetrate, it may be devised shape.

Further, although the above description has been described on the assumption the use of a liquid crystal display device, since even in the case of using a plasma display device is a possibility of temperature rise of the display surface, even when using a plasma display device the present invention is effective.

It is a cross-sectional view illustrating the configuration of a first embodiment of the outdoor display apparatus according to the present invention. It is a temperature characteristic diagram for explaining the operation of the first embodiment of the outdoor display apparatus according to the present invention. It is a cross-sectional view illustrating a configuration of a first modification of the first embodiment of the outdoor display apparatus according to the present invention. It is a cross-sectional view illustrating a configuration of a second modification of the first embodiment of the outdoor display apparatus according to the present invention. It is a cross-sectional view illustrating a configuration of a third modification of the first embodiment of the outdoor display apparatus according to the present invention. It is a cross-sectional view illustrating a structure of a fourth modification of the first embodiment of the outdoor display apparatus according to the present invention. It is a cross-sectional view illustrating a structure of a fourth modification of the first embodiment of the outdoor display apparatus according to the present invention. It is a cross-sectional view illustrating the configuration of a second embodiment of the outdoor display apparatus according to the present invention. It is a diagram for explaining a control

1/24/2018

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relationship of exemplary embodiment 2 configuration of outdoor display apparatus according to the present invention. It is a characteristic diagram showing the temperature change in the case of controlling the panel temperature by ON / OFF control of the fan. It is a characteristic diagram showing the temperature change in the case of controlling the panel temperature by the inverter control of the fan. It is a characteristic diagram showing the temperature change in the case of controlling the panel temperature by heating. It is a cross-sectional view illustrating a configuration in which a surface treatment on the front of the inner and outer surfaces and the liquid crystal panel of the transparent plate.

DESCRIPTION OF SYMBOLS

1 liquid crystal display device, 2 second device box, 11 housing, 12 backlight, 13 liquid crystal panel, 23 a transparent plate, 221 protrusions 223 back protrusion, AC1 front air duct, AC2 rear air path, OP1, OP2, OP3, OP4, OP5 opening, F1, F11, F12, F21, F31, F41, F42, F71, F72 fan, H1 front panel preheating heater, H2 housing preheating heater, TS temperature sensor.

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KR100953215B1 *	2008-05-07	2010-04-15	(주)삼진테크	Outdoor display enclosure
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8/10

CIVIQ0002655

SEC et al. v. MRI
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 IPR2023-00254

1/24/2018

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Family To Family Citations

* Cited by examiner, † Cited by third party, ‡ Family to family citation

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Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
JP200404357682A	2004-12-10	2004-12-10	Outdoor display device

Applications Claiming Priority (1)

Application	Filing date	Title
JP200404357682A	2004-12-10	Outdoor display device

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9/10

CIVIQ0002656

SEC et al. v. MRI
 SEC Exhibit 1031.0366
 IPR2023-00254

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最終頁に続く				

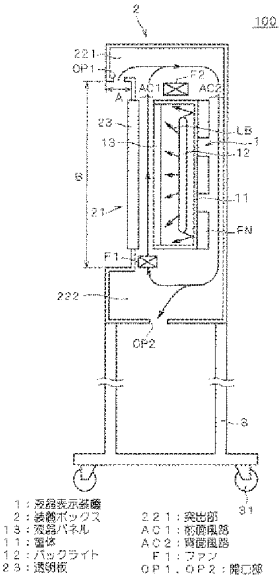
(54) 【発明の名称】 屋外用表示装置

(57) 【要約】

【課題】フラットパネル型表示装置から発生する熱を効率的に放散させることが可能な表示装置を提供する。

【解決手段】装置ボックス2内において、液晶表示装置1の液晶パネル13と、透明板23とが密着せず、両者の間に間隙（前面風路AC1）が存在するように液晶表示装置1が配設されている。また、液晶表示装置1の液晶パネル13とは反対側の背面と、それに対面する装置ボックス2の壁面との間にも間隙（背面風路AC2）が存在するように液晶表示装置1が配設されており、前面風路AC1の下側の開口部の近傍には前面風路AC1内に気流を発生させる手段であるファンF1が配設され、前面風路AC1内に下側から空気を送り込む構成となっている。

【選択図】 図1



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【特許請求の範囲】

【請求項1】

フラットパネル型表示装置を用いた屋外用表示装置であって、
前記フラットパネル型表示装置は装置ボックス内に収納され、
前記装置ボックスは、
前記フラットパネル型表示装置の表示パネルと対面する壁面にはめ込まれた透明板と、
少なくとも前記透明板と前記表示パネルとの間に設けられた間隙である前面風路に気流を発生させる気流発生手段と、を備える、屋外用表示装置。

【請求項2】

前記装置ボックスは、
前記透明板がはめ込まれた側の側面の前記透明板の上部側に庇状の突出部を有する、請求項1記載の屋外用表示装置。

【請求項3】

前記装置ボックスは、
前記透明板がはめ込まれた側の側面が、前記透明板の周囲が外側に突出して全体的に凹形状をなす、請求項2記載の屋外用表示装置。

【請求項4】

前記装置ボックスは、
前記突出部の下面に設けられた第1の開口部と、
前記装置ボックスの底面に設けられた第2の開口部と、
前記フラットパネル型表示装置の前記表示パネルが設けられた側とは反対側の背面と、
それに対面する前記装置ボックスの壁面との間に設けられた間隙である背面風路と、をさらに備える、請求項2記載の屋外用表示装置。

【請求項5】

前記気流発生手段は、
前記前面風路の下側の開口部の近傍に配設され、前記前面風路内に下側から空気を送り込むことで上昇気流を発生させるファンを含む、請求項4記載の屋外用表示装置。

【請求項6】

前記気流発生手段は、
前記前面風路の上側の開口部の近傍に配設され、前記前面風路内に上側から空気を送り込むことで下降気流を発生させる第1のファンと、
前記背面風路の上側の開口部の近傍に配設され、前記背面風路内に上側から空気を送り込むことで下降気流を発生させる第2のファンとを含む、請求項4記載の屋外用表示装置。

【請求項7】

前記気流発生手段は、
前記第2の開口部の近傍に配設され、前記第2の開口部から前記装置ボックス外部に空気を強制的に排出することで、前記前面風路内および前記背面風路内に下降気流を発生させるファンを含む、請求項4記載の屋外用表示装置。

【請求項8】

前記気流発生手段は、
前記第1の開口部の近傍に配設され、前記第1の開口部から前記装置ボックス内に空気を強制的に取り込むことで、前記前面風路内および前記背面風路内に下降気流を発生させるファンを含む、請求項4記載の屋外用表示装置。

【請求項9】

前記気流発生手段は、
前記前面風路の下側の開口部の近傍に配設され、前記前面風路内の空気を前記下側の開口部から強制的に排出することで前記前面風路内に下降気流を発生させるファンを含む、請求項4記載の屋外用表示装置。

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【請求項10】

前記装置ボックスは、
前記フラットパネル型表示装置の前記表示パネルが設けられた側とは反対側の背面と、
それに対面する前記装置ボックスの壁面との間に設けられた間隙である背面風路と、
前記装置ボックスの底面の中央部よりも前記前面風路寄りの位置に設けられた第1の開口部と、
前記背面風路寄りの位置に設けられた第2の開口部と、
前記第1および第2の開口部との間の前記底面から垂直上方に延在し、前記フラットパネル型表示装置の底面に達する隔壁と、をさらに備え、
前記気流発生手段は、
前記前面風路の下側の開口部の近傍に配設され、前記前面風路内に下側から空気を送り込むことで上昇気流を発生させるファンを含む、請求項1記載の屋外用表示装置。

【請求項11】

前記装置ボックスは、
前記突出部が設けられた側とは反対側の側面の、前記突出部と対応する位置において外側に突出する庇状の背面突出部と、
前記背面突出部の下面に設けられた第1の開口部と、
前記装置ボックスの底面に設けられた第2の開口部と、をさらに備え、
前記気流発生手段は、
前記前面風路の下側の開口部の近傍に配設され、前記前面風路内に下側から空気を送り込むことで上昇気流を発生させるファンを含む、請求項2記載の屋外用表示装置。

【請求項12】

前記フラットパネル型表示装置は液晶表示装置を含み、
前記液晶表示装置は、
前記表示パネルに相当する液晶パネルと、
前記液晶パネルの裏面に対向して設置されたバックライトと、
前記バックライトを収納する筐体とを有する、請求項1記載の屋外用表示装置。

【請求項13】

前記装置ボックスは、前記液晶表示装置の前記液晶パネルを加熱するパネル前面予熱用ヒータと、
前記液晶パネルの温度を測定する温度測定手段と、をさらに備え、
前記温度測定手段での測定結果に基づいて、前記気流発生手段および前記パネル前面予熱用ヒータを制御して、前記液晶パネルの温度を制御する、請求項12記載の屋外用表示装置。

【請求項14】

前記パネル前面予熱用ヒータは、
前記前面風路の上側の開口部の近傍に配設され、
前記気流発生手段は、前記前面風路を挟んで前記パネル前面予熱用ヒータとは反対側に配設され、前記前面風路内の空気を前記前面風路の下側の開口部から排出することで前記前面風路内に下降気流を発生させるファンを含む、請求項13記載の屋外用表示装置。

【請求項15】

前記装置ボックスは、
前記液晶表示装置の前記筐体を加熱する筐体予熱用ヒータをさらに備える、請求項13記載の屋外用表示装置。

【請求項16】

前記表示パネルの前面および前記透明板の前記表示パネルと対面する面に配設した光触媒薄膜をさらに備える、請求項1記載の屋外用表示装置。

【発明の詳細な説明】

【技術分野】

【0001】

本発明は表示装置に関し、特に表示部にフラットパネル型表示装置を用いた屋外用表示

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装置に関する。

【背景技術】

【0002】

従来の広告媒体としては、ポスターやステッカーなどの印刷物が挙げられるが、それ自体は表示内容が変化しないので必ずしも人目を引くものではなかった。また、電球や発光ダイオードなどの発光素子を点灯または点滅させて人目を引く方法もあるが、消費電力が大きいという問題がある。

【0003】

そこで考案されたものが、広告媒体として液晶表示装置を使用する方法である。液晶表示装置であれば表示内容を任意に変更でき、人目を引くという要求に応えることができる。

【0004】

その一例として、特許文献1に開示される液晶広告媒体が挙げられる。

特許文献1では、スタティック駆動により中間色を表示しないON/OFF駆動により制御したプラスチック液晶表示パネルと、印刷により描いた図柄層とを組み合わせることでポップアップ表示を可能とした液晶広告媒体が提案されている。

【0005】

【特許文献1】特開平8-15665号公報（図1）

【発明の開示】

【発明が解決しようとする課題】

【0006】

従来の液晶広告媒体は以上のように構成されているので、装置を屋外の路上等に設置した場合、液晶面を通行人などに触られ、液晶パネルが破損する可能性があり、液晶パネルに直接触れられないように、液晶パネル前面に透明な板を設置すると、透明な板により液晶パネル前面からの放熱が抑制され、液晶パネルの温度が上昇して正常に機能なくなるという問題があった。

【0007】

また、屋外で使用するためには、液晶表示装置を何らかの筐体で囲って、雨水や塵埃が液晶表示装置に直接に及ばないようにする必要があるが、その場合、液晶表示装置から発する熱を効率的に放散させることが難しいという問題があった。

【0008】

そして、このような問題は液晶表示装置に限らず、プラズマ表示装置などのいわゆるフラットパネル型表示装置を屋外用表示装置に使用する場合に共通する問題であった。

【0009】

本発明は上記のような問題点を解消するためになされたもので、フラットパネル型表示装置から発生する熱を効率的に放散させることが可能な表示装置を提供することを目的とする。

【課題を解決するための手段】

【0010】

本発明に係る請求項1記載の屋外用表示装置は、フラットパネル型表示装置を用いた屋外用表示装置であって、前記フラットパネル型表示装置は装置ボックス内に収納され、前記装置ボックスは、前記フラットパネル型表示装置の表示パネルと対面する壁面にはめ込まれた透明板と、少なくとも前記透明板と前記表示パネルとの間に設けられた間隙である前面風路に気流を発生させる気流発生手段とを備えている。

【発明の効果】

【0011】

本発明に係る請求項1記載の屋外用表示装置によれば、気流発生手段により透明板と表示パネルとの間に設けられた間隙である前面風路に気流を発生させるので、気流により表示パネルが冷却されて表示パネルの温度上昇を大幅に抑制できる。

【発明を実施するための最良の形態】

CIVIQ0002632

【0012】

＜A. 実施の形態1＞

＜A-1. 装置構成＞

本発明に係る実施の形態1として、液晶表示装置を使用する屋外用表示装置100の構成を図1を用いて説明する。

【0013】

図1に示すように、屋外用表示装置100は、液晶表示装置1と、それを収納する装置ボックス2と、装置ボックス2を支える脚部3とに大別される。

【0014】

なお、図1においては脚部3がキャスター31などの移動手段を備え、屋外用表示装置100の水平移動が容易な構成としたが、移動手段は必須のものではない。

【0015】

液晶表示装置1は、液晶パネル13（表示パネル）と、そのバックライト（例えば蛍光灯）12と、バックライト12を収納するとともに、液晶パネル13の駆動回路等を収納する筐体11とを備え、バックライト12から発する光LBが液晶パネル13を部分的に透過あるいは遮られることで、液晶パネル13に所望の画像が表示される。なお、以下の説明においては液晶パネル13に表示される画像の下方向を下側、画像の上方向を上側として扱う。

【0016】

液晶パネル13の縦横の長さの比率は、いわゆるテレビ受像機に使用される縦横比率に限定されるものではなく、例えばパーソナルコンピュータのディスプレイの縦横比率や、あるいは正方形であっても良い。また、縦長の形状でも良い。

【0017】

そして、装置ボックス2の液晶パネル13と対面する壁面には、例えばポリカーボネートの透明板23がはめ込まれ、液晶パネル13に表示される画像は、透明板23を通して外部から視認することができる。透明板23の平面的な大きさは液晶パネル13と同程度であることは言うまでもない。なお、透明板23が設けられた側の側面を窓側面21と呼称する。なお、簡単な試験を行った結果、ポリカーボネート板の板厚としては、3mm以上10mm以下が、視認性、耐衝撃性の観点から望ましいことが判った。

【0018】

ここで、ポリカーボネート板を使用するのは、透明性もさることながら、液晶パネル13の保護のための耐衝撃性と、液晶パネル13の劣化防止のための紫外線遮蔽能力において高い能力を有しているためである。従って、同等の性能を有する材質であればポリカーボネート板に限定されるものではなく、また、ポリカーボネート板と同等の耐衝撃性を有する透明な材料に、紫外線遮蔽膜を貼付した構成を採用しても良い。なお、ポリカーボネート板に代わる材料としては、例えばアクリル板を使用することが考えられ、紫外線遮蔽膜としては市販されているものを使用すれば良い。

【0019】

装置ボックス2は、液晶表示装置1を取り囲み、液晶表示装置1が雨水や塵埃に直接曝されることを防止する構成となっている。しかし、液晶表示装置1が装置ボックス2内に完全に密閉されると、液晶表示装置1から発する熱が装置ボックス2内にこもるので、通風口を設けることになる。図1の例では、通風口として、開口部OP1（第1の開口部）およびOP2（第2の開口部）を設けている。

【0020】

ここで、装置ボックス2内においては、液晶表示装置1の液晶パネル13と、透明板23とが密着せず、両者の間に間隙が存在するように液晶表示装置1が配設されており、当該間隙を前面風路AC1と呼称する。

【0021】

また、液晶表示装置1の液晶パネル13とは反対側の側面（背面）と、それに対面する装置ボックス2の壁面との間にも間隙が存在するように液晶表示装置1が配設されており

、当該間隙を背面風路AC2と呼称する。なお、液晶表示装置1の背面には空冷フィンFNが配設されている。空冷フィンFNは、図1に示すように液晶表示装置1の背面に複数個配設しても良いが、背面と同等の面積のものを1個だけ配設するようにしても良い。

【0022】

前面風路AC1の下側の開口部の近傍には前面風路AC1内に気流を発生させる手段であるファンF1が配設され、前面風路AC1内に下側から空気を送り込む構成となっている。なお、ファンF1は1つに限定されるものではなく、前面風路AC1の下側の開口部に沿って複数個並列に配設しても良い。また、液晶表示装置1の上方にはファンF2が配設され、開口部OP1からの空気の流入を促進する構成となっている。なお、ファンF2は1つに限定されるものではなく、液晶表示装置1の水平延在方向に沿って複数個並列に配設しても良い。また、ファンF2を有さずとも開口部OP1からの空気の流入が充分得られる場合にはファンF2を配設せずとも良い。

【0023】

ここで、装置ボックス2の窓側面21は、透明板23の周囲が外側に突出し、全体的に凹形状となっており、開口部OP1は、透明板23の上部側にある庇状の突出部221の下面に設けられているので、通常の状態では雨水等が侵入することが防止される構成となっている。また、開口部OP2は装置ボックス2の底面部に設けられており、開口部OP1と同様に、通常の状態では雨水等が侵入することが防止される構成となっている。

【0024】

ここで、突出部221は、液晶パネル13に日光が差し込み、視認性を低下させるのを防止するための庇としての機能も備えている。庇の長さに関して視認性の確認試験を実施した結果、突出部221の突出長さをAとし、突出部221と透明板23の下部側の突出部222との間の長さをBとした場合、 $A:B=1:3\sim 1:5$ の範囲に設定することで、ほとんどの条件で視認性を確保できることが判明した。

【0025】

なお、以上の説明では、装置ボックス2の窓側面21の透明板23の周囲が外側に突出し、全体的に凹形状となっているものとして説明したが、突出部221に相当する庇状の突出部のみを透明板23の上側に設ける構成としても良い。この場合も上記と同様の効果を得られることは言うまでもない。

【0026】

< A-2. 冷却動作 >

次に、図1を参照しつつ、図2を用いて屋外用表示装置100における液晶表示装置1の冷却動作について説明する。

図1に示すように、バックライト12（複数の場合もある）から出た光LBは、直接、もしくは、筐体11の内側に設けられた鏡（図示せず）、もしくは乱反射板（図示せず）によって反射され、液晶パネル13に照射される。照射された光LBは、液晶パネル13を部分的に透過あるいは遮られることで画像を形成する。

【0027】

このように、液晶パネル13の裏面に対向するようにバックライト12を配設し、鏡や乱反射板で光を反射させる構成を採ることで、液晶パネル13の表示画像を明るくすることができ、屋外での表示に適した表示装置が得られる。

【0028】

液晶パネル13は、バックライト12（例えば蛍光灯）が発する熱によって加熱される。通常の液晶ディスプレイでは、液晶パネルへの入熱を液晶パネルの熱伝導により筐体に逃がし、液晶パネルの過熱を抑制している。しかし、屋外用表示装置100では、明るい屋外での使用に供するので、表示の視認性を上げるために蛍光灯の輝度を上げることになるが、その場合、蛍光灯からの入熱が増え、液晶パネル13の動作可能温度を超えてしまう可能性がある。

【0029】

そこで、液晶パネル13と透明板23との間に間隙を設けて前面風路AC1とし、ファ

ンF 1によって前面風路AC 1に空気を送り込むことで液晶パネル1 3の前面を冷却する構成を採っている。

【0030】

ファンF 1は、前面風路AC 1内に下側から空気を送り込むように回転し、送り込まれた空気は上昇気流となって前面風路AC 1の上側の開口部から排出され、開口部OP 1から流入する新たな空気と混じって冷却され、背面風路AC 2を通して再びファンF 1によって前面風路AC 1に送り込まれる。図1には空気の流れを矢印によって示している。

【0031】

このように、装置ボックス2内では空気の循環経路が形成されるが、開口部OP 1からの流入分に相当する空気が開口部OP 2から外部に排出され、装置ボックス2内の気圧が過剰に高まることが防止される。従って、開口部OP 1は空気取り入れ口となり、開口部OP 2は空気排出口となる。

【0032】

なお、背面風路AC 2にも気流が生じるので、液晶表示装置1の背面に設けられた空冷フィンFNの冷却能力が高まり、筐体1 1も効率的に冷却することができる。筐体1 1が効率的に冷却されれば、液晶パネル1 3の裏面（バックライト1 2側の面）で発生した熱が筐体1 1に流れやすくなり、液晶パネル1 3の温度上昇の抑制につながる。

【0033】

< A-3. 効果 >

以上説明した構成を採ることで、以下に説明するように液晶パネル1 3の温度上昇を大幅に抑制できる。

【0034】

図2は液晶パネル1 3の表面の温度上昇特性を示す図であり、横軸に測定ステップ（一定時間間隔）を、縦軸に温度（℃）を表し、液晶パネル1 3の前面を冷却した場合のパネル表面での温度上昇特性をC 1、前面を冷却しない場合のパネル表面での温度上昇特性をC 2とし、また、装置ボックス2内での温度特性をC 0として表している。

【0035】

図2に示されるように、冷却を行わない場合は液晶パネル1 3の温度（パネル温度）が最大で6 5℃程度となり、冷却を行った場合には、最大でも5 5℃程度に抑えられる。従って、前面風路AC 1を設けてパネル前面を冷却することで、パネル温度を1 0℃以上低くできることが判る。

【0036】

なお、屋外用表示装置1 0 0では、ファンF 1を前面風路AC 1の下側の開口部の近傍に設けているので、液晶パネル1 3前面の冷却効率が高く、風速を調整することで冷却能力をセンシティブに調整することができる。

【0037】

ここで、液晶パネル1 3の裏面に風を吹き付けたり、バックライト1 2に風を吹き付けるなどの直接空冷を採用しないのは、直接空冷を行うとバックライト1 2などに誘起される静電気により、空気中の塵埃が蛍光灯に吸着しやすくなり、バックライト1 2の照度を短時間で低下させてバックライト1 2の寿命が短くなるためである。このため、バックライト1 2や液晶パネル1 3の駆動回路等の電子機器を筐体1 1内に収納し、筐体1 1には隙間がないようにパッキンや充填材などで密閉することが望ましい。

【0038】

また、屋外用表示装置1 0 0の転倒などによる衝撃を緩和するため、液晶表示装置1の筐体1 1と装置ボックス2の内壁との間に緩衝材を挟み込んだ支持構造を採ることが望ましい。

【0039】

また、信頼性向上のため、空気取り入れ口にあたる開口部OP 1にはフィルタを設け、塵埃が装置内に侵入するのを防止する。この際、メンテナンス性を確保するため、装置ボックス2の上面や背面（窓側面2 1とは反対側の面）を取り外し可能な構造とし、フィル

タ清掃が容易な構造とすることが望ましい。

【0040】

また、透明板23と装置ボックス2との接続部分には、パッキン等の密閉部材を配設し、隙間からの雨水や塵埃の侵入を防止することは言うまでもない。

【0041】

＜A-4. 変形例1＞

図1に示した屋外用表示装置100では、ファンF1を前面風路AC1の下側の開口部の近傍に設けた構成を採っていたが、図3に示す屋外用表示装置100Aのような構成としても良い。なお、図3においては、図1に示した屋外用表示装置100と同一の構成については同一の符号を付し、重複する説明は省略する。

【0042】

図3に示すように、屋外用表示装置100Aにおいては、前面風路AC1の上側の開口部の近傍にファンF11（第1のファン）を配設し、背面風路AC2の上側の開口部の近傍にファンF12（第2のファン）を配設している。

【0043】

このように配設されたファンF11およびF12を使用することで、開口部OP1から流入する空気は、ファンF11によって前面風路AC1に送り込まれるとともに、ファンF12によって背面風路AC2にも送り込まれる。そして、送り込まれた空気は、下降気流となって前面風路AC1および背面風路AC2のそれぞれの下側の開口部から排出され、装置ボックス2の底面の開口部OP2から外部に排出される。

【0044】

ここで、ファンF11は主として液晶パネル13の前面を冷却するので液晶パネル冷却ファンと呼称することができ、ファンF12は筐体11を冷却するので筐体冷却ファンと呼称することができる。

【0045】

このように、ファンF11およびファンF12を備えることで、装置ボックス2内で空気を循環させず前面風路AC1および背面風路AC2にそれぞれ独立して空気を送り込むことができるので、液晶パネル13の前面および筐体11を、共に流速の速い外気で冷却でき、液晶パネル13の冷却効率をさらに高めることができる。

【0046】

＜A-5. 変形例2＞

以上説明した屋外用表示装置100Aにおいては、装置ボックス2内で空気を循環させることなく、前面風路AC1および背面風路AC2にそれぞれ独立して空気を送り込む構成としたが、これを実現するには、図4に示す屋外用表示装置100Bあるいは、図5に示す屋外用表示装置100Cのような構成としても良い。なお、図4および図5においては、図1に示した屋外用表示装置100と同一の構成については同一の符号を付し、重複する説明は省略する。

【0047】

図4に示す屋外用表示装置100Bにおいては、装置ボックス2の底面の開口部OP2の近傍に気流発生手段であるファンF21が配設され、装置ボックス2内の空気を開口部OP2から強制的に排出するようにファンF21を回転させることで、開口部OP1から流入する空気は、前面風路AC1および背面風路AC2を通るように分かれ、それぞれ下降気流となって前面風路AC1および背面風路AC2を通過した空気は、ファンF21によって外部に排出される。

【0048】

このような構成を採ることによっても、液晶パネル13の前面および筐体11を、共に外気で冷却でき、液晶パネル13の冷却効率を高めることができる。

【0049】

また、図5に示す屋外用表示装置100Cにおいては、装置ボックス2の突出部221に設けられた開口部OP1の近傍に気流発生手段であるファンF31が配設され、装置ボ

ックス2内に外気を強制的に取り込むようにファンF31を回転させることで、開口部OP1から流入する空気は、前面風路AC1および背面風路AC2を通るように分かれ、それぞれ下降気流となって前面風路AC1および背面風路AC2を通過した空気は、装置ボックス2の底面の開口部OP2から外部に排出される。

【0050】

このような構成を採ることによっても、液晶パネル13の前面および筐体11を、共に外気で冷却でき、液晶パネル13の冷却効率を高めることができる。

【0051】

< A-6. 変形例3 >

以上説明した実施の形態1および変形例1、2では、液晶パネル13の裏面の冷却は、液晶パネル13で発生する熱を筐体11に熱伝導させて、筐体11を空冷することにより冷却する間接冷却を使用していたが、図6に示す屋外用表示装置100Dのような構成としても良い。なお、図6においては、図1に示した屋外用表示装置100と同一の構成については同一の符号を付し、重複する説明は省略する。

【0052】

図6に示す屋外用表示装置100Dにおいては、液晶表示装置1Aが、その内部に冷却用の空気を送り込むための構成を有している。

【0053】

すなわち、液晶表示装置1Aの筐体11Aは、その上面に開口部OP11を有し、底面に開口部OP12を有している。そして、開口部OP11はHEPA (high efficiency particulate air) フィルタ等のμm単位の塵埃を除去可能な高性能なフィルタHFLで覆われ、開口部OP12の近傍にはファンF42が配設されている。そして、前面風路AC1の下側の開口部の近傍には気流発生手段としてファンF41が配設されている。

【0054】

ファンF41は、前面風路AC1内の空気を下側の開口部から強制的に排出するように回転し、排出された空気は、装置ボックス2の底面の開口部OP2から外部に排出されるが、ファンF41の回転によって開口部OP1から流入する新たな空気は、前面風路AC1内に流入するとともに、ファンF42の回転によってフィルタHFLを通して筐体11A内にも流入し、液晶パネル13の裏面およびバックライト12を直接に冷却する。そして、ファンF42によって筐体11A外に強制的に排出され、さらに開口部OP2から外部に排出される。

【0055】

このように、液晶パネル13の裏面およびバックライト12を直接に空冷する構成を採ることで、液晶パネル13の冷却効率をさらに高めることができる。

【0056】

なお、筐体11A内に導かれる空気は、高性能なフィルタHFLを通してあるので、空気中の塵埃が除去され、バックライト12の寿命の低下を抑制することができる。

【0057】

なお、図6においては、液晶表示装置1Aの背面には冷却フィンが配設せず、また、背面風路AC2には開口部OP1から直接空気が流入しないように装置ボックス2内に隔壁PW1が設けられた構成を示しているが、隔壁PW1を設けない構成であっても良いし、液晶表示装置1Aの背面に冷却フィンを配設していても良い。

【0058】

< A-7. 変形例4 >

以上説明した実施の形態1および変形例1～3では、空気取り入れ口を装置ボックス2の突出部221に設け、空気排出口を装置ボックス2の底面に設けた構成を示したが、空気取り入れ口の配設位置はこれに限定されるものではなく、装置ボックス2の側面、背面あるいは底面に設けても良い。

【0059】

このような構成としては、図7に示す屋外用表示装置100Eあるいは、図8に示す屋

屋外用表示装置100Fのような構成が考えられる。なお、図7および図8においては、図1に示した屋外用表示装置100と同一の構成については同一の符号を付し、重複する説明は省略する。

【0060】

図7に示す屋外用表示装置100Eにおいては、装置ボックス2の底面の中央部よりも前面風路AC1寄りの位置に開口部OP3（第1の開口部）が設けられ、背面風路AC2寄りの位置に開口部OP4（第2の開口部）が設けられている。そして、開口部OP3とOP4との間には、装置ボックス2の底面から垂直上方に延在し、液晶表示装置1の底面に達する隔壁PW2が設けられている。そして、前面風路AC1の下側の開口部の近傍にはファンF1が配設されている。

【0061】

ファンF1は、前面風路AC1内に下側から空気を送り込むように回転し、送り込まれた空気は、前面風路AC1の上側の開口部から排出され、背面風路AC2を通過して開口部OP4から排出される。

【0062】

ファンF1の回転によって開口部OP3から新しい外気が流入するが、当該外気は隔壁PW2の存在により直接に背面風路AC2に供給されることはなく、まず、前面風路AC1に送り込まれて、液晶パネル13の前面を冷却することになる。

【0063】

このような構成を採ることで、新しい外気はまず液晶パネル13の前面のみを冷却するので、液晶パネル13の前面の冷却効率を高めることができる。

【0064】

また、この構成では装置ボックス2の底面に設けた開口部OP3が空気取り入れ口となり、空気取り入れ口の配設位置の自由度が増え、装置デザインの変更が容易になるという利点がある。

【0065】

図8に示す屋外用表示装置100Fにおいては、装置ボックス2の窓側面21とは反対側面であるボックス背面24の上部が庇状に突出した背面突出部223を有し、突出部221の下面に開口部OP5（第1の開口部）が設けられている。従って、開口部OP5は、通常の状態では雨水等が侵入することが防止される構成となっている。そして、前面風路AC1の下側の開口部の近傍にはファンF1が配設されている。

【0066】

ファンF1は、前面風路AC1内に下側から空気を送り込むように回転し、送り込まれた空気は、前面風路AC1の上側の開口部から排出され、開口部OP5から流入する新たな空気と混じって冷却され、背面風路AC2を通過して再びファンF1によって前面風路AC1に送り込まれる。

【0067】

このように、空気取り入れ口となる開口部OP5を、装置ボックス2の窓側面21とは反対側のボックス背面24に設けることで、装置ボックス2の窓側面21のデザインの変更が容易になるという利点がある。

【0068】

なお、前面風路および背面風路を備える構成であれば、実施の形態1および変形例1～4で示した、空気取り入れ口、空気排出口、およびファンの配置の組み合わせ以外でも、液晶表示装置の冷却を効率的に行うことは可能であることは言うまでもない。

【0069】

< B. 実施の形態2 >

< B-1. 装置構成 >

本発明に係る実施の形態2として、液晶表示装置を使用する屋外用表示装置200の構成を図9を用いて説明する。なお、図9においては、図1に示した屋外用表示装置100と同一の構成については同一の符号を付し、重複する説明は省略する。

【0070】

図1～図8を用いて説明した本発明に係る実施の形態1およびその変形例の屋外用表示装置においては、温度上昇を抑制するために液晶パネルを冷却するという観点に立った構成を説明したが、液晶パネルの動作温度を適正に保ち、かつ電力消費を低減するという観点に立てば、冷却だけでなく、加熱も必要となる場合がある。

【0071】

図9に示す屋外用表示装置200においては、前面風路AC1の上側の開口部の近傍には液晶パネル前面予熱用ヒータH1が配設され、液晶表示装置1の背面には、筐体予熱用ヒータH2が配設されている。そして、液晶パネル13の裏面には温度センサTS（温度測定手段）が取り付けられている。なお、液晶パネル前面予熱用ヒータH1は、前面風路AC1の上側の開口部に沿って長く延在する構成でも良いし、当該開口部に沿って複数個並列に配設する構成でも良いが、気流が速度を減殺されることなく通過できるような構成とする。

【0072】

また、前面風路AC1の下側の開口部の近傍にはファンF71が配設され、装置ボックス2の底面の開口部OP2の近傍にはファンF72が配設されている。

【0073】

なお、液晶パネル前面予熱用ヒータH1、筐体予熱用ヒータH2、温度センサTS、ファンF71およびF72は液晶パネル温度制御基板TCによって制御される。液晶パネル温度制御基板TCと、被制御機器との接続関係を図10に示す。

【0074】

< B-2. 温度制御動作 >

次に、図9を参照しつつ、図11～図13を用いて屋外用表示装置200における液晶表示装置1の温度制御動作について説明する。

液晶パネル13の裏面に取り付けられた温度センサTSを用いて測定した液晶パネル13の温度に関する情報が液晶パネル温度制御基板TCに与えられると、液晶パネル温度制御基板TCは、予め設定した温度になるようにファンF71、F72およびヒータH1、H2を制御する。

【0075】

ファンF71は、液晶パネル13の冷却時に、下から上の気流を作るために使用されるので、冷却時に液晶パネル前面予熱用ヒータH1が気流の妨げにならず、液晶パネル前面予熱用ヒータH1を設けても冷却効率が下がらない。また、ファンF72は、前面予熱用ヒータH1を使用する際に動作し、液晶パネル13の加熱時に上から下の気流を作るように回転する。

【0076】

< B-2-1. ファンのON/OFF制御による温度制御 >

まず、ファンのON/OFF制御による温度制御について説明する。

図11は、ファンF71のON/OFF制御によりパネル温度を制御する場合の温度変化を表す特性図である。

【0077】

図11においては、横軸に時間を、縦軸に温度を示しており、ファンF71のON、OFF期間と、それぞれの期間での液晶パネル13の温度（パネル温度）の変化を表している。また、液晶パネル動作可能温度下限をTL、温度制御設定下限をTO、温度制御設定上限をT1、液晶パネル動作可能温度上限をTHで表している。

【0078】

液晶表示装置1を起動すると、バックライト12などからの入熱によりパネル温度が上昇を始める。この段階ではファンF71はOFFしている。

【0079】

パネル温度は温度センサTSによって検出され、液晶パネル温度制御基板TCに温度情報が与えられる。

【0080】

液晶パネル温度制御基板TCでは、パネル温度が予め定めた温度T1に達すると、ファンF71を動作(ON)させる。

【0081】

ファンF71の動作によりパネル温度が下がり始め、温度T0まで低下するとファンF71を停止する。ファンF71を停止すると、再びパネル温度が上がり始めるので、温度T1に達した後はファンF71を動作させる。

【0082】

このように、ファンF71のON、OFFを繰り返すことで、液晶パネル13の温度変化を予め設定した温度制御領域(T0～T1)に収めることができる。

【0083】

なお、以上の説明は1台のファンF71をON/OFF制御する場合、あるいは複数のファンF71を同時にON/OFF制御する場合に対応するが、複数のファンF71を使用する場合、各ファンF71において、ON/OFF条件を異なる温度に設定することで、温度変化が、よりなだらかな温度コントロールが可能となる。

【0084】

例えば、複数のファンF71を、動作条件に応じて第1、第2および第3の3つに分類し、パネル温度が上昇を始め、温度T0に達した段階で、まず、第1の分類のファンF71を動作させる。第1の分類のファンF71だけではパネル温度を低下させるまでには至らないが、上昇速度は抑えることができる。そして、さらに温度が上昇して温度T0とT1との間に達した場合には、第2の分類のファンF71を動作させる。第2の分類のファンF71の動作により、温度上昇速度がさらに抑えられる。そして、温度T1に達した段階で、第3の分類のファンF71を動作させる。

【0085】

第3の分類のファンF71の動作によりパネル温度が低下に転じるが、今度は、温度T0とT1との間に達した場合には、第3の分類のファンF71を停止し、温度T0に達した段階で第1および第3の分類のファンF71を停止する。

【0086】

なお、複数のファンF71の分類は3つに限定されるものではなく、また、ON/OFF条件も上記に限定されるものではない。

【0087】

また、上述した段階的制御を行うには、複数のファンF71が前面風路AC1に直接に空気を送り込む構成よりも、前面風路AC1の手前に空気溜まりを設け、まず、そこに複数のファンF71が空気を送り込む構成とすることが望ましい。このような構成を採ることで、1台のファンF71から空気を送り込む場合でも、前面風路AC1全体に均等に空気を送り込むことができる。

【0088】

< B-2-2. ファンのインバータ制御による温度制御 >

次に、ファンのインバータ制御による温度制御について説明する。

図12は、ファンF71のインバータ制御によりパネル温度を制御する場合の温度変化を表す特性図である。

【0089】

図12においては、ファンの回転制御に使用するインバータの周波数変化をパネル温度変化に併記しており、縦軸には温度およびインバータの周波数を示している。なお、各温度の定義については図11と同じである。

【0090】

液晶表示装置1を起動してパネル温度が上昇を始め、パネル温度が予め定めた温度T0に達すると、ファンF71を起動するが、その時点での制御インバータの周波数は低く、ファンF71の回転数も低い。

【0091】

制御インバータの周波数はパネル温度の上昇に伴って増加し、ファンF71の回転数も高くなって冷却効率が高まる。そして、パネル温度が一定になると制御インバータの周波数も一定となる。

【0092】

このように、ファンF71の回転数をインバータにより制御することで、パネル温度の変化をなだらかに制御することができ、また、パネル温度を一定に保った状態を維持することが可能となる。

【0093】

＜B-2-3. ヒータを用いた温度制御＞

次に、ヒータを用いた温度制御について説明する。

屋外では液晶表示装置1を使用していない状態では、液晶パネル13の温度は戸外温度と同じ程度になり、寒冷地では、動作可能温度下限よりも低くなる可能性がある。

【0094】

その場合、液晶パネル13の温度はバックライト12からの入熱だけでも、時間をかけることで温度制御設定下限T0に近づくが、パネル前面予熱用ヒータH1および筐体予熱用ヒータH2を使用することで、パネル温度が温度制御設定下限T0と温度制御設定上限T1との間の領域として規定される温度制御領域に到達するまでの時間を短縮することができる。

【0095】

図13は、パネル前面予熱用ヒータH1を使用してパネル温度を制御する場合の温度変化を表す特性図である。

【0096】

図13においては、横軸に時間を、縦軸に温度を示しており、パネル前面予熱用ヒータH1のON、OFF期間と、それぞれの期間での液晶パネル13の温度（パネル温度）の変化を「ヒータあり」の特性として表している。また、パネル前面予熱用ヒータH1を使用しない場合のパネル温度の変化を「ヒータなし」の特性として表している。なお、各温度の定義については図11と同じである。

【0097】

図13に示すように、液晶表示装置1を使用していない状態では、パネル温度は動作可能温度下限TLよりも低い状態になっているが、液晶表示装置1を起動するとバックライト12からの入熱によりパネル温度が上昇を始める。

【0098】

ここで、「ヒータなし」の特性に着目すると、パネル温度が温度T0に到達するのは時間t1である。一方、液晶表示装置1を起動後、パネル前面予熱用ヒータH1をONすると、「ヒータあり」の特性に表されるように、パネル温度の上昇速度が上がり、時間t1よりも短い時間t0で温度T0に到達する。

【0099】

温度T0に到達した後は、バックライト12からの入熱だけで温度上昇が続くので、パネル前面予熱用ヒータH1を停止（OFF）する。

【0100】

このように、パネル前面予熱用ヒータH1を用いることでパネル温度が温度制御領域に到達するまでの時間を短縮することができ、パネル温度が短時間で温度制御領域に入ること、液晶パネルの動作温度が適正に保たれて、液晶パネル13の動作が安定するまでの時間を短くすることができる。

【0101】

なお、上述の説明ではパネル前面予熱用ヒータH1だけを使用する場合を説明したが、筐体予熱用ヒータH2も併用することで、パネル温度が温度制御領域に入るまでの時間をさらに短縮できる。

【0102】

また、パネル温度が温度制御領域に到達した後は、パネル前面予熱用ヒータH1および

／または筐体予熱用ヒータH2を停止するので、消費電力を低減できる。

【0103】

なお、上述の説明では、バックライト12からの入熱だけでも、時間をかけることでパネル温度が温度制御領域に入るものとして説明したが、バックライト12からの入熱だけでは温度制御領域に到達しない場合は、戸外温度が極めて低いことが考えられるので、その場合は、パネル前面予熱用ヒータH1および／または筐体予熱用ヒータH2を使用して温度制御領域に到達させた後も、ヒータを停止させずに、パネル温度が温度制御領域で一定になるようにヒータの電力を調整することで対応することができる。

【0104】

以上説明したように、パネル温度をモニターし、パネル温度に基づいてファンF71、F72、パネル前面予熱用ヒータH1および筐体予熱用ヒータH2の動作を適宜制御することで、パネル温度を効率的に制御することができ、パネル温度を一定に保つなどして、表示機能を安定させることができ、また、不要な冷却や加熱を排除して消費電力を低減できる。

【0105】

< B-3. 結露防止対策 >

寒冷な環境から、室内などに屋外用表示装置を移動すると、条件によっては液晶パネル13の前面、もしくは透明板23の内側表面に結露を生じ、画像の視認性が低下する可能性がある。

【0106】

そこで、図14に示すように、透明板23の内外表面および液晶パネル13の前面に表面処理を施すことで、結露による視認性の低下を抑制する構成を採る。

【0107】

図14においては透明板23および液晶表示装置1だけを抜粋して示しており、透明板23の外側面には外面被膜231が、透明板23の内側面には内面被膜232が配設され、液晶パネル13の前面には液晶パネル前面被膜131が配設されている。

【0108】

内面被膜232および液晶パネル前面被膜131には、酸化チタン膜などの光触媒薄膜や光触媒シートが使用され、光触媒反応により結露による視認性の低下を抑制することができる。

【0109】

透明板23の外側面は、表面の細かな傷による乱反射が視認性を低下させるケースもあるため、外面被膜231としては、硬度の高い透明な保護シートを貼付したり、保護膜を塗布し、必要に応じて取り替えることで傷などによる視認性低下を抑制するようにすれば良い。もちろん、光触媒薄膜や光触媒シートを使用しても良く、その場合には雨水の付着などによる視認性の低下を抑制することができる。

【0110】

以上の説明では本発明に係る屋外用表示装置を、屋外で使用することを前提として説明したが、屋内で使用しても良く、その場合にも、冷却、防塵、防眩、破損防止などに同様の効果があることは言うまでもない。

【0111】

なお、屋内で使用するという観点に立てば、透明板23の上部側に庇状の突出部221を設ける必要はなく、また、屋外で使用する場合も、視認性を多少犠牲にしても良いのであれば突出部221を設けずとも良く、窓側面21が平坦な構造であっても良い。その場合、通風口から雨水や塵埃が侵入しにくいように通風口の配置位置や、形状を工夫すれば良い。

【0112】

また、以上の説明では液晶表示装置を使用することを前提として説明したが、プラズマ表示装置を使用する場合にも表示面の温度上昇の可能性があるので、プラズマ表示装置を使用する場合にも本発明は有効である。

CIVIQ0002642

【図面の簡単な説明】

【0113】

【図1】本発明に係る屋外用表示装置の実施の形態1の構成を説明する断面図である。

【図2】本発明に係る屋外用表示装置の実施の形態1の動作を説明する温度特性図である。

【図3】本発明に係る屋外用表示装置の実施の形態1の変形例1の構成を説明する断面図である。

【図4】本発明に係る屋外用表示装置の実施の形態1の変形例2の構成を説明する断面図である。

【図5】本発明に係る屋外用表示装置の実施の形態1の変形例2の構成を説明する断面図である。

【図6】本発明に係る屋外用表示装置の実施の形態1の変形例3の構成を説明する断面図である。

【図7】本発明に係る屋外用表示装置の実施の形態1の変形例4の構成を説明する断面図である。

【図8】本発明に係る屋外用表示装置の実施の形態1の変形例4の構成を説明する断面図である。

【図9】本発明に係る屋外用表示装置の実施の形態2の構成を説明する断面図である。

【図10】本発明に係る屋外用表示装置の実施の形態2の構成の制御関係を説明する図である。

【図11】ファンのON/OFF制御によりパネル温度を制御する場合の温度変化を表す特性図である。

【図12】ファンのインバータ制御によりパネル温度を制御する場合の温度変化を表す特性図である。

【図13】加熱によりパネル温度を制御する場合の温度変化を表す特性図である。

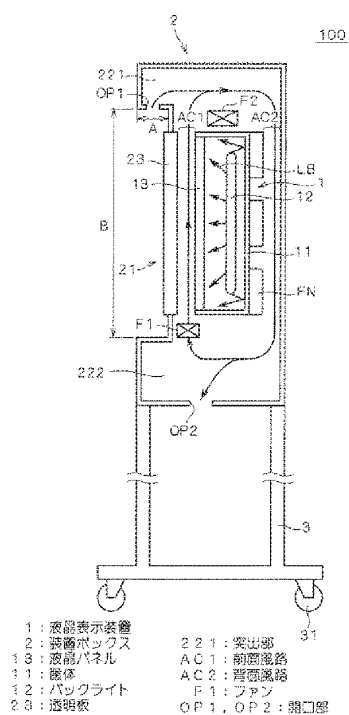
【図14】透明板の内外表面および液晶パネルの前面に表面処理を施した構成を説明する断面図である。

【符号の説明】

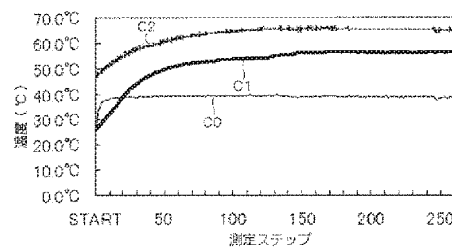
【0114】

1 液晶表示装置、2 装置ボックス、11 筐体、12 バックライト、13 液晶パネル、23 透明板、221 突出部、223 背面突出部、AC1 前面風路、AC2 背面風路、OP1、OP2、OP3、OP4、OP5 開口部、F1、F11、F12、F21、F31、F41、F42、F71、F72 ファン、H1 パネル前面予熱用ヒータ、H2 筐体予熱用ヒータ、TS 温度センサ。

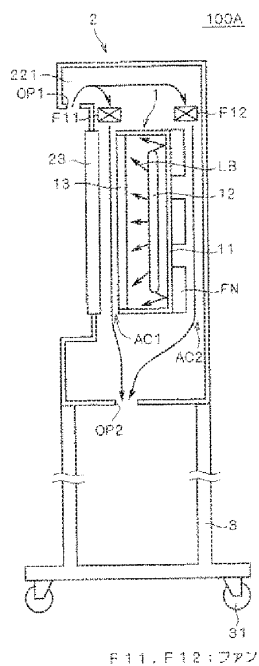
【図1】



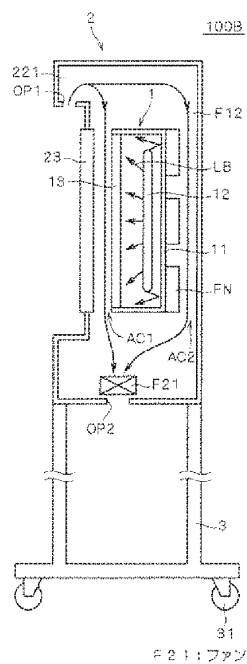
【図2】



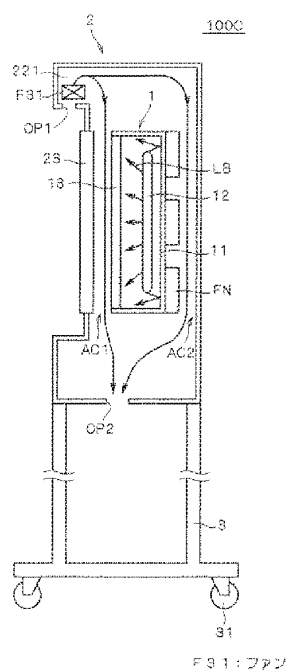
【図3】



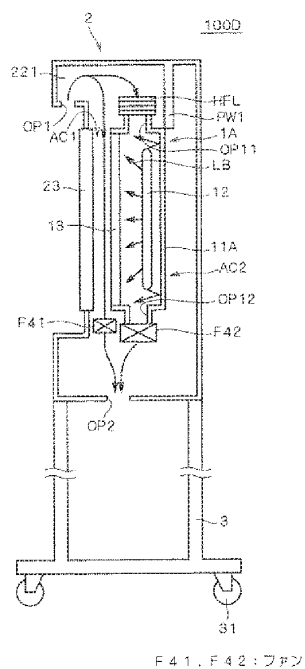
【図4】



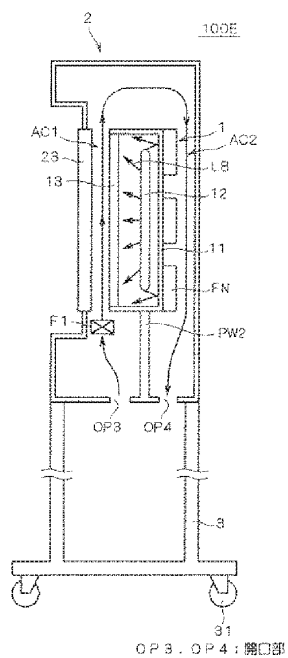
【図5】



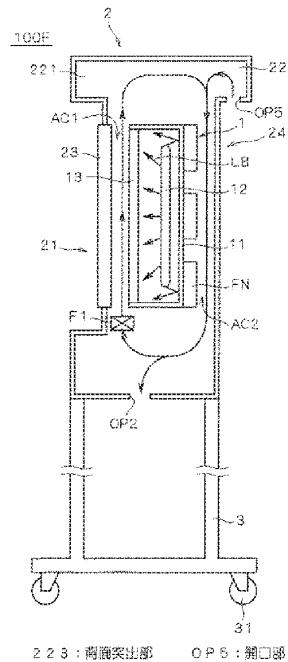
【図6】



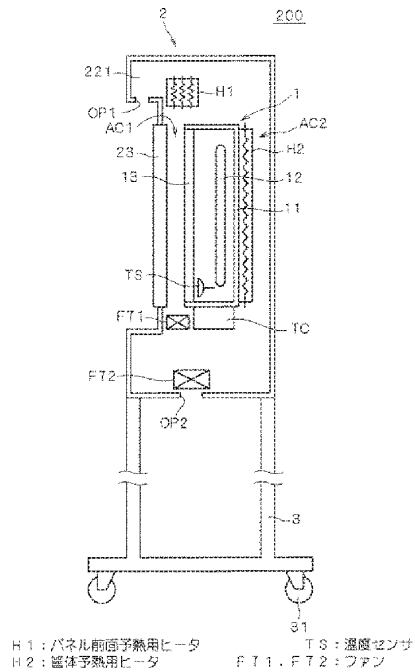
【図7】



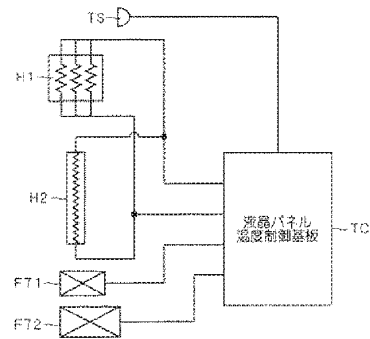
【図8】



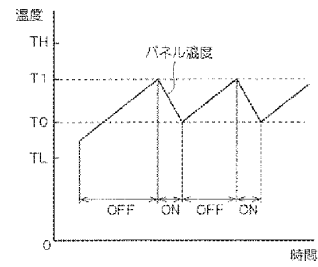
【図9】



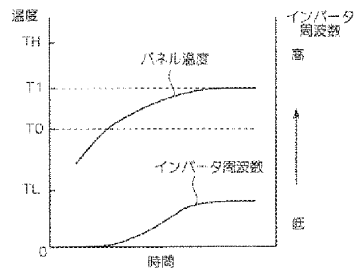
【図10】



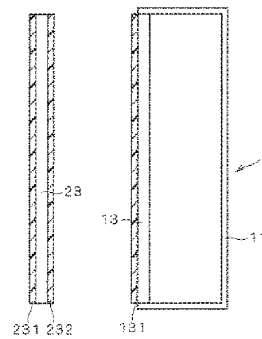
【図11】



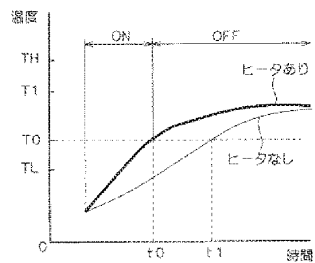
【図12】



【図14】



【図13】



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HH18 LL19

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ENCLOSED ELECTRONIC EQUIPMENT CASE

Inventor(s): SASAKI KAZUYUKI; MATSUO YASUHIRO ± (SASAKI KAZUYUKI, ; MATSUO YASUHIRO)

Applicant(s): FANUC LTD ± (FANUC LTD)

Classification: - international: *H05K7/20*; (IPC1-7): H05K7/20
- cooperative:

Application number: JP19960083030 19960313

Priority number(s): JP19960083030 19960313

Abstract of JPH09246766 (A)

PROBLEM TO BE SOLVED: To enable the heat generated in an electronic equipment case to be efficiently radiated by a method wherein a partition is provided to form a path for making the air agitated by a fan provided in the case circulate in the whole case. SOLUTION: A partition 7 is provided in parallel with a partial outer wall 2 of an electronic case 1 and then aperture parts are provided on both ends so as to fix a fan 5 on one aperture part as an air outlet while the air agitated by the fan 5 is run away from the air inlet 7' as the other aperture part along the outer wall to be absorbed from the lower flange part of the fan 5 of the outlet to the fan 5 to form a circulation path. Through these procedures, the distance of the air running along the outer wall 2 is prolonged thereby enabling the radiating effect to be enhanced efficiently.

(19)日本国特許庁 (J P)

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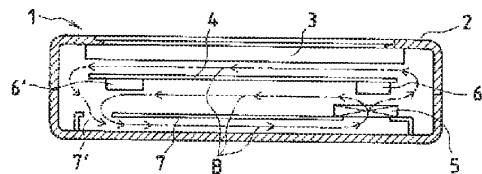
弁理士 竹本 松司 (外4名)

(54)【発明の名称】 密閉型電子機器ケース

(57)【要約】

【課題】 密閉型電子機器ケースの放熱効率を良くする。

【解決手段】 ケース内に空気循環用のパーティション7、10、ケース外壁の一部8に良放熱体、および空気通路Dに放電フィン9を設ける。



CIVIQ0001575

SEC et al. v. MRI
SEC Exhibit 1031.0388
IPR2023-00254

【特許請求の範囲】

【請求項1】 電子部品を内蔵した密閉構造の電子機器ケースにおいて、該ケース内に設けたファンで攪拌した空気が該ケース内全体に循環するような通路をパーティションを設けて構成したことを特徴とする密閉型電子機器ケース。

【請求項2】 請求項1記載の密閉型電子機器ケースにおいて、該ケースの外壁の一部又は全体に熱伝導性のよい金属板を使用したことを特徴とする密閉型電子機器ケース。

【請求項3】 電子部品から発生した熱により暖められた空気がファンによって該ケース内を循環する通路に放熱フィンを設け、さらに放熱効果を向上させたことを特徴とする請求項1又は請求項2記載の密閉型電子機器ケース。

【請求項4】 前記ケースの外壁とで空気通路を形成するパーティションを設け発熱量が大きい電子部品の配置位置に対応して前記空気通路の空気吐き出し口を設け、該吐き出し口から離れた位置に前記空気通路の吸入口を設けた請求項1ないし請求項3記載のいずれか1項記載の密閉型電子機器ケース。

【発明の詳細な説明】

【0001】

【発明の属する利用分野】電子機器ケースに関する。

【0002】

【従来の技術】機械工場などの暑い環境の下で使用される制御装置などの電子部品を収納した電子機器においては、異物の侵入を防ぐために密閉型の電子機器ケースが使用される。密閉型電子機器ケースでは、該ケースに内蔵された電子部品の信頼性を該ケース内に発生する熱を効率的に放熱することが重要であるが、従来は発熱する電子部品の近傍にファンを設け、ファンによる電子部品への直接冷却によってのみ電子機器ケースの放熱を行っていた。

【0003】図5は従来の電子機器ケース20内のファン5による放熱の様子を示している。ファン5の回転によりプリント板4に実装されたファン5近傍にある発熱量の大きい電子部品6は冷却され、ファン5によって電子部品6に吹き付けられた空気は図5のAに示すように電子機器ケース内の空間に飛散する。しかし、この構成では、空気の循環が悪く、ファン5より遠い位置にある電子部品6'はなかなか冷やされない。

【0004】

【発明が解決しようとする課題】このように、従来のファンのみによる冷却では、電子機器ケース内の空気の循環が充分に行なわれず、ファン近傍の電子部品の冷却には効果を奏するが、ファンより離れた位置にある電子部品には十分な冷却が施されず、その結果、電子機器ケースの放熱効果は充分ではなかった。

【0005】

【課題を解決するための手段】本発明は、ファンによって攪拌された空気が上記ケース内の全体に循環するような通路を設けること、上記ケースの外壁に放熱効率の良い金属を用いること、また、上記空気の循環経路に放熱フィンを設けることにより、電子機器ケース内に発生する熱を効率よく放熱する。

【0006】

【発明の実施の形態】図1は本発明の第1の実施形態を示す密閉型電子機器ケースの要部断面図である。該第1の実施形態においては、空気を循環する通路を確保するためのパーティション7が電子機器ケース1内に設けられている。パーティション7は電子機器ケース1の一部外壁2と平行に設けられ、両端に開口部を設けており、一方の開口部にはファン5をとりつけることによって、図1の例では空気吐出口とされ、空気は図の他方の開口部（吸入口）から該ケース外壁内面を這って流れ、吐出口のファン5の下方フランジ部からファン5に吸い込まれるようになっている。

【0007】また、パーティション7の空気吸入口7'を構成する開口部はファン5より出来るだけ離れた位置に設けられ、空気がケース内全体に循環出来るようにすると共に、空気がケース外壁2に沿って流れる距離を長くして放熱効果を上げるようにしている。

【0008】これにより、図1の空気通路Bに示すように、ファン5によって攪拌された空気は電子部品6に吹き付けられ、プリント板4とパーティション7の間、およびプリント板4と装着部品（本実施の形態では表示器）3の間を流れ、パーティション7の空気吸入口7'を構成する開口部に送られる。

【0009】上記の通路を空気が循環することにより、暖かい空気が該電子機器ケースの外壁に接触することにより冷やされるから電子機器ケースは効率的に冷却される。

【0010】ケース外壁2に沿って流れることにより冷却された空気が吐出される位置は、発熱量の大きい電子部品6の位置であることが望ましい。図1の例では、発熱量の大きい電子部品6が右隅に設けられ、該電子部品6に対して吐出口（ファン5）が設けられ、該吐出口より遠い左隅に空気吸入口7'を設け、空気が外壁2に沿って流れる距離を長くして、空気が充分に冷却されるようにしている。

【0011】このように、循環する空気を冷却するには、該外壁に沿って流れる距離を長くする必要があり、プリント板4に電子部品を装着する際には、発熱量が大きい部品を隅に配置することが望ましい。しかし、配線等の都合上発熱量の大きい部品を中央に配置した場合は、該位置に吐出口を設け、該吐出口より出来るだけ遠い周辺の複数の位置に吸入口を設ける。

【0012】図2は本発明の第2の実施形態を示す例で、図1で示す例と相違する点は、電子機器ケース1の

外壁2の一部8に熱伝導性の良い金属板を使用したことである。電子機器ケースは通常プラスチックで出来ているが、空気通路Bを形成する外壁の部分を熱伝導性の良いアルミ板8で構成することによって、さらに放熱効率を高めた。なお、電子機器ケース1全体を熱伝導性の良い金属板で構成しても良い。

【0013】図3は図1、図2の本実施形態においてケース外壁2とパーティション7によって形成される空気通路を長くしたもので、パーティション10を設け、空気通路をジグザグにし、循環する空気が外壁と長い距離（時間）接するように構成することにより、放熱効果を上げ空気を冷却するようにしたものである。

【0014】即ち、暖められた空気は図3の空気通路Cのようにこのパーティション10に沿って流れるため、放熱効果が高めることが出来た。

【0015】図4は、図3の実施形態と同様に循環する空気の冷却効率を上げるようにしたもので、図1、図2の実施形態において、ケース外壁2とパーティション7によって形成される空気通路に平行に複数枚の放熱フィン9を設置したものである。暖かい空気は図4の空気通路Dに沿って流れるのでこの放熱フィン9によってさらに放熱される。

【0016】

【発明の効果】密閉型電子機器ケースにおいて、ファンによる空気攪拌通路を空気がケース内を完全に循環する

ような通路を設けることにより、電子機器ケース内温度の放熱効率を高めた。また、ケース外壁に放熱性の良い金属板を使用することにより放熱効率を高めた。さらに空気循環通路に放熱フィンを設置することでさらに放熱効率を高めた。

【図面の簡単な説明】

【図1】本発明の第1の実施形態の要部断面図である。

【図2】本発明の第2の実施形態の要部断面図である。

【図3】本発明の第3の実施形態の要部説明図である。

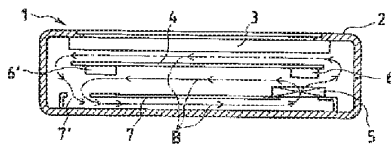
【図4】本発明の第4の実施形態の要部説明図である。

【図5】従来の密閉型電子機器ケースの要部断面図である。

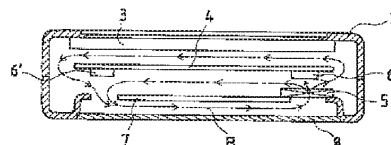
【符号の説明】

- 1 本願発明の電子機器ケース
- 2 電子機器ケース外壁
- 3 表示器
- 4 プリント板
- 5 ファン
- 6, 6' 電子部品
- 7, 10 パーティション
- 7' 空気吸入口
- 8 電子機器ケース外壁（良放熱体部）
- 9 放熱フィン
- 20 従来の電子機器ケース
- A, B, C, D 空気通路

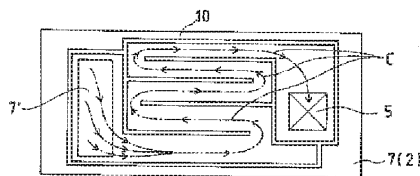
【図1】



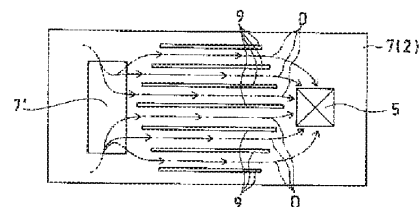
【図2】



【図3】



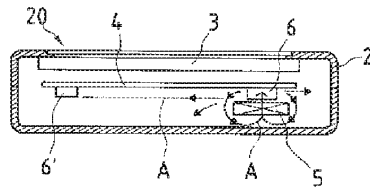
【図4】



(4)

特開平9-246766

【図5】



CIVIQ0001578

SEC et al. v. MRI
SEC Exhibit 1031.0391
IPR2023-00254

1/18/2018

Fulltext

Air cleaner having a advertising plate

List of publications

Publication number	Publ. date	Appl. Number	Appl. Date	Document type
KR200388674	2004-11-06	2004KR-U021808	2004-07-30	Y1 - Utility model specification

Abstract

This idea the billboard which the indication river course rock does a letter and design to the looking away body of the air cleaner assembly about under affixing not only function of the air cleaner assembly that billboard as competitive power security will be with the function which the air cleaner assembly royal tomb and frame function or advertisement function is complex and to do the advertisement function lead will be able to expect will be able to for the idea, by the filtering process of filter system with the blue microphyll apparatus at the time of discharge about under purifying the height to be to an air cleaner assembly, and to one side of the minute description air cleaner assembly and schedule interval to reach standing, and the single step the hinge being combined with, together other grade by self-reliance the attachment possible billboard burn to be had the air which the outside get air with all, and the separate way which are supplied to the minute description air cleaner assembly the prescribed image is illustrated to the whole the panel where brightly in order to shed light, from the illuminant which comes out evenly and the light uniformly at the time of diffusion height the 1st billboard where the light guide plate for is had and the 1st billboard and all to be formed to that panel, the luminous element is established and as billboard which is had with the 2nd billboard is had is provided a prescribed advertizing copy

English Abstract (Native or MT)

This idea the billboard which the indication river course rock does a letter and design to the looking away body of the air cleaner assembly about under affixing not only function of the air cleaner assembly that billboard as competitive power security will be with the function which the air cleaner assembly royal tomb and frame function or advertisement function is complex and to do the advertisement function lead will be able to expect will be able to For this idea, by the filtering process of filter system with the blue microphyll apparatus at the time of discharge about under purifying the height to be to an air cleaner assembly, and to one side of the minute description air cleaner assembly and schedule interval to reach standing, and the single step the hinge being combined with, together other grade by self-reliance the attachment possible billboard burn to be had the air which the outside get air with all, and the separate way which are supplied to the minute description air cleaner assembly the prescribed image is illustrated to the whole the panel where brightly in order to shed light, from the illuminant which comes out evenly and the light uniformly at the time of diffusion height the 1st billboard where the light guide plate for is had and the 1st billboard and all to be formed to that panel, the luminous element is established and as billboard which is had with the 2nd billboard is had is provided a prescribed advertizing copy

Other Abstracts

본 고안은 공기정정기의 외면에서 글자 및 도안 등을 표시하도록 하는 광고판을 장착하여 공기정정기의 기능뿐만 아니라 그 광고판을 통한 광고기능을 선택적으로 재구성하도록 함으로써, 공기정정기능과 액자 기능 또는 광고기능을 고 저렴한 비용으로 광고를 제공할 수 있다. 이를 위해 본 고안은, 외부의 오염된 공기를 필터시스템의 필터를 과정에서 의해 청정공기로 정화하여 배출시키는 공기정정기에 있어서, 상기 공기정정기의 일면에는 그 공기정정기를 구성하고 있는 본체 하우징과 일정 간격 이격되도록 부착 가능한 광고판이 구비되고, 상기 광고판은 상기 공기정정기에 공급되는 전원과 별도로 전원을 공급받으면서, 전면에 소정 이미지가 도시된 패턴을 받게 비주도록 내부에 설치된 광원으로로부터 나오는 빛을 고루 분산시켜 그 1은 제 1광고판 및, 제 1광고판과 일체 형성되며 발광소자가 설치되어 소정 광고문안을 표시하는 제 2광고판으로 구비되는 광고판이 구비된 공기정정기가 제공된다.

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Patent Assignee History HWANG JEONG SOOK

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CPC Codes B01D-046/02/05* B01D-046/12 G09F-023/00

Notes Number of Claims: 3

Claims

Claims machine translated from Korean

1. The air which the outside is imbrued by the filtering process of filter system with the blue microphyll apparatus at the time of discharge about under purifying the height is in an air cleaner assembly. To one side of the minute description air cleaner assembly the main body housing which composes that air cleaner assembly and schedule interval to reach standing, and the single step the hinge being combined with, together billboard burn is had.

Minute description billboard. Supply to get all with all, and the separate way which are supplied to the minute description air cleaner assembly the prescribed image is illustrated to the whole the panel where brightly in order to s inside to disperse the light which comes out evenly and the light uniformly at the time of diffusion height the 1st billboard where the light guide plate for is had and the 1st billboard and all to be formed to that panel, the luminous for under indicating is had with the 2nd billboard the air cleaner assembly where the billboard the fact that with feature is had.

2. There is in a 1st claim.

Supplies all as selectively to the minute description 1st billboard and the 2nd billboard and all will be able to supply, the select switch is had the air cleaner assembly where the billboard the fact that with feature is had.

3. There is in a 1st claim.

As for the image which is had to the minute description 1st billboard with the different image shift to be possible, and the advertizing copy which is indicated to the minute description 2nd billboard the multiple dog the memor where the billboard the fact that with feature is had.

Original Claims

1. 외부의 오염된 공기를 필터시스템의 필터를 과정에서 의해 청정공기로 정화하여 배출시키는 공기정정기에 있어서,

상기 공기정정기의 일면에는 그 공기정정기를 구성하고 있는 본체 하우징과 일정 간격 이격되도록, 일단을 힌지 결합부와 아울러 타단은 자력에 의해 탈부착 가능한 광고판이 구비되고,

상기 광고판은: 상기 공기정정기에 공급되는 전원과 별도로 전원을 공급받으면서, 전면에 소정 이미지가 도시된 패턴을 받게 비주도록 내부에 설치된 광원으로로부터 나오는 빛을 고루 분산시켜 그 패턴에 빛이 일정하게 확산시켜; 일체 형성되며 발광소자가 설치되어 소정 광고문안을 표시하는 제 2광고판으로 구비되는 것을 특징으로 하는 광고판이 구비된 공기정정기.

2. 제 1항에 있어서,

상기 제 1광고판 및 제 2광고판에 전원을 선택적으로 공급하거나 모두 공급할 수 있도록 선택스위치가 구비되는 것을 특징으로 하는 광고판이 구비된 공기정정기.

3. 제 1항에 있어서,

상기 제 1광고판에 구비된 이미지는 다른 이미지로 교체 가능하여, 상기 제 2광고판에 표시되는 광고문안이 다수개 저장되는 메모리가 더 구비되는 것을 특징으로 하는 광고판이 구비된 공기정정기.

Description

Description machine translated from Korean

Description Of Drawings

Also 1 also the strabismus which showed the air cleaner assembly where the billboard of this idea is had.

Also as many as 2 also separation strabismus of 1.

Also 3 following this idea is the situation map which presented the opening and shutting condition of the billboard.

* About main minute in plans explanation of code *

100. Air cleaner assembly, 110. Filter module department.

120. Housing, 122. Bracket.

124. Hinge absence, 132. 1st billboard.

134. 2nd billboard.

Background Art

This idea about the air cleaner assembly where the billboard is had as the thing, in detail, in order for the picture, the design, the billboard in order for and letter to be indicated, to be affixed in one side of the air cleaner assembly tomb not only to combine an advertisement function at the same time, about the air cleaner assembly where the billboard is had is a thing.

The normality and the air cleaner assembly were established an external air to inlet port suction opening part of the suction river course rock main body [hup] the mouth grill, the air which is sucked flowing, at the time of the mo and suction air and smell ingredient as for under removing the filter module department which became accomplished with the multiple filter, by a minute description filter module department at the time of discharge the height the source of pollution is removed and is composed.

And, the air cleaner assembly remotely the low of indicating indication addition is formed the function of the control river course rock remote control reception department and the air cleaner assembly from the place where the sc As for such minute description air cleaner assembly by the filter to suck the air which is imbrued with the fan minute dust around until 0.01 .micron or fungus 3 dust collection (dust collection) seizes a body odor or tobacco s reduced the ion by the ionizer at the time of recovery as for height will like the thing the various air purifier to be developed, at the time of purification as for height in method many kind method is being applied an air.

So to speak, purifies a minute description air filter module department of the air cleaner assembly for, to be skipped from the free filter which skips the dust where the particle hair or blanket dust is big primarily and the HEPA filter which not only the radioactivity particle in the medium filter and air the sterilizing power to remove the minute dust and the pollen, the bacterium and cigarette smoke the contaminant of smell and gas situation in the HEPA filter which network structure and air as for under absorption removing the seizure filter and stonehouse catalyst particle to the metal side [pyung] to be lightly becoming in high temperature, VOC and the ozoneAs well as the poison gas whi storehouse catalyst filter being had complex, with, after sucking the air which is imbrued through filtering process of many phase air completely, is purifying.

Consequently, the same as above air cleaner assembly removes the contamination of recent indoor air and condition a sick house syndrome at the time of the mortar the height is producer of the various chemical substance, re or allergic symptom respects, as the equipment which is most effective is recognized, is used.

However, currently as for the air cleaner assembly which is supplied to assumption or office the low of purifying does not provide the function which other than function is additional to be able an air, cannot be satisfied the craving Namely, the minute description air cleaner assembly according to air purge ably simply will provide only a air purge function only different function is not provided from the situation which is formed at the fixed size, because bei space was troublesome and there was a problem where the effectiveness decreases.

Technical Field

As hereupon this idea being contrived in order to solve the problem which described minutely, the air cleaner assembly as for under providing not only the air purifier royal tomb the various image and advertizing message own assembly where the billboard is had is the goal is.

Achieves the goal which described minutely the air cleaner assembly where the billboard of this idea for is had. By the filtering process of filter system with the blue microphyll apparatus at the time of discharge about under puri one side of the minute description air cleaner assembly the main body housing which composes that air cleaner assembly and schedule interval to reach standing, and the single step the hinge being combined with, together billboard burn to be had the air which the outside is imbrued, the minute description billboard. Supply to get all with all, and the separate way which are supplied to the minute description air cleaner assembly the prescribed ima in order to shed light, from the illuminant which is established to the inside to disperse the light which comes out evenly and the light uniformly at the time of diffusion height the 1st billboard where the light guide plate for is had an luminous element is established and prescribed advertizing copy the low of indicating the fact that is had with the 2nd billboard with feature.

Config

Below, about under referring explains the plan which this idea is attached a desirable conduct example, does.

Also 1 also the strabismus which showed the air cleaner assembly where the billboard of this idea is had, also as many as 2 is also the separation strabismus of 1.

Also like 1 and is illustrated to 2 and, the air cleaner assembly (100) approximately position to have the form of the body, is imbrued the air which purify and the pure air which is purified in order the air guide (126) through to (102), the medium filter (104), the HEPA filter and the seizure filter (106), the storehouse catalyst filter (108) with the filter module department which became accomplished (110) the housing which is had built-in (120) to be h (130) is established in the situation where the prescribed interval has become standing (d) at the front.

And, the minute description billboard (130) in order for the housing (120) with the attachment burn to be easy, the housing (120) above department or middle underneath department the bracket where the magnet is included, description bracket (122) other than the place which is affixed, in order for so to speak underneath department or to above department the minute description billboard (130) to be met together with the outside direction, hing

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SEC et al. v. MRI
SEC Exhibit 1031.0392
IPR2023-00254

1/18/2018

billboard (130) is composed connection.
The minute description bracket (about 122) configured places says again, the bracket of minute description magnet nature (122) underneath being had to above department department to, if hinge absence (124) the situation a part the hinge and provided the structure where the top is opened and shut by the magnetic force of the minute description magnet. The billboard which the minute description bracket (122) with is confronted consequently mutually the attachment turn must be affixed the possible medium.
And, the minute description billboard (130) in order to shed light the panel where the prescribed image is illustrated to the whole brightly to the inside from the illuminant disperses the light which comes out evenly and the light the height atlas light guide plate is had (132) with, the 1st billboard (132) the lower part department and all to be formed, the light-emitting diode of that power (LED) is established to that panel and prescribed advertizing copy billboard (134) with.
Here, the minute description 2nd billboard (134) not only the light-emitting diode the liquid crystal display equipment (LCD) and the different display device could be applied obviously.
Also, America is illustrating to the plan, the minute description air cleaner assembly (100) in all who is supplied and the minute description billboard (130) in all who is supplied will be able to use respectively as selectively the ac all affector to be established, in order for together the minute description 1st billboard (132) and the 2nd billboard (134) also the drive which is selective to become accomplished, is desirable for the select switch to be had.
Namely multi beginning and end does, the minute description billboard (130) when the minute description air cleaner assembly (100) is operated, limits and is supplied, together becomes the drive, or all of separate way the sup the drive with separate way to be, and according to minute description select switch fabrication the 1st billboard (132) with the 2nd billboard (134) also the drive will be able to select freely.
And, the minute description 2nd billboard (134) to stores the advertizing copy which is indicated the memory for (the plan American city) the minute description air cleaner assembly (100) within to be established, the minute de-formed to the prescribed part or a remote control fabrication from the minute description memory advertizing copy data of option about under accessing the minute description 2nd billboard (134) in will be able to indicate, does.
American explanation code 128 function of the remote control reception department and the air cleaner assembly the low of indicating is the indication buoy
Like that and also operates this idea which is composed 1 to also about under referring explains 3.
First of all, when the air cleaner assembly (100) to the billboard (130) the application of power is authorized from the situation which is established, the minute description air cleaner assembly (100) the main body housing (120) opening of this standing (8) interval and namely at directions the contaminated air is sucked. Minute description the contaminated air which is sucked the housing (the filter module department which is had to 120) insides (110) filter and the seizure filter (102), the storehouse catalyst filter (109) by the filtering process lead is purified air conduit pure the source of pollution is removed, the air guide (128) through is discharged.
Like that and air cleaner assembly (100) does the function which is basic and meantime, this idea does the air cleaner assembly (100) in the billboard which is affixed (130) through will be able to provide an advertisement advertisement function explains.
The minute description advertisement function becomes accomplished the 1st billboard (132) with the 2nd billboard (134) through.
The minute description advertisement function the minute description air cleaner assembly (100) is supplied with supply all, and separate way when follows in case, by a select switch fabrication the 1st billboard (132) or the make.
When minute description is supplied, the minute description 1st billboard (132) from the illuminant which is established to the inside the minute description light the light to be emitted select, by the light guide plate is dispersed, this according to luminous intensity/oft can make the illuminant, around in the case where the luminous intensity is bright the illuminant from off Keane situation enough will be able to indicate the image, the interior or aro.
illuminant with Sikkim brightly will shed light the image, will be able to indicate.
This the air cleaner assembly (100) not only function will be able to provide a frame or advertisement function is.
And, because although the minute description 1st billboard (132) to as for the image which attaches with the different image shift possibility be the air cleaner assembly (100) runs wild, the space or the user obvious wants hits to Meantime, the minute description 2nd billboard (134) leads and also will be able to provide an advertisement function, the minute description 2nd billboard (134) the light-emitting diode (LED) to by the advertizing copy is indica the structure which is indicated.
This time and the minute description 2nd billboard (134) in the advertizing copy which is indicated is not a thing where only which one advertizing copy is not indicated by the selection fabrication of the user from the situation will order for the different advertizing copy to can be indicated. Minute description advertizing copy such as company logo or goods introduction as information will be able to store with option.
Consequently, the minute description 1st billboard (132) or the 2nd billboard (134) middle the drive can make only me under the, the 1st billboard (132) to be right the 2nd billboard (134) to advertizing copy is under indicating to I provide an advertisement function becomes.
Meantime, the minute description billboard (130) the hinge with puling the part which by a magnet nature in the center is combined, because the billboard (130) the air cleaner assembly (100) the housing (120) from this sta department (110) the respectively filter (102, 104, 106 and 108) about under the separating which will listen will be able to clean easily.
Effect
Like explained from above and, according to the air cleaner assembly where the billboard of this idea is had will be able to indicate the image and a letter to one side of the air cleaner assembly the billboard to be affixed to u illuminant provides the function which as selectively frame function and advertisement function is complex, because will compare to the competing product, will be able to expet a competitive power security.
Besides, with air cleaner assembly the advertisement effect all the because, cheap expense which can do an advertisement there is an effect.
Meantime, this idea the specification which stated above is not limited to desirable conduct example not to be, the low of requesting without escaping the essential of this idea, encounters from request scope, when from the field and who the various fringe land conduct the possible thing.

Description

Description Of Drawings

도 1은 본 고안의 광고판이 구비된 공기정정기를 보인 사시도.

도 2는 도 1의 분리사시도.

도 3은 본 고안에 따른 광고판의 개폐 상태를 보인 상태도이다.

“도면의 주요부분에 대한 부호의 설명”

100 : 공기정정기, 110 : 필터모듈부,

120 : 하우징, 122 : 브라켓

124 : 힌지부재, 132 : 제 1광고판,

134 : 제 2광고판

Background Art

본 고안은 광고판이 구비된 공기정정기에 관한 것으로서, 보다 상세하게는 그림, 도안, 및 문자 등이 표시되는 광고판이 공기정정기의 일면에 장착되도록 하여 공기정정기 기능을 제공할 뿐만 아니라 광고기능을 동시에 겸하도록 하는 종상, 공기정정기는 외부공기를 흡입하도록 본체의 흡입구 주변에 설치된 흡입그릴, 흡입된 공기의 흐름을 유방시키는 블로우어 및 흡입 공기중에 포함된 먼지와 냄새성분을 제거하는 다수의 필터로 이루어진 필터모듈부, 상기 사시키는 에어가이드(Airguide)가 포함되 구성된다.

그리고, 공기정정기를 통해 거리 이격된 개소에서 원적으로 제어하도록 리모콘수신부 및 공기정정기의 기능을 표시하는 표시부가 형성된다

그럼 상기 공기정정기는 요오덴 공기를 팬으로 흡입하고 필터에 의해 0.01μm정도까지의 미세한 먼지나 세균을 집진(集塵)하여 처리나 담배냄새를 탈취하거나, 요오 덴에는 집진된 용(陰)이온을 이온발생기에 의해 복속시키, 기를 정화시키는 발광에도 여러 가지 방법이 적용되고 있다.

예컨대, 상기 공기를 정화하기 위한 공기정정기의 필터모듈부는 여러차례이나 이온처리 등의 일자가 큰 일지를 일차적으로 거르는 프리필터와, 그 프리필터에서 걸러지지 않은 미세먼지와 정진도가 등을 흡착하는 미디엄 필터와, 악테리아, 담배연기 등을 제거하고 살균력을 제공하도록 그를 구조로 이루어지는 HEPA 필터와, 공기중의 냄새와 가스상태의 오염물질을 흡착 제거하는 알활탄 필터, 정숙해 입자가 공속만에 고온으로 공작되어 있어서 VOC와 오, 촉매 필터 등이 복합적으로 구비함으로써, 오염된 공기를 흡입한 후 여러 단계의 정화된 과정을 통해 공기를 완전하게 정화하고 있다.

이에 따라, 상기와 같은 공기정정기는 근래 실내 공기의 오염을 제거하거나 새집 증후군과 공상을 유발시키는 각종 화학물질의 발생으로 인하여 두통이나 알레르기 증세를 일으키는 일종의 생활 공해를 제거하기 위한 가장 효과적 그런데, 현재 기정이나 사무실 등에 보급되고 있는 공기정정기는 공기 정화하는 기능 이외의 부가적인 기능을 제공하지 못하고 있어 다양한 소비자의 욕구를 만족시키지 못하고 있다.

즉, 상기 공기정정기는 공기 정화능력에 따라 일정한 크기로 형성된 상태에서 단순히 공기 정화기능만을 제공할 뿐 다른 기능이 제공되지 못하고 있기 때문에, 좁은 공간의 장소에 설치된 경우에는 번잡하여 그 효율성이 저하되 Technical Field

이에 본 고안은 상기한 문제점을 해결하기 위하여 안출된 것으로서, 공기정정기가 제공하는 공기 정화기능뿐만 아니라 다양한 이미지 및 광고문자가 표시되도록 하는 광고판이 구비된 공기정정기를 제공할 때 그 목적이 있다.

상기한 목적을 달성하기 위한 본 고안의 광고판이 구비된 공기정정기는; 외부의 오염된 공기를 필터시스템의 필터링 과정에 의해 정정공기로 정화하여 배출시키는 공기정정기에 있어서, 상기 공기정정기의 일면에는 그 공기정정 일면에서 결합된가 아울러 타단은 자연에 의해 탈부착 가능한 광고판이 구비되고, 상기 광고판은, 상기 공기정정기에 공급되는 전원과 별도로 전원을 공급받으면서, 전원에 소정 이미지가 표시된 패널을 받게 되도록 내부에 어 및 전기 일체하게 형성시키기 위한 도광판이 구비되는 제 1광고판 및, 제 1광고판과 일체 형성되어 발광층이 설치되어 소정 광고문안을 표시하는 제 2광고판으로 구비되는 것을 특징으로 한다.

Config

이하, 본 고안의 바람직한 실시예를 첨부된 도면을 참조하여 설명하기로 한다.

도 1은 본 고안의 광고판이 구비된 공기정정기를 보인 사시도, 도 2는 도 1의 분리사시도이다.

도 1 및 도 2에 도시된 바와 같이, 공기정정기(100)는 대략 직육면체의 형상을 가지면서 오염된 공기를 정화시키고 정화된 청정 공기를 에어가이드(128)를 통해 실내에 배출시키기 위하여 프리필터(102), 미디엄 필터(104), HEPA필터모듈부(110)가 내장되는 하우징(120)이 구비되며, 상기 프리필터(102)의 전방으로 소정 간격 이격(이)된 상태로 광고판(130)이 설치된다.

그리고, 상기 광고판(130)은 하우징(120)의 탈부착이 용이하도록 하우징(120)의 상측부 또는 하측부 중 한 곳에 지직이 포함된 브라켓(122)이 돌출형성되고, 상기 브라켓(122)이 장착된 개소 이외, 예컨대 하측부 또는 상측부 두 개(124)가 구비되어 하우징(120)과 광고판(130)이 연결 구성된다.

상기 브라켓(122) 장착개소에 대해서 다시 말하면 상기 지직 성질과 브라켓(122)이 상측부에 구비되고 하측부에는 힌지부재(124)가 구비된 상태라면 상기 광고판(130)은 하부를 힌지축으로 하여 상부가 상기 지직과의 지직에 오 대 대응되는 광고판(130)의 내면 부분에는 지직의 성질에 의해 상호 탈부착이 가능한 액자형 장착되어 한다.

그리고, 상기 광고판(130)은 전원에 소정 이미지가 표시된 패널을 받게 되도록 그 내면에는 광원으로로부터 나오는 빛을 고루 분산시켜 그 패널에 빛이 일체하게 확산시키도록 도광판이 구비되는 제 1광도판(132)과, 제 1광도판(LED)가 설치되어 소정 광고문안을 표시하는 제 2광도판(134)으로 이루어진다.

여기서, 상기 제 2광도판(134)는 발광다이오드뿐만 아니라 액정 표시 장치(LCD) 및 다른 표시장치가 적용될 수 있음을 물론이다.

또한, 요면에 미도시하고 있지만 상기 공기정정기(100)에 공급되는 전원과 상기 광고판(130)에 공급되는 전원은 각각 선택적으로 사용할 수 있도록 외부에서 인가된 교류전원이 분배회로로 전원분배기가 설치되며, 아울러 상기 이루어지도록 선택스위치가 구비되는 것이 바람직하다.

즉 다시말해, 상기 광고판(130)은 상기 공기정정기(100)가 동작할 때에 한하여 전원이 공급되어 함께 구동되거나, 또는 별도의 전원을 공급받아 공기정정기 (100)와는 별도로 구동될 수 있는 것이며, 상기 선택스위치 조작에 따라 선택할 수 있다.

그리고, 상기 제 2광도판(134)에 표시되는 광고문안을 기 저장하기 위한 메모리(도면 미도시)가 상기 공기정정기(100)내에 설치되며, 상기 하우징(120)의 소정 부위에 형성되는 조작패널 또는 리모콘 조작에 의해 상기 메모리로부터(134)에 표시할 수 있도록 한다.

마지막 부분 128는 리모콘수신부 및 공기정정기의 기능을 표시하는 표시부이다.

그리고 같이 구성된 본 고안의 작용을 도 1 내지 도 3을 참조하여 설명하기로 한다.

우선, 공기정정기(100)의 광고판(130)이 설치된 상태에서 전원 공급이 인가되면 상기 공기정정기(100)의 본체 하우징(120)과 광고판(130)과의 이격(이) 간격, 즉 서방의 흡입구를 통해 오염 공기가 흡입된다. 상기 흡입된 오염 공기는, 프리필터(102), 미디엄 필터(104), HEPA필터 및 알활탄 필터(109), 광촉매필터(108)를 통한 필터링 과정에 의해 오염원이 제거된 청정 공기로 정화되고, 에어가이드(128)를 통해 배출된다.

그와 같이 공기정정기(100)의 기본적인 기능을 행하는 한편, 본 고안은 공기정정기(100)에 장착된 광고판(130)을 통해 광고기능을 제공할 수 있으며, 계속해서 광고 기능에 대해 설명하기로 한다.

상기 광고기능은 제 1광도판(132)과 제 2광도판(134)을 통해 이루어진다.

상기 광고기능은 상기 공기정정기(100)의 공급전원과 별도로 전원이 공급되고, 경우에 따라서는 선택스위치 조작에 의하여 제 1광도판(132) 또는 제 2광도판(134)을 선택하여 구동시킬 수 있다.

상기 전원이 공급되면 상기 제 1광도판(132)의 내면에 설치된 광원으로로부터 빛이 발생되고 상기 빛은 도광판에 의해 고르게 분산되어 이미지가 형성된 패널을 비추게 된다. 이는 주변 조도에 따라 광원을 온/오프시킬 수 있는바, 기 중화하여 이미지를 표시할 수 있으며, 실내 조도는 주변 조도가 한가지에 낮은 장소에는 광원을 온 시킴으로써 이미지를 밝게 비추어 표시할 수 있다.

이후, 공기정정기(100)의 기능뿐만 아니라 액자 또는 광고 기능을 제공할 수 있는 것이다.

그리고, 상기 제 1광도판(132)에 부착된 이미지는 다른 이미지로 교체가능하여 때문에 공기정정기(100)가 설치되는 공간 또는 사용자가 원하는 광고 문안에 맞는 이미지로 바꿀 수 있음을 물론이다.

한편, 상기 제 2광도판(134)을 통해서도 광고기능을 제공할 수 있는 바, 상기 제 2광도판(134)은 발광다이오드(LED)에 의해 광고 문안이 정지상태로 표시되거나 연속적으로 변화되면서 표시되는 구조를 제공한다.

이때, 상기 제 2광도판(134)에 표시되는 광고 문안은 어느 하나의 광고문안이 표시되는 것이 아니라, 다수의 광고문안을 메모리에 저장한 상태에서 사용자의 선택조작에 의해 다른 광고문안에 표시되도록 할 수 있다. 상기 광고문 저장할 수 있다.

따라서, 상기 제 1광도판(132) 또는 제 2광도판(134) 중 어느 하나만을 구동시킬 수 있지만, 제 1광도판(132)의 이미지에 맞게 제 2광도판(134)에 광고문안을 표시하게 되면 일체적으로 보다 더 광고기능을 제공할 수 있게 된다.

한편, 상기 광고판(130)의 힌지축을 중심으로 지직성질에 의해 결합되어 있는 부분을 당김으로써 쉽게 광고판(130)을 공기정정기(100)의 하우징(120)으로부터 이격시킬 수 있기 때문에, 상기 필터모듈부(110)의 각각의 필터(102) Effect

1/18/2018

이 점에서 설명한 바와 같이, 본 고인의 광고판이 구비된 공기청정기에 따르면 공기청정기의 일면에 이미지 및 문자를 표시할 수 있는 광고판이 작동가능하게 장착되어 공기청정 기능 이외에도 선택적으로 액자 기능 및 광고 기능을 경쟁적 확보를 기대할 수 있다.
다독이 공기청정 기능과 함께 광고를 행할 수 있기 때문에 지대한 비용으로 광고효과를 극대화할 수 있는 효과가 있다.
한편, 본 고안은 상술한 특정의 바깥적인 실시예에 한정되지 아니하며, 청구범위에서 청구하는 본 고안의 요지를 벗어남이 없이 당해 고안이 속하는 분야에서 통상의 지식을 가진 자라면 누구든지 다양한 변경 실시가 가능할 것이다.

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기술적요전 심사관 : 김정석

(54)광고판이 구비된 공기청정기

요약

본 고안은 공기청정기의 외면체에 문자 및 도안 등을 표시하도록 하는 광고판을 장착하여 공기청정기의 기능뿐만 아니라 그 광고판을 통한 광고기능을 선택적으로 제공하도록 함으로써, 공기청정기능과 액자 기능 또는 광고기능의 복합적인 기능으로 인하여 경쟁력 확보를 기대할 수 있고 저렴한 비용으로 광고를 제공할 수 있다.

이를 위해 본 고안은, 외부의 오염된 공기를 필터시스템의 필터링 과정에 의해 청정공기로 정화하여 배출시키는 공기청정기에 있어서, 상기 공기청정기의 일면에는 그 공기청정기를 구성하고 있는 본체 하우징과 일정 간격 이격되며, 일단은 힌지 결합됨과 아울러 타단은 자력에 의해 탈부착 가능한 광고판이 구비되고, 상기 광고판은; 상기 공기청정기에 공급되는 전원과 별도로 전원을 공급받으면서, 전면에 소정 이미지가 도시된 패널을 밝게 비추도록 내부에 설치된 광원으로부터 나오는 빛을 고루 분산시켜 그 패널에 빛이 일정하게 확산시키기 위한 도광판이 구비되는 제 1광고판 및, 제 1광고판과 일체 형성되며 발광소자가 설치되어 소정 광고문안을 표시하는 제 2광고판으로 구비되는 광고판이 구비된 공기청정기가 제공된다.

대표도

도 1

색인어

공기청정기, 광고, 액자, 장식

명세서

도면의 간단한 설명

도 1은 본 고안의 광고판이 구비된 공기청정기를 보인 사시도,

도 2는 도 1의 분리사시도,

도 3은 본 고안에 따른 광고판의 개폐 상태를 보인 상태도이다.

도면의 주요부분에 대한 부호의 설명

100 : 공기청정기, 110 : 필터모듈부,

120 : 하우징, 122 : 브라켓,

124 : 힌지부재, 132 : 제 1광고판,

134 : 제 2광고판.

고안의 상세한 설명

고안의 목적

고안이 속하는 기술 및 그 분야의 종래기술

본 고안은 광고판이 구비된 공기청정기에 관한 것으로서, 보다 상세하게는 그림, 도안, 및 문자 등이 표시되는 광고판이 공기청정기의 일면에 장착되도록 하여 공기청정기능을 제공할 뿐만 아니라 광고기능을 동시에 겸하도록 하는 광고판이 구비된 공기청정기에 관한 것이다.

통상, 공기청정기는 외부공기를 흡입하도록 본체의 흡입구 부분에 설치된 흡입그릴, 흡입된 공기의 흐름을 유발시키는 블로우어 및 흡입 공기중에 포함된 먼지와 냄새성분을 제거하는 다수의 필터로 이루어진 필터모듈부, 상기 필터모듈부에 의하여 오염원이 제거된 청정 공기를 배출시키는 에어가이드(Air guide)가 포함되어 구성된다.

그리고, 공기청정기를 일정 거리 이격된 개소에서 원격으로 제어하도록 리모콘수신부 및 공기청정기의 기능을 표시하는 표시부가 형성된다.

그러한 상기 공기청정기는 오염된 공기를 팬으로 흡입하고 필터에 의해 0.01 μm 정도까지의 미세한 먼지나 세균류를 집진(集塵)하여 채워나 담배냄새를 탈취하거나, 오염 때문에 감소된 음(陰)이온을 이온발생기에 의해 회복시키는 것과 같이 다양한 공기 청정기가 개발되고 있으며, 공기를 정화시키는 방법에도 여러 가지 방법이 적용되고 있다.

예컨대, 상기 공기를 정화하기 위한 공기청정기의 필터모듈부는 머리카락이나 이불먼지 등의 입자가 큰 먼지를 일차적으로 거르는 프리필터와, 그 프리필터에서 걸러지지 않은 미세먼지와 집진드기 등을 흡착하는 미디엄 필터와, 공기 중의 방사능 입자 뿐만 아니라 미세먼지와 꽃가루, 박테리아, 담배연기 등을 제거하고 살균력을 제공하도록 그물 구조로 이루어지는 HEPA필터와, 공기중의 냄새와 가스상태의 오염물질을 흡착 제거하는 탈취필터와, 광촉매 입자가 금속면에 고온으로 용착되어 있어서 VOC와 오존은 물론 신축건물에서 나오는 유독가스를 제거하는 광촉매필터 등이 복합적으로 구비됨으로써, 오염된 공기를 흡입한 후 여러 단계의 필터링 과정을 통해 공기를 완전하게 정화하고 있다.

이에 따라, 상기과 같은 공기청정기는 근래 실내 공기의 오염을 제거하거나 새집 증후군의 증상을 유발시키는 각종 화학물질의 발생으로 인하여 두통이나 알레르기 증세를 일으키는 일종의 생활 공해를 제거하기 위한 가장 효과적인 장치로서 인식되어 사용되고 있다.

그런데, 현재 가정이나 사무실 등에 보급되고 있는 공기청정기는 공기를 정화하는 기능 이외의 부가적인 기능을 제공하지 못하고 있어 다양한 소비자의 욕구를 만족시키지 못하고 있다.

즉, 상기 공기청정기는 공기 정화능력에 따라 일정한 크기로 형성된 상태에서 단순히 공기 정화기능만을 제공할 뿐 다른 기능이 제공되지 못하고 있기 때문에, 좁은 공간의 장소에 설치된 경우에는 번잡하여 그 효율성이 저하되는 문제가 있었다.

고안이 이루고자 하는 기술적 과제

이에 본 고안은 상기한 문제점을 해결하기 위하여 안출된 것으로서, 공기청정기가 제공하는 공기 청정기능뿐만 아니라 다양한 이미지 및 광고문자가 표시되도록 하는 광고판이 구비된 공기청정기를 제공함에 그 목적이 있다.

상기한 목적을 달성하기 위한 본 고안의 광고판이 구비된 공기청정기는; 외부의 오염된 공기를 필터시스템의 필터링 과정에 의해 청정공기로 정화하여 배출시키는 공기청정기에 있어서, 상기 공기청정기의 일면에는 그 공기청정기를 구성하고 있는 본체 하우징과 일정 간격 이격되며, 일단은 힌지 결합됨과 아울러 타단은 자력에 의해 탈부착 가능한 광고판이 구비되고, 상기 광고판은; 상기 공기청정기에 공급되는 전원과 별도로 전원을 공급받으면서, 전면에 소정 이미지가 도식된 패넬을 밝게 비추도록 내부에 설치된 광원으로부터 나오는 빛을 고루 분산시켜 그 패넬에 빛이 일정하게 확산시키기 위한 도광판이 구비되는 제 1광고판 및, 제 1광고판과 일체 형성되며 발광소자가 설치되어 소정 광고문안을 표시하는 제 2광고판으로 구비되는 것을 특징으로 한다.

고안의 구성 및 작용

이하, 본 고안의 바람직한 실시예를 첨부된 도면을 참조하여 설명하기로 한다.

도 1은 본 고안의 광고판이 구비된 공기청정기를 보인 사시도, 도 2는 도 1의 분리사시도이다.

도 1 및 도 2에 도시된 바와 같이, 공기청정기(100)는 대략 직육면체의 형상을 가지면서 오염된 공기를 정화시키고 정화된 청정 공기를 에어가이드(126)를 통해 실내에 배출시키기 위하여 프리필터(102), 미디엄 필터(104), HEPA필터 및 탈취필터(106), 광촉매필터(108)로 이루어진 필터모듈부(110)가 내장되는 하우징(120)이 구비되며, 상기 프리필터(102)의 전방으로 소정 간격 이격(d)된 상태로 광고판(130)이 설치된다.

그리고, 상기 광고판(130)은 하우징(120)과의 탈부착이 용이하도록 하우징(120)의 상측부 또는 하측부 중 한 곳에 자석이 포함된 브라켓(122)이 돌출형성되고, 상기 브라켓(122)이 장착된 개소 이외, 예컨대 하측부 또는 상측부에는 상기 광고판(130)이 외측방향으로 회동되도록 힌지부재(124)가 구비되어 하우징(120)과 광고판(130)의 연결 구성된다.

상기 브라켓(122) 장착개소에 대해서 다시 말하면 상기 자석 성질의 브라켓(122)이 상측부에 구비되고 하측부에는 힌지부재(124)가 구비된 상태라면 상기 광고판(130)은 하부를 힌지축으로 하여 상부가 상기 자석과의 자기력에 의해 개폐되는 구조를 제공한다. 따라서 상기 브라켓(122)과 대응되는 광고판(130)의 내면 부분에는 자석의 성질에 의해 상호 탈부착이 가능한 매체가 장착되어야 한다.

그리고, 상기 광고판(130)은 전면에 소정 이미지가 도식된 패넬을 밝게 비추도록 그 내면에는 광원으로부터 나오는 빛을 고루 분산시켜 그 패넬에 빛이 일정하게 확산시키도록 도광판이 구비되는 제 1광고판(132)과, 제 1광고판(132)의 하단부와 일체 형성되며 저전력의 발광다이오드(LED)가 설치되어 소정 광고문안을 표시하는 제 2광고판(134)으로 이루어진다.

여기서, 상기 제 2광고판(134)은 발광다이오드뿐만 아니라 액정 표시 장치(LCD) 및 다른 표시장치가 적용될 수 있을은 물론이다.

또한, 도면에 미도시하고 있지만 상기 공기청정기(100)에 공급되는 전원과 상기 광고판(130)에 공급되는 전원은 각각 선택적으로 사용할 수 있도록 외부에서 인가된 교류전원이 분배되도록 전원분배기가 설치되며, 아울러 상기 제 1광고판(132) 및 제 2광고판(134)도 선택적인 구동이 이루어지도록 선택스위치가 구비되는 것이 바람직하다.

즉 다시말해, 상기 광고판(130)은 상기 공기청정기(100)가 동작될 때에 한하여 전원이 공급되어 함께 구동되거나, 또는 별도의 전원을 공급받아 공기청정기 (100)와는 별도로 구동될 수 있는 것이며, 상기 선택스위치 조작에 따라 제 1광고판(132)과 제 2광고판(134)의 구동도 자유롭게 선택할 수 있다.

그리고, 상기 제 2광고판(134)에 표시되는 광고문안을 기 저장하기 위한 메모리(도면 미도시)가 상기 공기청정기(100)내에 설치되며, 상기 하우징(120)의 소정 부위에 형성되는 조작패넬 또는 리모콘 조작에 의해 상기 메모리로부터 임의의 광고문안 데이터를 액세스하여 상기 제 2광고판(134)에 표시할 수 있도록 한다.

미설명 부호 128는 리모콘수신부 및 공기청정기의 기능을 표시하는 표시부이다.

그와 같이 구성된 본 고안의 작용을 도 1 내지 도 3을 참조하여 설명하기로 한다.

우선, 공기청정기(100)에 광고판(130)이 설치된 상태에서 전원 공급이 인가되면 상기 공기청정기(100)의 본체 하우징(120)과 광고판(130)과의 이격(d) 간격, 즉 사방의 흡입구를 통해 오염 공기가 흡입된다. 상기 흡입된 오염 공기는 하우징(120) 내부에 구비된 필터모듈부(110)의 프리필터(102), 미더엄필터(104), HEPA필터 및 탈취필터(106), 광촉매필터(108)를 통한 필터링 과정에 의해 오염원이 제거된 청정 공기로 정화되고, 에어가이드(126)를 통해 배출된다.

그와 같이 공기청정기(100)의 기본적인 기능을 행하는 한편, 본 고안은 공기청정기(100)에 장착된 광고판(130)을 통해 광고기능을 제공할 수 있으며, 계속해서 광고 기능에 대해 설명하기로 한다.

상기 광고기능은 제 1광고판(132)과 제 2광고판(134)을 통해 이루어진다.

상기 광고기능은 상기 공기청정기(100)의 공급전원과 별도로 전원이 공급되고, 경우에 따라서는 선택스위치 조작에 의하여 제 1광고판(132) 또는 제 2광고판(134)을 선택하여 구동시킬 수 있다.

상기 전원이 공급되면 상기 제 1광고판(132)의 내부에 설치된 광원으로부터 빛이 발산되고 상기 빛은 도광관에 의해 고르게 분산되어 이미지가 형성된 패넌을 비추게 된다. 이는 주변 조도에 따라 광원을 온/오프시킬 수 있는바, 주변 조도가 밝은 경우에는 광원을 오프시킨 상태에서도 충분히 이미지를 표시할 수 있으며, 실내 또는 주변 조도가 현저하게 낮은 장소에는 광원을 온 시킴으로써 이미지를 밝게 비추어 표시할 수 있다.

이는, 공기청정기(100)의 기능뿐만 아니라 액자 또는 광고 기능을 제공할 수 있는 것이다.

그리고, 상기 제 1광고판(132)에 부착된 이미지는 다른 이미지로 교체가능하기 때문에 공기청정기(100)가 설치되는 공간 또는 사용자가 원하는 광고 문안에 맞는 이미지로 바꿀 수 있음은 물론이다.

한편, 상기 제 2광고판(134)을 통해서도 광고기능을 제공할 수 있는 바, 상기 제 2광고판(134)은 발광다이오드(LED)에 의해 광고 문안이 정지상태로 표시되거나 연속적으로 변화되면서 표시되는 구조를 제공한다.

이때, 상기 제 2광고판(134)에 표시되는 광고 문안은 어느 하나의 광고문안만이 표시되는 것이 아니라 다수의 광고문안을 메모리에 저장한 상태에서 사용자의 선택조작에 의해 다른 광고문안이 표시되도록 할 수 있다. 상기 광고문안은 회사 로고나 상품 소개 등과 같은 정보로서 임의로 저장할 수 있다.

따라서, 상기 제 1광고판(132) 또는 제 2광고판(134) 중 어느 하나만을 구동시킬 수 있지만, 제 1광고판(132)의 이미지에 맞게 제 2광고판(134)에 광고문안을 표시하게 되면 입체적으로 보다 더 광고기능을 제공할 수 있게 된다.

한편, 상기 광고판(130)의 힌지축을 중심으로 자석성질에 의해 결합되어 있는 부분을 당김으로써 손쉽게 광고판(130)을 공기청정기(100)의 하우징(120)으로부터 이격시킬 수 있기 때문에, 상기 필터모듈부(110)의 각각의 필터(102, 104, 106, 108)들을 분리하여 손쉽게 청소할 수 있다.

고안의 효과

이상에서 설명한 바와 같이, 본 고안의 광고판이 구비된 공기청정기에 따르면 공기청정기의 일면에 이미지 및 문자를 표시할 수 있는 광고판이 회동가능하게 장착되어 공기청정 기능 이외에도 선택적으로 액자 기능 및 광고 기능의 복합적인 기능을 제공하기 때문에 경쟁 제품에 비하여 경쟁력 확보를 기대할 수 있다.

더욱이, 공기청정 기능과 함께 광고를 행할 수 있기 때문에 저렴한 비용으로 광고효과를 극대화할 수 있는 효과가 있다.

한편, 본 고안은 상술한 특징의 바람직한 실시예에 한정되지 아니하며, 청구범위에서 청구하는 본 고안의 요지를 벗어남이 없이 당해 고안이 속하는 분야에서 통상의 지식을 가진 자라면 누구든지 다양한 변경 실시가 가능할 것이다.

(57) 청구의 범위

청구항 1.

외부의 오염된 공기를 필터시스템의 필터링 과정에 의해 청정공기로 정화하여 배출시키는 공기청정기에 있어서,

상기 공기청정기의 일면에는 그 공기청정기를 구성하고 있는 본체 하우징과 일정 간격 이격되며, 일단은 힌지 결합됨과 아울러 타단은 자력에 의해 탈부착 가능한 광고판이 구비되고,

상기 광고판은; 상기 공기청정기에 공급되는 전원과 별도로 전원을 공급받으면서, 전면에 소정 이미지가 도시된 패널을 함께 비추도록 내부에 설치된 광원으로부터 나오는 빛을 고루 분산시켜 그 패널에 빛이 일정하게 확산시키기 위한 도광판이 구비되는 제 1광고판 및, 제 1광고판과 일체 형성되며 발광소자가 설치되어 소정 광고문안을 표시하는 제 2광고판으로 구비되는 것을 특징으로 하는 광고판이 구비된 공기청정기.

청구항 2

제 1항에 있어서,

상기 제 1광고판 및 제 2광고판에 전원을 선택적으로 공급하거나 모두 공급할 수 있도록 선택스위치가 구비되는 것을 특징으로 하는 광고판이 구비된 공기청정기.

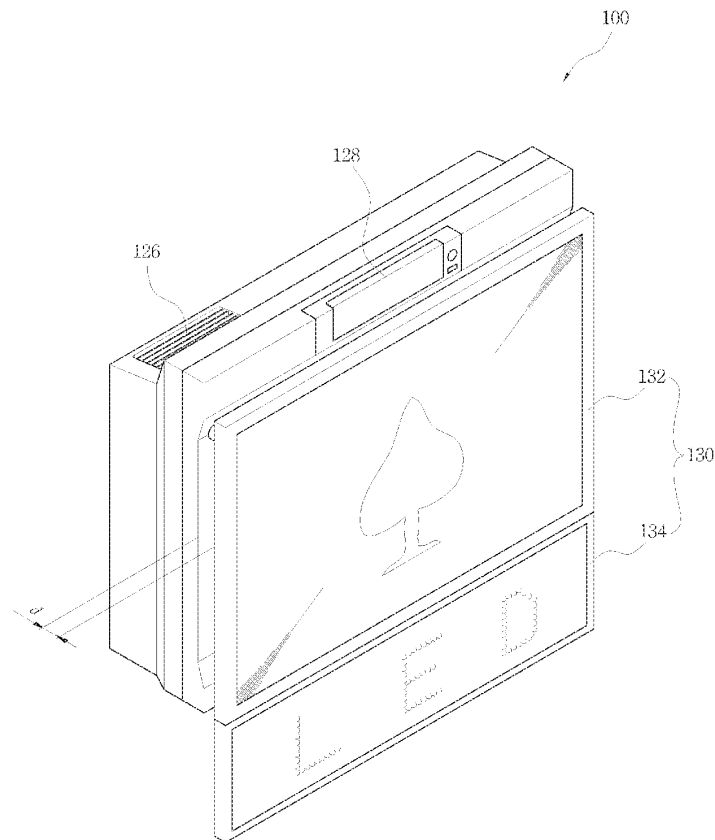
청구항 3

제 1항에 있어서,

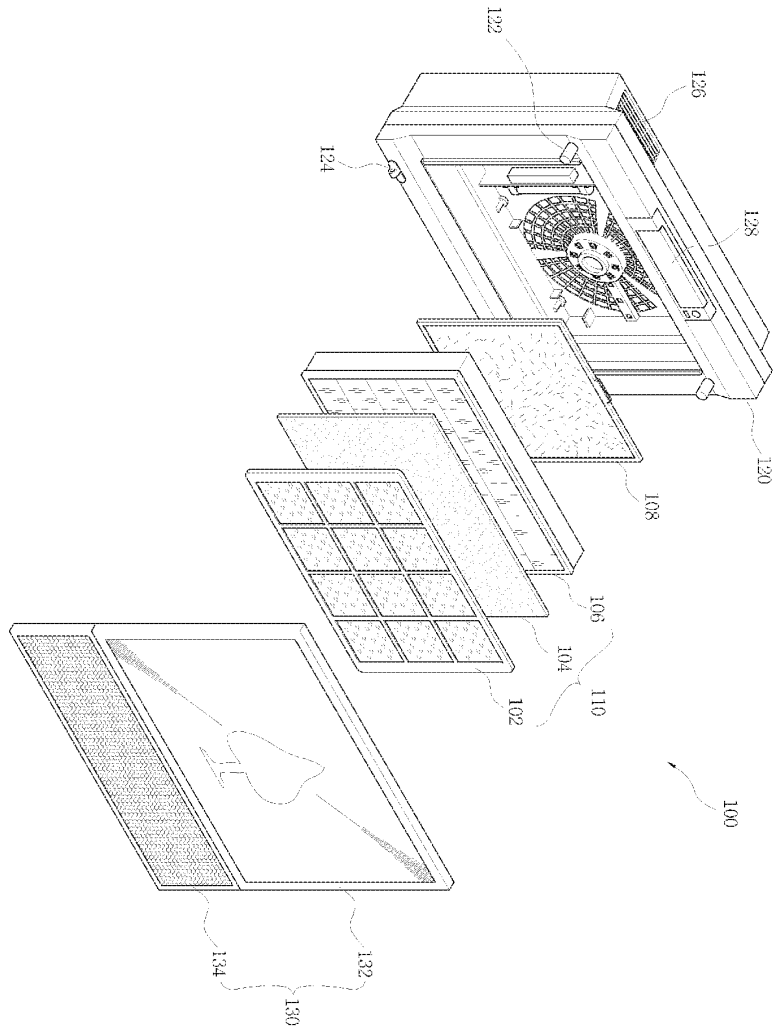
상기 제 1광고판에 구비된 이미지는 다른 이미지로 교체 가능하며, 상기 제 2광고판에 표시되는 광고문안이 다수개 저장되는 메모리가 더 구비되는 것을 특징으로 하는 광고판이 구비된 공기청정기.

도면

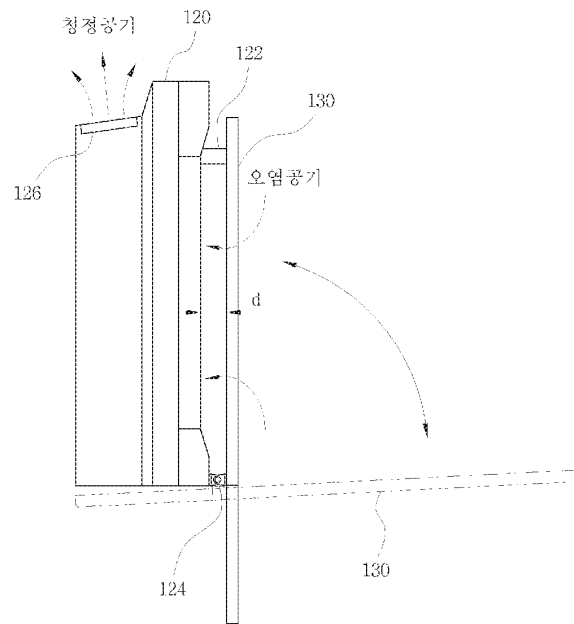
도면1



도면2



도면3



**Espacenet****Bibliographic data: KR200401354 (Y1) — 2005-11-15**

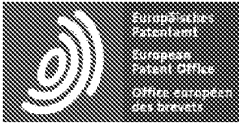
Cooling Structure for Liquid Crystal Display**Inventor(s):****Applicant(s):**

Classification: - international: **G02F1/1333**; (IPC1-7): G02F1/1333
- cooperative: **G02B6/0085**; **G02F1/133385**; **G02F1/133603**;
G02F1/133608 [more](#)

Application number: KR20050025873U 20050907 [Global Dossier](#)

Priority number(s): KR20050025873U 20050907

Abstract not available for KR200401354 (Y1)



Notice

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DESCRIPTION KR200401354

Technical Field [0001] The present invention relates to a cooling structure for a liquid crystal display device,

1 is a perspective view showing an appearance of a liquid crystal display device according to the present invention;

2 is an exploded perspective view showing a heat dissipation structure of a conventional liquid crystal display device.

3 is an exploded perspective view showing a heat dissipation structure of a liquid crystal display device according to the present invention.

4 is an exploded perspective view showing a heat dissipation structure of another liquid crystal display device according to the present invention.

Fig. 5 is an exploded perspective view showing a heat dissipation structure of another liquid crystal display device according to the present invention; Fig.

6 is a perspective view showing a heat dissipation structure of a liquid crystal display device according to a preferred embodiment of the present invention;

7 is a perspective view illustrating a heat dissipation structure of a liquid crystal display device according to another preferred embodiment of the present invention;

8 is an explanatory view showing a heat source flow of the heat dissipation structure of the liquid crystal display device according to the present invention.

FIG. 9 is a perspective view showing an embodiment of a combination of a plate heat pipe and a heat sink according to a preferred embodiment of the present invention; FIG.

FIG. 10 is a partial view showing a top - to - bottom coupling structure of a liquid crystal display device according to a preferred embodiment of the present invention; FIG.

11 is a partial sectional view showing an internal section of a plate - shaped heat pipe applied to a preferred embodiment of the present invention;

(Description of Reference Numerals for Main Parts of Drawings)

10;

An external chassis 11, a first chassis 12, a second chassis

[12]

12a second chassis slope 20, a backlight unit (BLU) 30, an LCD panel (LCD panel)

40;

A light transmitting portion 41, a prism sheet 42,

43;

A reflective sheet 44, a light guide plate 50, an LED package circuit board (LED package circuit board)

51;

LED 60, backlight unit frame (BLU frame) 70: control panel

100;

A heat radiating plate 110a, a side ventilation hole 110b,

[110]

110c; an inclined surface ventilation hole 120; a separating wall 200;

211;

A plate - shaped heat pipe container 212; Plate type heat pipe channel

220;

A heat sink 230;

[32]

BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to a heat dissipation structure of a liquid crystal display device including a backlight unit (hereinafter referred to as BLU) using an LED as a light source, and more particularly, Has a heat dissipating structure in which a very excellent heat pipe is used as a heat transfer medium and a heat sink for dissipating heat transferred to a heat pipe is disposed in an upper space of an outer chassis of the liquid crystal display device. The heat pipe takes the form of a plate for thinning the heat dissipation module. In general, LCDs such as TFT - LCDs are light - emitting elements that can not emit light themselves, and thus an external light source is required, and the device that provides this light is a BLU. Light sources used in BLU include cold cathode fluorescent lamp (CCFL), light emitting diode (LED), and surface light source (FFL). In recent years, the adoption of LEDs having advantages of high power consumption, low power consumption, environment friendly, and thinness has been increasing in the light source market led by cold cathode fluorescent lamps. LED has the advantages described above, but has a disadvantage that the light efficiency is as low as 20 to 30%. 32The number of LEDs used in the BLU of an inch TFT - LCD is about 400 (about 1W consumed power per LED), and the heat generated here is about 280W. Failure to dissipate such high temperatures can lead to short circuit of the LED printed circuit board on which the LED is mounted, causing BLU inoperability, and durability and reliability are largely lowered due to the operation of the related electronic components in a high temperature environment. A cold cathode fluorescent lamp mainly used as a BLU light source of a conventional liquid crystal display device has a very small calorific value as compared with an LED, and a BLU frame 60, which is a structure for accommodating the BLU, is used as a heat discharger or a fin - 100), and heat generated from a heat source such as a light source is radiated to the outside using natural convection or forced convection. 2 shows a heat dissipation structure of a conventional liquid crystal display device. Recently, the adoption of LEDs as a BLU light source of a liquid crystal display device is increasing. The heat generated in the LED 51 is dissipated to the outside through the heat emitting body 100 mounted on the rear surface of the BLU frame 60. However, the volume of the heat emitting body 100 is increased, I have.

Also, although a large - capacity cooling fan is employed to promote heat dissipation, it has a problem that a large noise is generated. The object of the present invention is to provide a heat dissipation structure of a liquid crystal display device having excellent heat dissipation performance while satisfying the thinning requirement of a liquid crystal

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SEC et al. v. MRI
SEC Exhibit 1031.0406
IPR2023-00254

display device. The heat sink is used as a medium for transferring the heat generated by the LED. A heat sink, which is a main means for being coupled to the plate - type heat pipe condenser and dissipating the heat to the outside, And a heat radiation structure of a liquid crystal display device which is excellent in heat radiation performance and can be made thinner and lighter.

In order to achieve the above object, the present invention provides a liquid crystal display device including a BLU (20) using an LED as a light source, wherein a cooling module having a plate heat pipe (200) and a heat sink Thin, lightweight, and improved in heat radiation performance. The plate heat pipe 200 is mounted on one side of the LED package circuit board 50 or the back surface of the BLU frame 60 with a side of the plate heat pipe 200 attached thereto. The LED package circuit board 50 or the plate - shaped heat pipe 200 installed on the rear surface of the BLU frame 60 is installed at an acute angle with respect to the gravity direction. Here, the direction in which the channel 212, which is the working fluid movement space in the plate - type heat pipe 200, is formed is the same as the installation direction of the plate - type heat pipe. The plate heat pipe 200 is a plate type in which at least one surface of the upper and lower surfaces of the container 211 has a constant flatness for reducing the thickness and resistance to heat. The heat sink 220 is installed on the plate - shaped heat pipe 200, which is disposed at an acute angle with respect to the direction of gravity by the heat dissipating means of the plate - type heat pipe 200. The heat sink 220 coupled to the upper portion of the flat plate heat pipe 200 is installed in a space above the second chassis 12 to reduce the thickness of the liquid crystal display device. And may be installed in the upper space of the first chassis 11. The upper space of the second chassis 12, on which the heat sink 220 is installed, functions as a passage for air movement. And a side ventilation hole 110a, a top ventilation hole 110b or a slope ventilation hole 110c is installed on one side of the second chassis 12. [Also, a cooling fan 230, which is forced convection inducing means, may be mounted on the ventilation opening. According to a preferred embodiment of the present invention, the plate - shaped heat pipe 200 is provided at an acute angle with respect to the gravity direction on the back side of the LED 51 as an exothermic optical element, and the heat sink 220 is disposed on the upper side of the plate - By being installed in the upper space of the chassis, it contributes to the thinness of the liquid crystal display device, improves the heat radiation performance, and improves the reliability and durability of the liquid crystal display device.

BEST MODE FOR CARRYING OUT THE INVENTION Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. It should be understood that the detailed description of the

present invention is illustrative of the present invention and is not limited to the embodiments described herein but may be embodied in other forms. The above - described embodiments are provided so that the disclosure may be thorough and complete, and that those skilled in the art will be able to convey the spirit and scope of the present invention. In the accompanying drawings, some are exaggerated in order to clearly convey the features of the present invention. In addition, general additional components and devices of the liquid crystal display device which are not described in detail herein can be provided. 3, the cooling structure of a liquid crystal display according to the present invention includes a backlight unit 20 for providing a light source to an LCD panel 30, an LCD panel 30 as a light receiving element, and an LED 51 as an exothermic optical element. A cooling module to which the heat sink 220 and the plate heat pipe 200 for processing the generated heat are coupled, a control panel (not shown) such as a first chassis 11, a second chassis 12 and an LED driving circuit 70). The backlight unit 20 includes a light correction unit 40 composed of a light guide plate 44, a reflection sheet 43, a diffusion sheet 42, a prism sheet 41 and the like and an LED 51 serving as a light source. And a BLU frame 60 serving as a structure for coupling the BLU components such as the LED package circuit board 50 with the light transmission unit 40. [The BLU frame 60 also serves as a radiator for diffusing the heat generated by the LED 51 in addition to the structure supporting the BLU 20 component. 4, the heat sink 220 coupled to the upper portion of the plate - shaped heat pipe 200 may be divided into at least one unit, and the heat transferred through the plate - The separating wall 120 is installed on the upper surface of the second chassis 12 in order to minimize thermal interference between the first chassis 12 and the second chassis 12. [The partition wall is provided in proportion to the number of the divided heat sinks 220.

Also, an upper surface ventilation hole 110b may be formed on the upper surface to smoothly perform indoor and outdoor air inflow and outflow. 4 and 5 show a heat radiation structure by forced convection with a cooling fan 230 as a forced convection inducing means. Referring to FIG. 5, the heat transferred to the heat sink 220 through the plate - shaped heat pipe 200 without the cooling fan 230 as the forced convection means dissipates the heat source to the outside by natural convection. A side ventilation hole 110a and a slope ventilation hole 110c are formed in the second chassis 12 in order to smoothly radiate heat by natural convection. The outside low - temperature air flows into the side ventilator 110a, and the inflow air gets heat from the heat sink 220, and the heated air is discharged to the outside through the sloping ventilator 110c. 6 and 7, there is shown a heat dissipation structure of a liquid crystal display device in which a plate - shaped heat pipe 200 accommodated in a second chassis 12 and a heat sink 220 are coupled. 6 is a heat dissipation structure of a liquid crystal display according to a preferred embodiment of the present invention by forced convection provided with a cooling fan 230. FIG. The heat generated from the LED 51 is transferred to the upper

heat sink 220 through the plate heat pipe 200 and is discharged to the outside by forced convection by the cooling fan 230 mounted inside the side ventilation hole 110a. Thereby releasing heat. 7 is a heat dissipation structure of a liquid crystal display according to another preferred embodiment of the present invention by natural convection without a cooling fan. The heat generated by the LED 51 is transferred to the upper heat sink 220 through the plate heat pipe 200 and the air introduced from the side air vents 110a and the like takes heat from the heat sink 220, The ventilation hole 110c and the like. Referring to FIG. 8, the process of heat dissipation from the LED 51 to the outside will be described. Heat generated from the LEDs 51 mounted on the LED package circuit board 50 is transferred to the BLU frame 60 through the LED package circuit board 50. The BLU frame 60 serves as a structure for receiving the BLU components and at the same time diffuses the heat transferred from the LEDs 51 by using a large area to perform a heat radiation function to lower the heat amount per unit area.

Therefore, the material of the BLU frame 60 is preferably aluminum or the like having excellent thermal conductivity. The heat transferred and diffused into the BLU frame 60 is transferred to the plate - shaped heat pipe 200, and the heat is transferred to the internal working fluid, so that the liquid working fluid absorbs the heat and is changed to the vapor phase to move upward. The moved working fluid discharges heat by the cooling fan or the low - temperature outside air introduced from the side ventilated by the natural convection in the condensed part to which the heat sink 220 is coupled. The working fluid in the gas phase that externally releases heat is liquefied and returned in gravity direction by gravity and capillary force. By repeating this series of processes, heat generated from the LED 51 is emitted to the outside. Referring to FIG. 9, according to the cooling structure of the liquid crystal display device according to the present invention, the heat sink 200 is coupled to the upper portion of the plate - shaped heat pipe 200. In the plate heat pipe 200, a plurality of small heat spread pipes 200 are installed in parallel with each other depending on the arrangement of the LEDs 51. 10, in the cooling module including the plate heat pipe 200 and the heat sink 220 coupled to the plate heat pipe 200, the heat sink 220 is disposed in a space above the second chassis 12, . The plate - shaped heat pipe 200 is installed at an acute angle with respect to the gravity direction on the back surface of the LED package circuit board 50 or the back surface of the BLU frame 60, and a thermal interface material such as a heat dissipation pad is used to reduce thermal resistance . The channel direction of the plate - shaped heat pipe 200 is the longitudinal direction, and exhibits the maximum performance when the installation direction is the gravity direction. Referring to FIG. 11, the channels 212 of the plate - shaped heat pipe 200 are formed as a single unit or a plurality of units are formed in parallel. In case of a single channel, a circular container 211 having an inner wick or a circular heat pipe is compressed by pressing or the like to form a flat surface to form a plate - shaped heat pipe. 11 (b), a plate heat pipe in which a plurality of

channels are formed in parallel by extrusion or drawing processing does not require additional processing such as pressing, but surface grinding such as grinding may be added to improve flatness.

As described above, according to the cooling structure of the liquid crystal display device according to the present invention, since the heat generated in the LEDs 51 is dissipated to the outside, the cooling structure of the liquid crystal display device having excellent heat dissipation performance, .



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CLAIMS KR200401354

1.

1. A cooling structure for a liquid crystal display including a backlight unit (BLU) using an LED as a light source, the cooling structure comprising: a plate - shaped heat pipe for diffusing and transporting heat generated from the LED; A heat sink having a plurality of fins coupled to an upper portion of the plate - shaped heat pipe as heat dissipating means of the plate - type heat pipe; A second chassis for receiving the plate - shaped heat pipe and the heat sink; A second chassis upper space in which the heat sink is located and forms a travel section of the air flow; And an air vent formed on a side surface, an upper surface, or an inclined surface of an upper portion of the second chassis for flowing outside air into the heat sink.

2.

The cooling structure of a liquid crystal display device according to claim 1, wherein the plate - shaped heat pipe is provided on the rear surface of the LED package circuit board or the backlight unit frame.

3.

The cooling structure of a liquid crystal display device according to claim 1, wherein the plate - shaped heat pipe has at least one channel and at least one outer surface is flat.

4.

The cooling structure of a liquid crystal display device according to claim 1, wherein the plate - like heat pipe and the heat sink are integrally or detachably coupled.

5.

The cooling structure of a liquid crystal display device according to claim 1, wherein a cooling fan, which is forced convection inducing means, is provided on a side surface, an upper surface, or an inclined surface of the upper portion of the second chassis.

Electronic Acknowledgement Receipt	
EFS ID:	32459211
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Title of Invention:	ELECTRONIC DISPLAY WITH COOLING
First Named Inventor/Applicant Name:	William Dunn
Customer Number:	8698
Filer:	Eric Michael Gayan/Brianna Lacy
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Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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Total Files Size (in bytes):			198046232		

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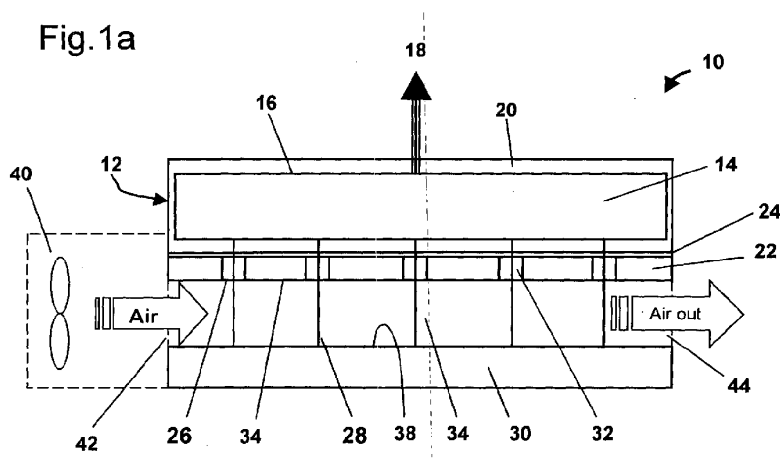
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(54) **Light emission display arrangements**

(57) The present invention provides arrangements for electroluminescent displays 10 comprising a packaged semiconductor light emitting element 12 that has a light emitting display side 16. A heat sink 22 is disposed in the region of a rear side of the light-emitting element 12 opposite to the display side. Electrical con-

nections 28 from the light emitting element 12 pass through said heat sink 22. Drive circuitry 30 for the light emitting element 12 is connected thereto by the electrical connections 28 and spaced apart from the heat sink 22 in such a manner that at least one cooling channel 34 is defined between the heat sink 22 and the drive circuitry 30 for the passage in use of a cooling fluid.

Fig.1a



EP 1 408 476 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to light emission from displays, e.g. flat panel displays and in particular to methods and apparatus for cooling a flat panel display, especially a large size segmented or tiled display, e.g. an LED or OLEO display. The displays are preferably suitable for display of varying digital or analog information, e.g. video films, television or camera pictures. The displays may be for use indoors or outdoors.

BACKGROUND TO THE INVENTION

[0002] It is known to provide an electroluminescent element, arranged for example in the form of a lighting unit or a display, especially as a flat panel display. Flat panel displays are described in "Display interfaces", R. L. Myers, Wiley, 2002. The electroluminescent element of a flat panel display may comprise one or more devices such as light emitting diodes (LED's), organic light emitting diodes (OLED), Liquid Crystals elements (LCD), Plasma elements (PDP), electroluminescent inorganic elements (EL-Displays), Field Emission elements (FED). If only one such device is used, or a small number of them, dissipation of heat generated during emission of light does not generally pose any great problem. Many devices of this type do not, however, produce much light individually and need to be grouped into arrays in order to be useful for many applications. The collective heat generated by such arrays may prove harmful to the devices forming the array and the ability to dissipate it will dictate the density of devices in the array and their durability. This problem is particularly acute in tiled display apparatus, which may be assembled by juxtaposition of a plurality of arrays and provide little scope for peripheral heat dissipation due to their abutting each other along their side edges. Further, electroluminescent materials used may degrade at different rates at different temperatures. For example, aging may result in lower luminosity and/or colour shifts and therefore to variations in display quality across a large display area. Where displays have to be sealed against water or dust this sealing can increase the difficulty of extracting heat.

[0003] In US-6161910 an LED reading light is proposed in which an array of white LED's are provided with a tubular housing including two heat sinks. One heat sink is to the rear of the device behind an LED drive circuit and a front heat sink is interposed between the LED array and the drive circuit. The front heat sink is connected, via a thermal pad, to the rear side of the LED array. Heat generated by the LED's is transferred by conduction to the front heat sink, from where it flows radially outward to the tubular housing and then rearward to the rear heat sink. Such an arrangement concentrates heat dissipation around a periphery of the array. This makes it less than ideal for use in a tiled array, where

adjoining tiles would all be dissipating heat around their abutting edges. In addition, it will be noted that at least a portion of the heat generated by the LED's must be transported from the LED heat sink to a further (i.e. rear) heat sink before being dissipated. Thus temperature gradients are probably inevitable except at low power. Also the display has a considerable thickness or depth and weight caused by the plurality of heat sinks which need to contain significant amounts of metal to be effective.

[0004] In US-6255786 an LED display is disclosed for signs and proposes passive and active heat dissipation. Passive dissipation is proposed in the form of conduction from connector legs of the LED's to a solder pad of a circuit board. The whole circuit board is in turn connected to a rear-mounted heat sink via a heat pad. As the density of LED's increases, an active heat transfer device may be introduced in the form of a fan blowing onto the heat sink. Like the lamp of US-6161910, at least a portion of the heat generated by the LED's in this proposal must be transported from one heat sink (the solder pad) to a further (rear) heat sink for dissipation. Thus temperature gradients will be caused. An arrangement such as the one proposed in US-6255786 may prove bulky for use in a tiled array, requiring a rear mounted fan for each tile. Cooling air being blown onto the rear of the heat sink may be deflected sideways off the heat sink and interfere with the equivalent arrangement of adjacent arrays.

[0005] It is known to tile flat panel displays. Two types of tiled displays are shown schematically in Figs. 11a and B. In Fig. 11a two tiles 90, 91 are shown of the type where connections 94-96 to the light emitting elements of the arrays are attached to the side of the panels. LCD tiled displays can be made in this manner as described in US Patent Application 2002/0080302. The side connections require a T connector 96 between the tiles in one direction which should preferably be as narrow as possible. In the other direction T-connectors 94, 95 are provided. A mask 93 obscures the unsightly connection between the two tiles 90, 91. The connectors 94,96 extend in a direction opposite to the display direction.

[0006] In Fig. 11b two tiles 97, 98 are shown of the type where connections 99,100 connected to the light emitting elements of the arrays are attached to the rear side of the panels 97, 98. LED tiled displays can be made in this manner, for example as supplied by BARCO N.V. Belgium, the Dlite 7, 10, 14 and Ilite 6, 8, 10 ranges. Back connections are much more suited to tiled displays as the mask 93 can be very much smaller. As shown in the drawing the connectors 99,100 extend in a direction opposite to the display direction.

[0007] It can therefore be seen that, in at least the art of electroluminescent displays, it is desirable to produce an arrangement that provides adequate heat dissipation and that is preferably also suitable for assembly of multiple arrays to generate tiled display arrangements.

SUMMARY OF THE INVENTION

[0008] It is an object of the present invention to provide improved addressable displays and in particular to provide improved cooling arrangements for such displays, especially tiled or segmented displays.

[0009] It is also an object of the present invention to provide improved addressable displays and in particular to provide improved cooling arrangements for such displays suitable for use where the display must be sealed, e.g. against dust or water, or out of doors where they can be subject to moisture.

[0010] It is an object of the present invention to provide improved displays and in particular to provide improved cooling arrangements for such displays, especially tiled or segmented displays.

[0011] It is also an object of the present invention to improve the compactness of displays having cooling arrangements.

[0012] Accordingly, the present invention provides a display, especially a flat panel display comprising a substrate having an array of addressable light emitting devices. A light emitting device may comprise a combination of elements which, in combination, form a light emitting device, e.g. as is found in an LCD. The array has a light emitting display side facing in a first direction. An input is provided for inputting an arbitrary image, e.g. video, data or a still image. Drive circuitry for said array of light emitting devices is provided for driving said light emitting devices to display the arbitrary image. Electrical connections are provided from said light emitting devices to the drive circuitry, said electrical connections extending from a rear side of the substrate in a second direction substantially opposed to the first direction. Said drive circuitry is spaced apart from said array in such a manner that at least one cooling channel is defined between said array and said drive circuitry for extraction of heat from said array and said drive circuitry by passage in use of a cooling fluid through the cooling channel. The cooling channel is sealed with respect to both the array of addressable light emitting devices, and with respect to the drive circuitry for said array of light emitting devices.

[0013] The cooling channel may be arranged so as to extract heat from said array and said drive circuitry in parallel.

[0014] It is understood that a flat panel display does not have to be exactly flat but includes shaped or bent panels. A tiled display may be constructed in a variety of geometrical shapes if the substrate on which the light emitting devices are to be formed can be shaped in this way. A heat sink may be disposed in the region of a rear side of said array of light emitting devices opposite to said display side and forming one side of the cooling channel remote from the drive circuitry. Preferably, the heat sink abuts the rear side of the array. The electrical connections may pass through said heat sink and through the cooling channel. Said light emitting devices

may comprise semiconductor light emitting elements such as Light Emitting Diodes (LED's), for example in the form of surface mounted devices (SMD). Such devices may also be field controlled devices such as are used in plasma displays or field emission displays. The light emitting devices may also be made of other materials, e.g. they may be Organic Light Emitting Diodes (OLEO), EL-displays with phosphors or Liquid Crystal elements.

[0015] The array is preferably packaged when it is to be protected from dust or water or other environmental influences. For example, said light emitting array may comprise a plurality of Light Emitting Diodes (LED's) integrated into a silicon wafer and the packaging may comprise encapsulation for environmental protection. For instance, the elements may also be OLED's which are formed on a glass substrate which forms a barrier in the viewing direction. Generally the glass substrate will be sealed and therefore may be described as being part of encapsulation. Such encapsulation usually comprises, at least over a working area of said first side, a substantially transparent material. Tough, glass or shatter resistant plastic materials are preferred for the encapsulation such as polycarbonate or epoxy resin.

[0016] The heat sink may comprise a heat transporting plate having holes defined therein through which said electrical connections pass into. The connectors may pass through said cooling channel. Said heat sink may comprise a metallic material and electrical insulation may be provided between said electrical connections and said heat sink. The electrical connections may be completely insulated. The heat sink material may comprise, for example, aluminum or an alloy thereof.

[0017] Said cooling fluid may comprise a gas or may comprise a liquid. A preferred cooling fluid is a gas, especially air. A suitable liquid may comprise water. Said cooling fluid may be forced or drawn through one or more cooling channels by a fluid propulsion means. In the case of a gas cooling fluid, said fluid propulsion means may comprise a fan, blower or air pump arrangement which either blows or sucks. In the case of a liquid cooling fluid, said fluid propulsion means may comprise a pump or turbine. The cooling system may be open loop, with the cooling fluid being discarded after passage through the cooling channel. In the alternative, the cooling system may be closed loop, with the cooling fluid being recirculated. In the case of a closed loop cooling system, the cooling fluid may be cooled itself by means of a heat exchanger. In the case of gas-cooled closed loop system, a refrigerant gas may be used, such as those used in air-conditioning systems. If a liquid-cooled closed loop system is used, the cooling fluid may include a fluid other than water and may, for example, comprise distilled water with additives such as ethyl glycol, for example as anti-freeze and for corrosion inhibition.

[0018] The present invention also provides a tiled panel display formed from a plurality of display panels according to the invention, said plurality of display pan-

els preferably being juxtaposed and configured to form a unified tiled display. The inlets and/or outlets of the cooling channels need not be linked between said plurality of display panels forming said tiled display. Each cooling channel may discharge the fluid separately, for instance. Alternatively, the cooling may be provided by forcing a cooling fluid through several or all of the display tiles, some of which are connected in series to form a cooling circuit. In some cases, e.g. if cooling is very critical, it is advantageous to only have short cooling channels. In this way, the temperature drop between the beginning and the end of the cooling channel is reduced.

[0019] A panel display or tiled panel display according to the present invention may be used as a direct view display.

[0020] The present invention also provides a method of producing a panel display, the method including:

- a) providing an array of light emitting devices that has a light emitting display side facing in a first direction;
- b) providing drive circuitry for said array of light emitting devices spaced apart from said array in such a manner that at least one cooling channel is defined between said array and said drive circuitry for the passage in use therethrough of a cooling fluid;
- c) sealing said cooling channel from both the drive circuitry and the array; and
- d) connecting said drive circuitry to said array of light emitting devices by means of said electrical connections extending in a second direction substantially opposite to the first direction.

A heat sink may be disposed in the region of a rear side of said array of light emitting elements opposite to said display side, the heat sink forming a side of the cooling channel remote from the drive circuitry. The method may include providing said cooling fluid in the form of at least one of a gas or a liquid and preferably forcing or drawing it through the or each cooling channel using a fluid propulsion means.

[0021] The present invention also provides a method of producing a tiled display, including juxtaposing a plurality of panel displays produced using a method according to the present invention.

[0022] The present invention also provides a method of cooling a panel display, the method including:

- a) providing an array of light emitting devices that has a light emitting display side facing in a first direction;
- b) providing drive circuitry for said array of light emitting devices spaced apart from said array in such a manner that at least one cooling channel is defined between said array and said drive circuitry, the cooling channel being sealed from both the drive circuitry and the array of light emitting devices;
- c) electrically connecting said drive circuitry to said

array of light emitting devices by means of electrical connections passing through or adjacent to said cooling channel, and

d) passing a cooling fluid through the cooling channel.

[0023] The present invention will now be described with reference to the following drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Figs. 1a and b are schematic diagrams of a section through a flat panel display according to embodiments of the present invention;

Figs. 2a and b show a rear view and a front view, respectively of a display tile in accordance with an embodiment of the present invention;

Fig. 3 is the rear view of Fig. 2a with the fan assembly cover plate removed.

Fig. 4 shows the view of Fig. 3 with the door removed.

Fig. 5 shows the view of Fig. 4 with the controller removed.

Figs. 6a and 6b show the view of Fig. 5 with the drivers removed for two embodiments of the present invention.

Fig. 7 shows the front of the plate onto which the light emitting devices are mounted.

Fig. 8 shows a front view of the display panel without a cover plate.

Fig. 9a shows schematic views of cooling channels of a display shown in Fig. 6a. Fig. 9b shows schematic views of cooling channels of a display shown in Fig. 6b.

Fig. 10 shows an exploded view of a display panel in accordance with the present invention.

Fig. 11a is a schematic representation of a prior art LCD tiled display. Fig. 11b is a schematic representation of a prior art LED tiled display.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0025] The present invention will now be described by way of example only, with reference to certain embodiments and with reference to the above mentioned drawings. The skilled person will appreciate that many alternative arrangements are possible while still remaining within the scope of the attached claims. The invention will be described with reference to flat panel displays. It is understood that a flat panel display does not have to be exactly flat but includes shaped or bent panels. A flat panel display differs from display such as a cathode ray tube in that it comprises a matrix of array of "cells" or "pixels" each producing or controlling light over a small area. There is a relationship between the pixel of an im-

age to be displayed and a cell of the display. Usually this is a one-to-one relationship. Each cell may be addressed and driven separately. It is not considered a limitation on the present invention whether the flat panel displays are active or passive matrix devices. The array of cells is usually in rows and columns but the present invention is not limited thereto but may include any arrangement, e.g. polar or hexagonal. The invention will mainly be described with respect to LED and OLED displays but the present invention is more widely applicable to flat panel displays of different types, such as plasma displays, field emission displays, EL-displays, LCD's, etc. In particular the present invention relates not only to displays having an array of light emitting elements but also displays having arrays of light emitting devices, whereby each device is made up of a number of individual elements.

[0026] For a general understanding of the types and connectivity of semiconductor light emitting devices referred to herein, the reader is recommended to study: *"Semiconductor Devices: Physics and Technology"* by S. M. Sze, published by John Wiley & Sons Inc. under ISBN 0-471-33372-7.

[0027] Referring to the drawings and for the moment in particular to Figure 1 a, a flat panel display device 10 comprises a display 12 of an array 14 of light emitting devices. The light emitting devices are addressable, i.e. they can be addressed by a suitable control device to display any suitable image. The light emitting devices may comprise semiconductor elements or devices such as semiconductor light emitting diodes (LED's) or may be any other suitable light emitting devices or elements which may be arranged in an array for displaying 2D images, such as still or video images. Suitable light emitting elements are also organic light emitting diodes (OLED). The term light emitting device also includes combinations of elements which emit light and are addressable. An example of such a combination is an LCD in which a liquid crystal, one or more light polarizers, a light source and optionally coloured filters can be used to generate a light output. Light emission from the light emitting devices forming the array 14 is emitted from a display side 16 of the array 14 in a predetermined direction 18. This direction 18 is arranged such that, in use, the display 10 may be used as a direct view display, e.g. information may be read substantially directly from it by a user.

[0028] The array may require environmental protection, e.g. against dust or moisture. The array 14 may be formed from OLED's and be for use in indoors or outdoors. It is preferred to seal an OLED display environmentally. Alternatively, optical elements such as lenses may be located on the viewing side of the light emitting elements to provide certain effects, e.g. focussing the displayed light into a narrower but more intense beam with a reduced viewing angle and greater brightness. The array 14 may be formed from a series of surface mounted devices, for example deposited on a substrate

or integrated into a semiconductor wafer. Such devices may require environmental protection when the display is to be used out of doors. To protect the array 14 from environmental damage or degradation it is sealed in a package, by for example encapsulation 20. This is performed in such a manner that at least a working area of the display side 16 is covered in a substantially transparent material such as polycarbonate plastic. All items placed on the viewing side of the light emitting elements may reduce the ease with which heat is removed from that side of the display.

[0029] Preferably, a heat sink 22 is provided in the form of a heat transporting plate disposed in the region of a rear side of the array 14 of light emitting devices. The heat sink 22 is preferably in thermal communication with the light emitting devices and is arranged in use to absorb heat generated thereby. The heat sink 22 may comprise a metal having a high thermal conductivity, for example, aluminum or an alloy thereof. Thermal communication may be optimized by connecting the heat sink 22 to the rear face of the light-emitting display 12 through an optional thermal pad 24. In addition the heat sink 22 may be coloured suitably to absorb heat energy, e.g. mat black to absorb radiant energy.

[0030] The heat sink 22 defines a series of holes 26 through which electrical connections 28 pass between the array 14 and associated drive circuitry 30, which comprises power and control means for the display 10. In at least the case of bare metal electrical connections 28, it is preferable for the heat sink 22 to be insulated from those connections 28 and also insulated from the rear side of the light emitting elements. Electrical insulation 32 is provided to insulate the connections 28 from the heat sink 22 and may optionally be provided to insulate the light emitting elements from the heat sink 22, e.g. in the form of an insulating layer on the rear side of the light emitting devices. The electrical insulation 32 has electrical insulating properties, but may be thermally conductive so as to conduct heat away from the electrical connections 28. The insulation 32 may, for example, comprise any suitable material and may be provided in the heat sink 22, on the electrical connections 28 or a combination of the two.

[0031] The drive circuitry 30 is spaced apart from the heat sink 22, i.e. away from the assembly comprising the light emitting devices and heat sink 22, so as to define at least one cooling channel 34 between the array 14 and the drive circuitry 30. The heat sink 22 forms at least one side of the cooling channel. An additional heat sink and heat shield (not shown) may be located adjacent the drive circuitry and facing towards the cooling channel 34. According to an aspect of the present invention, the cooling channel 34 is sealed from both the array 14 and the drive circuitry 30. The cooling channel 34 provides a passage for a cooling fluid to pass across a heat exchange face 36 of the heat sink 22 and across an upper face 38 of the drive circuitry (or additional heat sink if present). The heat exchange face 36 of the heat

sink 22 (and/or the additional heat sink) may be ribbed or otherwise contoured so as to increase the surface area available for heat exchange to the cooling fluid, such profiling preferably being formed in such a manner as to promote laminar or turbulent flow. In displays having an increased LED density and in displays where the electronics are sealed off to avoid deterioration due to moisture, the heat extraction is even more difficult than for other displays. In these cases, it could be important to keep the cooling channel 34 very short, having a cooling channel 34 which goes straight through the display device 10, separating the array 14 of light emitting devices and the drive circuitry 30, as in the present invention. The cooling channel 34 should furthermore be preferably designed such that there is only cooling flow in one direction in the cooling channel 34, as illustrated in Fig. 1 a, whereby the array 14 of light emitting devices is separated from the electronic layer comprising the drive circuitry 30 by the cooling flow. The latter means that the cooling flow is in contact with both the array 14 of light emitting devices and the drive circuitry 30 at the same time, avoiding worse cooling or even reheating of components by a cooling flow that has already been heated too much by first passing another component, which may be the case when drive circuitry 30 and array 14 would be serially cooled by one and the same stream of cooling fluid. Furthermore, by the parallel extraction of heat from the drive circuitry 30 and from the array 14, the covered distance of the cooling fluid may be relatively short, so that an efficient cooling may be obtained due to a relatively low pressure drop of the cooling fluid in the cooling channel 34.

[0032] The cooling channel 34 is completely sealed from the drive circuitry 30, the electrical connections 28 and the array 14 of light emitting devices. This may allow the use of a liquid as a cooling fluid. Passage of cooling fluid through the cooling channel may be open loop or closed loop. In the case of open loop cooling, the cooling fluid is discarded after passing along the cooling channel 34. In closed loop cooling, the cooling liquid is recycled, preferably being cooled between cycles by for example a heat exchanger. The cooling fluid preferably comprises a gas, such as for example air. In a basic embodiment, air-cooling may be used in open loop form with the cooling provided by convection. The advantage of this approach is that it offers the simplest and cheapest construction.

[0033] The efficiency of cooling in an open-loop or closed loop arrangement may be improved by employing a fluid propulsion means adapted to force or draw the cooling fluid through one or more of the or each cooling channels. For a gas cooling system, a fluid propulsion means may conveniently be provided in the form of a fan, blower, venturi or similar apparatus such as an air pump adapted to provide forced convection. For a liquid cooling arrangement, a fluid propulsion means may comprise a pump, turbine or equivalent.

[0034] In the case of a closed loop gas cooling ar-

range ment, a suitable refrigerant gas may be used, such as those used in air-conditioning systems. In a closed loop liquid cooling system, a simple embodiment may employ water as a cooling fluid. It may, however, prove preferable to use a cooling fluid including a fluid or fluids other than tap water, such as for example distilled water mixed with additives such as ethyl glycol, for example as anti-freeze and for corrosion inhibition.

[0035] In the particular but non-limiting example illustrated in Figure 1a, an open loop gas cooling arrangement is shown. A fan 40 blows air into an inlet portion 42 of the cooling channel 34 and provides forced convection such that the cooling air exits from an outlet portion 44 of the cooling channel 34 after having passed over the surfaces 34, 38 of the heat sink 22 and drive circuitry 30.

[0036] Figure 1b shows an alternative open loop gas cooling arrangement. The reference numbers in Fig. 1b refer to the same items as in Fig. 1a and only the differences with respect to Fig. 1a will be mentioned. The fan 40 sucks air into the inlet portion 42 of the cooling channel 34 and provides forced convection such that the cooling air exits from the outlet portion 44 of the cooling channel 34 after having passed over the surfaces 34, 38 of the heat sink 22 and drive circuitry 30. In this arrangement a partition is provided in the middle of the cooling channel which directs the air flow to first cool the heat sink 22 and then to cool the drive circuitry 30. In an alternative arrangement the fan may blow air into the cooling channel 34 in which case the drive circuitry is cooled first followed by the heat sink 22. A barrier 45 is provided at the opposite end of the cooling channel 34 to reverse the air flow.

[0037] In order to provide large displays and/or displays that can be configured for diverse outputs, the present invention is adapted for juxtaposition of display units 10 to form tiled displays. In order to make such tiled displays appear as if they are one-piece, the gap between neighbouring displays is preferably kept to a minimum.

[0038] A single tile 50 of such an array being an embodiment of the present invention will be described with reference to Figs. 2 to 11. Figs. 2a and b show the reverse side and the display side of a tile 50, respectively. On the reverse side, connectors 54 are mounted on a door 56 which can house a power supply. Connectors can be provided for a variety of functions, e.g. for power input, for control purposes and for input of an image signal. With respect to the latter, the display according to the present invention has an input for image signals which are to be displayed by the addressable light emitting elements in the display. For various protocols such as VESA GTF, CIF, VGA, NTSC, CCIR-601, SMPTE, SXGA, HDTV, Wide XGA, Ultra XGA, etc. which may be used with the present invention reference is made to standards works such as "Display Interfaces", R. L. Myers, Wiley, 2002

[0039] A plate 52 covers a fluid propulsion unit for

generating a convective cooling flow in cooling channels, e.g. one or more fans when the fluid is a gas, e.g. air. The display side comprises a cover sheet 55 underneath which a plurality of display devices 58 are provided in the form of an array 59, e.g. the light emitting devices may be LED's or OLED's. Fig. 3 shows the reverse side of the tile 50 of Fig. 2 with the cover plate 52 removed thereby exposing a fluid propulsion assembly such as a fan assembly having a number of fans 60. The cover plate 52 covers the fans 60 and provides an air inlet. The fans may be impregnated to have an IP54 rating. Fig. 4 shows the reverse side of Fig. 3 with the door 56 and power supply removed. A power supply 61 is thereby exposed. Fig. 5 shows the view of Fig. 4 with the fan assembly 60 and the power supply 61 removed. A controller 62 and a driver assembly 64 with one or more drivers are then exposed. The drivers are able to drive a plurality of light emitting elements 58 of a display 59 so as to display an arbitrary still image, an arbitrary data image or an arbitrary video image or similar. Where the fans have been removed the entrance of one or more cooling channels 66 can be seen. The exit 88 for the cooling channels 66 can be located on the opposite side of the tile 50. The fluid outlet 88 of one tile 50 may be connected to the fluid inlet 66 of the next tile when assembled. Figs. 6a and b both show cooling assemblies being the view of Fig. 5 with the drivers 64 removed for two different embodiments. A plate 68 is visible for mounting the drivers 64 and the controller 62. The plate 68 may be made of a heat conducting material, e.g. aluminium and may act as a heat sink on the controller/driver side of the cooling channel 66. On the opposite side a similar plate 69 is mounted. Holes 70 are provided for receiving connectors from the drivers to the array of light emitting devices 58. In Fig. 6a, the cooling channels 66 run underneath the plate 68 and exit at 88. These cooling channels are shown in more detail in Fig. 9a. Also shown in Fig. 9a are the connector holes 70 for receiving the connectors which connect the drivers 64 to the array 59. The connectors when mounted preferably pass through the cooling fluid in the cooling channels and are therefore cooled optimally. The exiting cooling fluid such as air may be released to the atmosphere via 88 or conveyed to another part of the display system, e.g. to the fluid input of the next tile or to an air cooling unit from which it returns to the input of a tile. In Fig. 6b an alternative cooling arrangement is shown in which the cooling channels are arranged in a labyrinth/serpentine between plate 69 and plate 68, e.g. a series of meanders over the full width of plate 68 and exit from the input side through one of the channels 66 as shown in Fig. 9b. Note that in this case the connectors 86 are received in holes 70 and are located adjacent to the cooling channels. An alternative for meandering the cooling channels 66 over the full width of plate 68 may be meandering back and forward from left to right, referenced to figure 9b section A-A, instead of meandering back and forward from top to bottom. The inlets and out-

lets of the cooling channels 66 are on the same side of the tile. This is advantageous for side mounted connectors, e.g. for LCD displays, where access for cooling may be limited by the connector positions. In all cases the cooling channels 66 are preferably arranged over the area of the light emitting devices 58 so as to provide uniform cooling of all elements of the display array 59.

[0040] Fig. 7 shows the front side of the display to which the display array 59 is attached. It shows one or more heat sinks 72 which are made of a heat conducting material, especially a metal such as aluminium. Holes 74 are provided which line up with the holes 70 shown in Fig. 6 when assembled so that connectors can pass through these holes 70, 74 from the drivers to the display elements 58. The display array 59 (as shown in Fig. 8) is attached to this plate to form a display unit. A cover sheet 55 may be applied to protect the display 59 (see Fig. 2b).

[0041] The various plates of the display device are connected together using suitable studs and bolts and may be sealed with suitable gaskets in a packaged manner so that the display is environmentally protected. Fig. 10 shows an exploded view through the assembled device. From bottom to top: a transparent protection sheet 55 is secured to the board 80 on which an array 59 of light emitting devices 58 are located. The light emitting devices 58 of the display array 59 are connected with one or more connectors 86 to the driver board(s) 64 through holes in the one or more plates (heat sinks) 72 and plate(s) 67, 68 (heat sink). The connectors 86 extend from the rear side of the array 59 in a direction parallel to the main viewing direction, i.e. opposite to the display direction. The drivers 64 are connected to the controller 62. The controller 62 and the other devices are powered by a power supply 61 located on the door 56. The plate 52 covers the region of the forced cooling equipment 60 (e.g. fans) which force cooling fluid into the cooling channels 66. It can be seen in this arrangement that sources of heat such as a power supply, a controller, the drivers for the light emitting devices are all arranged on one side of the cooling channels, namely the side remote from the viewing surface of the display, whereas the light emitting devices themselves are located on the other side of the cooling channels. Thus the heat sources are separated from the sensitive light emitting elements by the cooling channels.

[0042] It can therefore be seen that an arrangement according to the present invention provides improved cooling for flat panel displays, in particular for those that include packaged light emitting devices. The heat sink draws heat substantially directly off the light emitting devices forming the array and there is little danger of mutual heating between the cooling surfaces of the display and its drive circuitry. In addition, precise conduits may be formed for the coolant fluid, which lends itself to more precise control of overall heat exchange. The electrical connections benefit from direct cooling from the cooling fluid along at least a portion of their length. In particular

the connectors are cooled close to their connection to the light emitting devices of the array so that heat transferred along the metal conductive pathways in the connectors can be removed before it reaches the light emitting elements. Also the present invention lends itself to tiled displays having minimal gaps between constituent parts whilst providing efficient cooling sufficient to allow use of light emitting devices of the surface-mount variety and/or devices integrated into a silicon wafer. In the above mentioned embodiments, the cooling at those places where the fans 60 are mounted differs from the cooling at places where the cooling channels 66 are present. This can have negative effects as there can be a difference in cooling ability at one of these places. In alternative embodiments, not represented in the drawings, and having the same features as the above embodiments, this problem may be avoided by placing an inlet of the cooling channel 66, and consequently also the fan(s) 60, at the back of the flat panel display device 10, instead of at the side of the flat panel display device 10, whereby the cooling channel 66 is immediately led between the array 14 of light emitting devices and the drive circuitry 30 to allow parallel cooling of both parts, i.e. without cooling e.g. the drive circuitry 30 first. In this way, cooling of the array 14 of light emitting devices and the drive circuitry 30 occurs in parallel, i.e. simultaneously. In the same way the exit 88 of the cooling channel 66 can be directed to the back of the display device 10, thereby providing a connection that is as short as possible between the part of the cooling channel 34 which runs substantially parallel to the array 16 and the back of the display device 10. The latter is preferred to avoid large cooling channels 34 with inherent pressure drops and inefficient cooling, as well as unnecessary heating of the components, e.g. by passing already heated cooling fluid over other elements to be cooled.

[0043] The cooling channel 34, running substantially parallel to the light emitting part and the electronics part, can be present along the whole display, with a single inlet and outlet to the back. In other embodiments, different inlets and outlets can be used, all positioned at the back side of the display, but all installed such that no real cooling takes place prior to the channel being in between the array part and the electronics part, the cooling fluid thus being provided so as to perform cooling of both parts simultaneously. While the present invention has been particularly shown and described with respect to a preferred embodiment, it will be understood by those skilled in the art that changes in form and detail may be made without departing from the scope and spirit of the invention.

Claims

1. A panel display comprising:

a) a substrate having an array of addressable

light emitting devices, the array having a light emitting display side facing in a first direction;
b) an input means for inputting an arbitrary image;

c) drive circuitry for said array of light emitting devices for driving said light emitting devices to display the arbitrary image;

c) electrical connections from said light emitting devices to the drive circuitry, said electrical connections extending from a rear side of the substrate in a second direction opposed to the first direction; and

d) said drive circuitry is spaced apart from said array in such a manner that at least one cooling channel is defined between said array and said drive circuitry for extraction of heat from said array and said drive circuitry by passage of a cooling fluid through the cooling channel,

wherein the cooling channel is sealed with respect to both the array of addressable light emitting devices, and with respect to the drive circuitry for said array of light emitting devices.

2. A panel display according to claim 1, wherein the cooling channel is arranged so as to extract heat from said array and said drive circuitry in parallel.

3. A panel display according to any of the previous claims, wherein the panel is flat or curved.

4. A display according to any of the previous claims, wherein a heat sink is disposed within or adjacent said at least one cooling channel.

5. A display according to claim 4, wherein the heat sink is disposed in the region of the rear side of said array of light emitting devices opposite to said display side.

6. A display according to any previous claim, wherein said light emitting devices comprise semiconductor light emitting devices.

7. A display according to claim 6, wherein said light emitting devices comprise a plurality of Light Emitting Diodes (LED's) or organic light emitting devices (OLED's).

8. A display according to any previous claim, wherein said light emitting devices are packaged for environmental protection.

9. A display according to claim 8, wherein said encapsulation comprises, at least over a working area of the display side, a substantially transparent material.

10. A display according to any of the claims 4 to 9, wherein said heat sink comprises a heat transporting plate having holes defined therein through which said electrical connections pass.

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11. A display according to claim 10, wherein said heat sink comprises a metallic material and electrical insulation is provided between said electrical connections and said heat sink.

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12. A display according to any preceding claim, wherein said cooling fluid comprises a gas or a liquid.

13. A display according to any preceding claim, wherein said cooling fluid is forced or drawn through one or more cooling channels by a fluid propulsion means.

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14. A tiled display formed from a plurality of flat panel displays according to any preceding claim, said plurality of displays preferably being juxtaposed and configured to form a unified said tiled display.

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15. A tiled display according to claim 14, wherein said cooling channels are separated between said plurality of displays forming said tiled display.

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16. A tiled display according to claim 14, wherein the cooling channels of a plurality of flat panel displays forming the tile display are connected together to form a cooling circuit.

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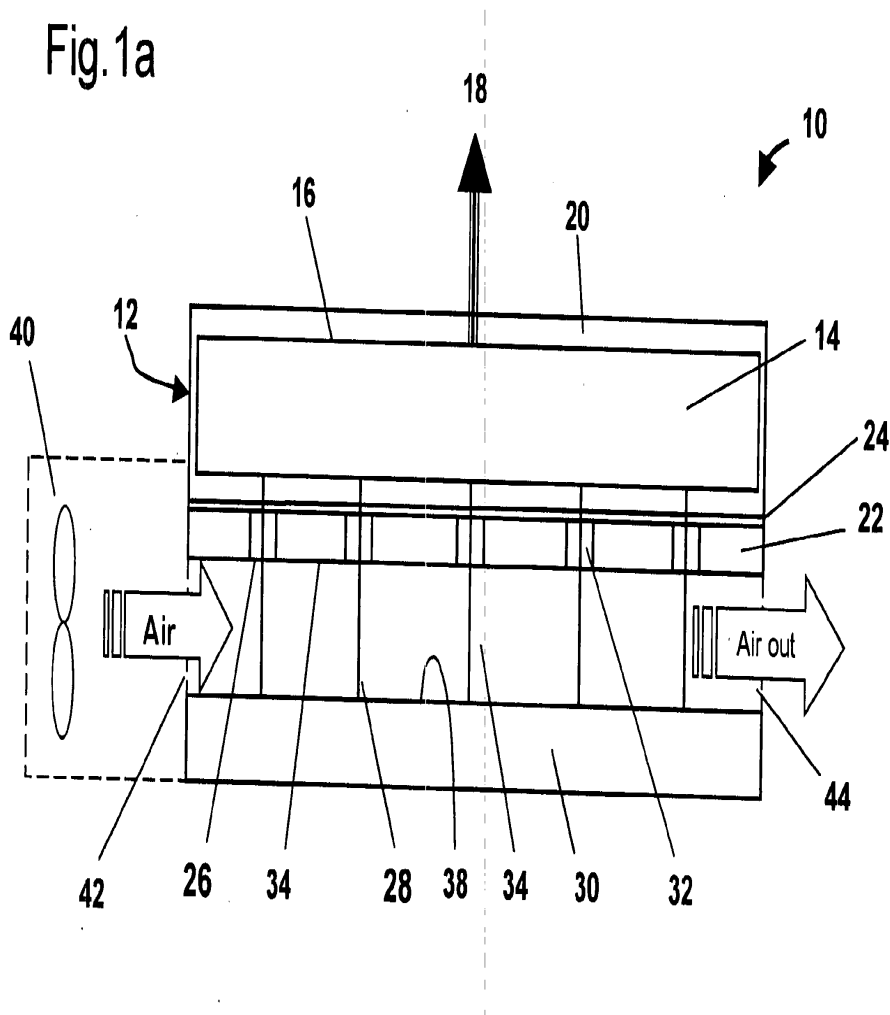
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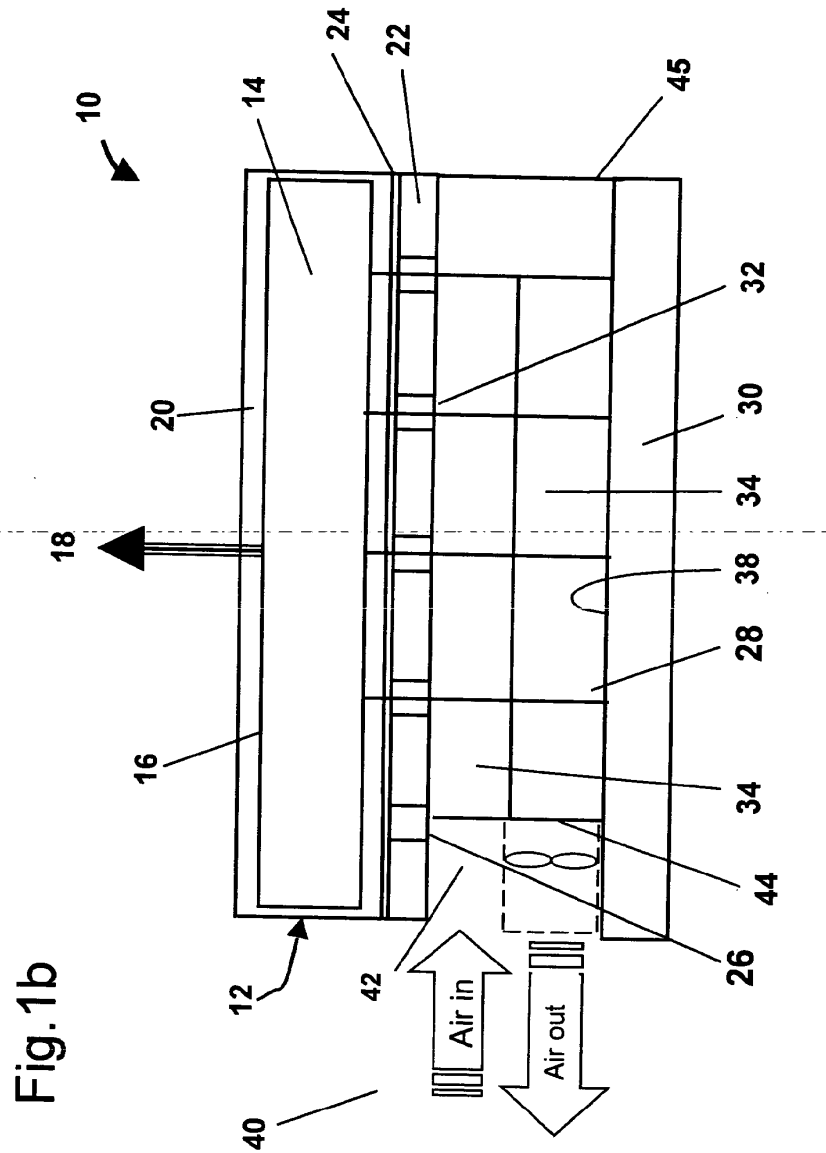
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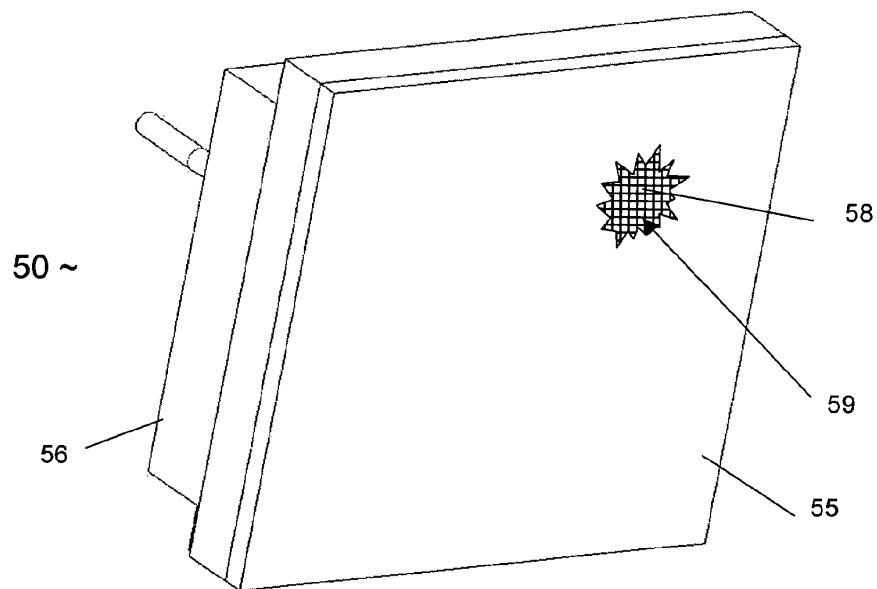
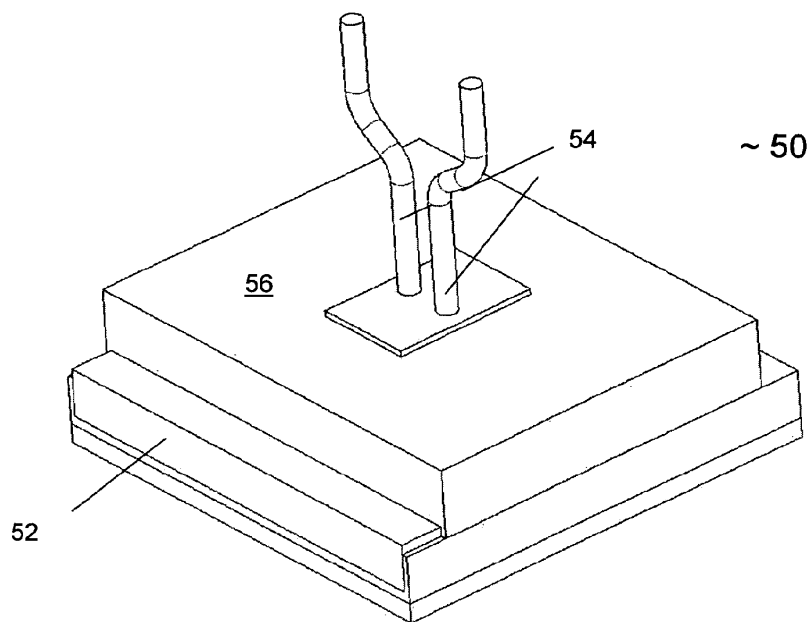
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Fig.1a



EP 1 408 476 A1





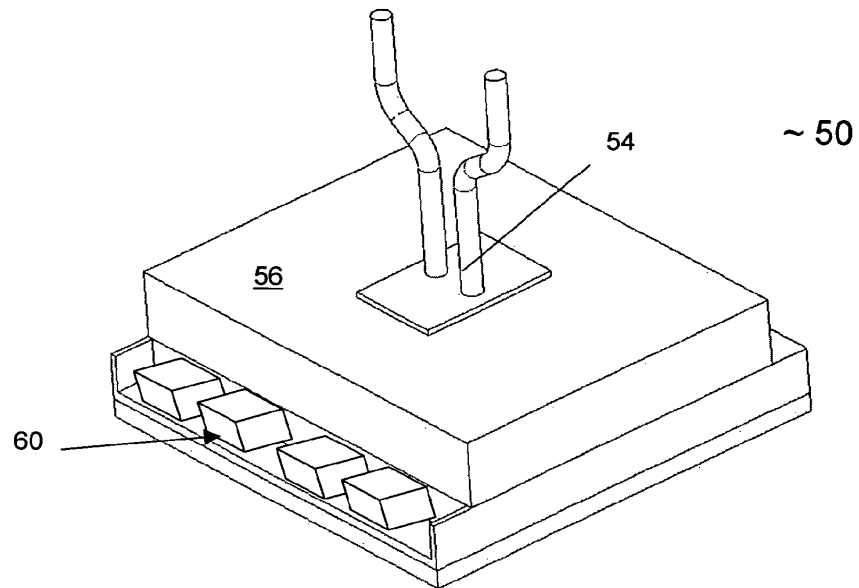


Fig. 3

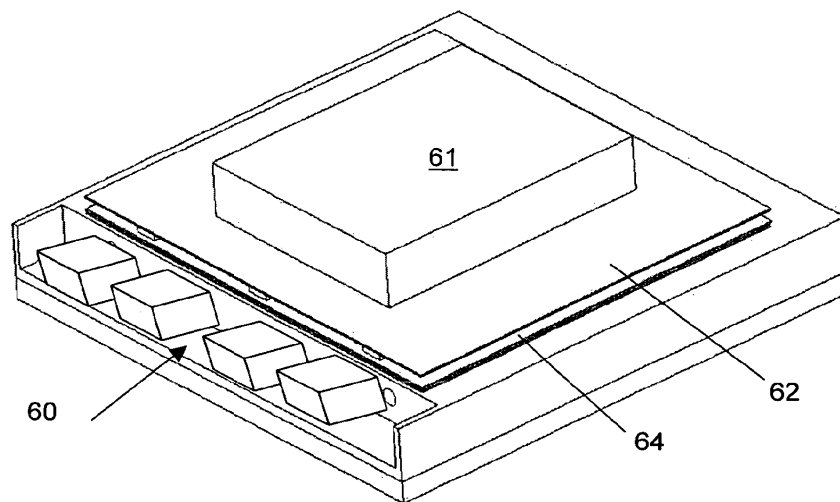


Fig. 4

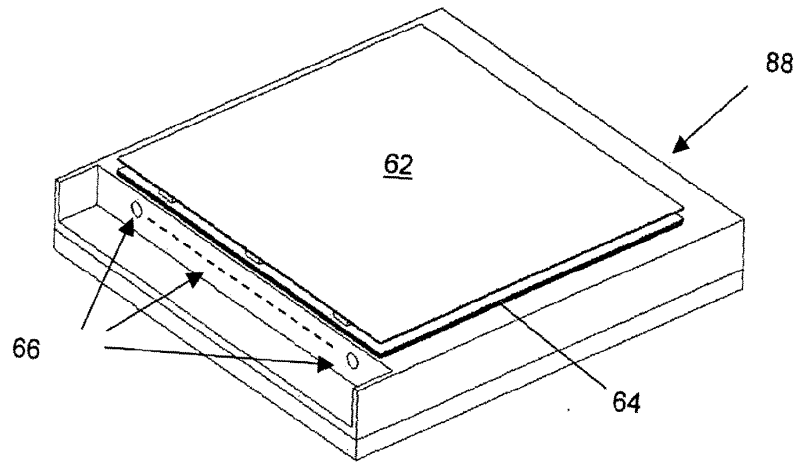


Fig. 5

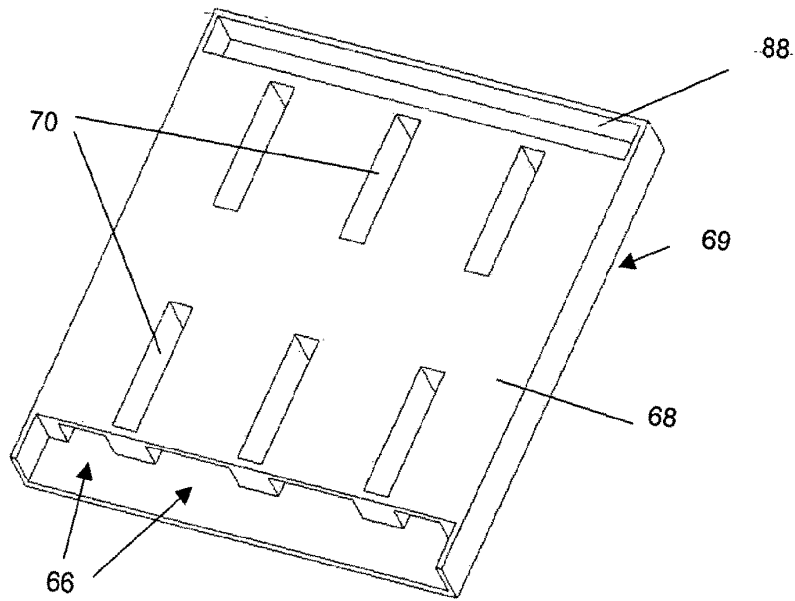


Fig. 6a

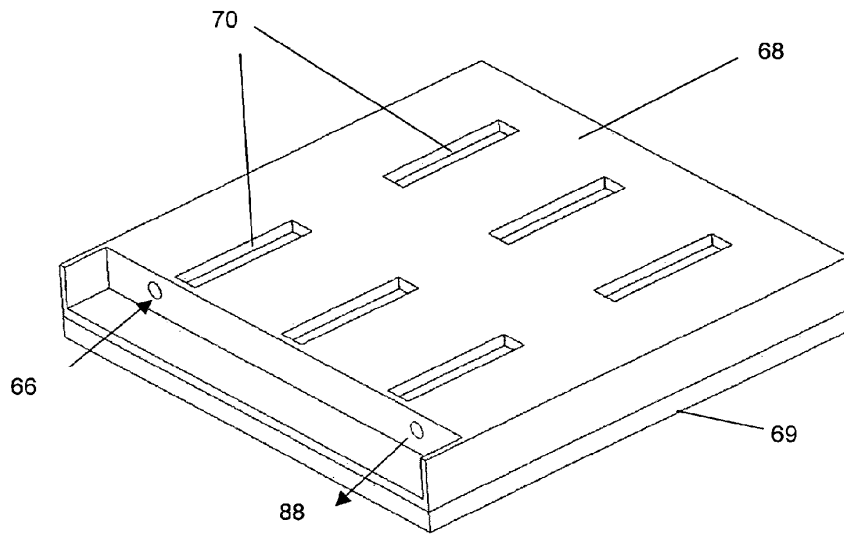


Fig. 6b

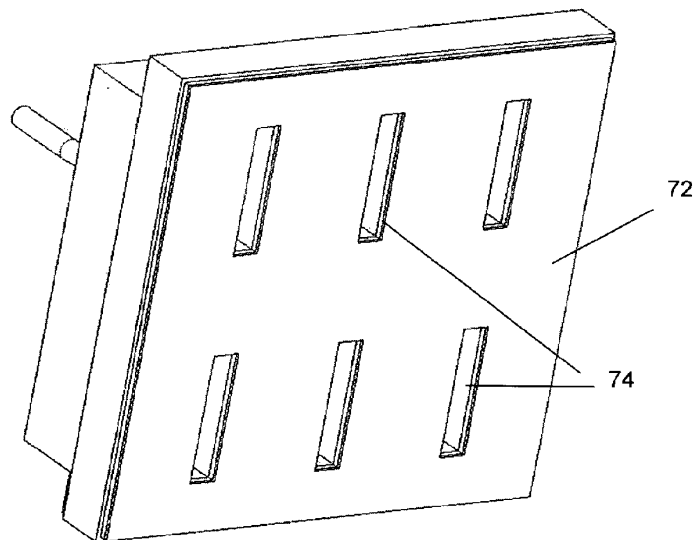


Fig. 7

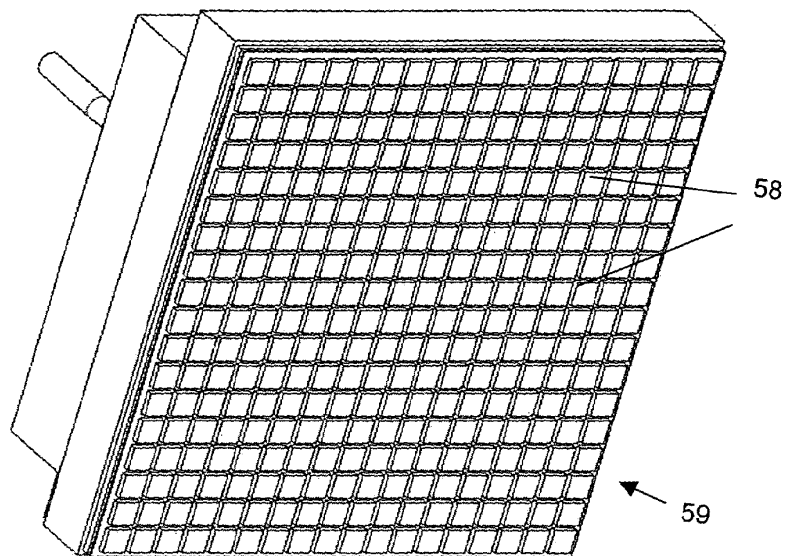


Fig. 8

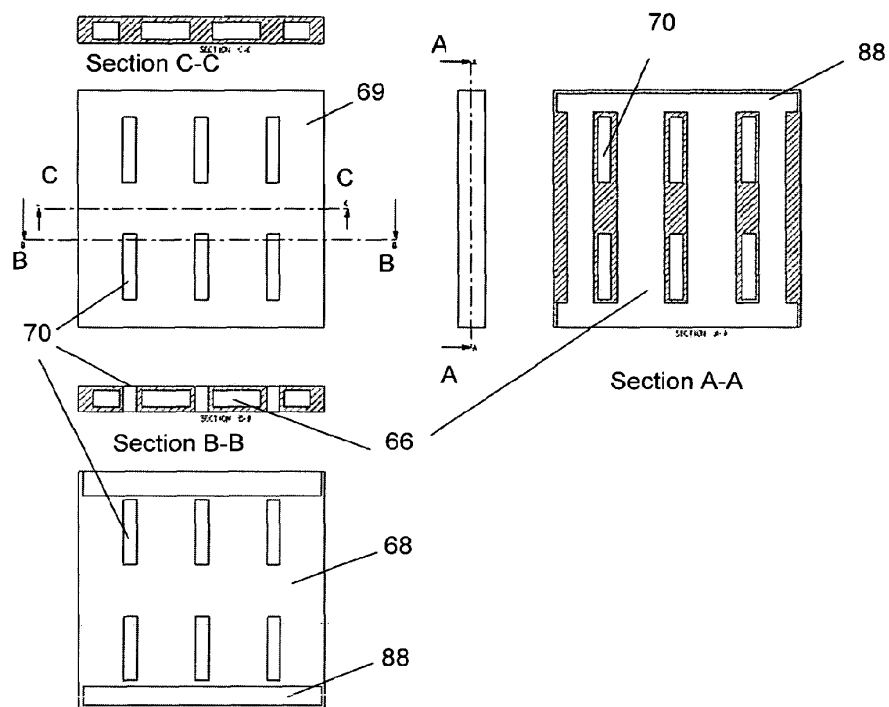


Fig. 9a

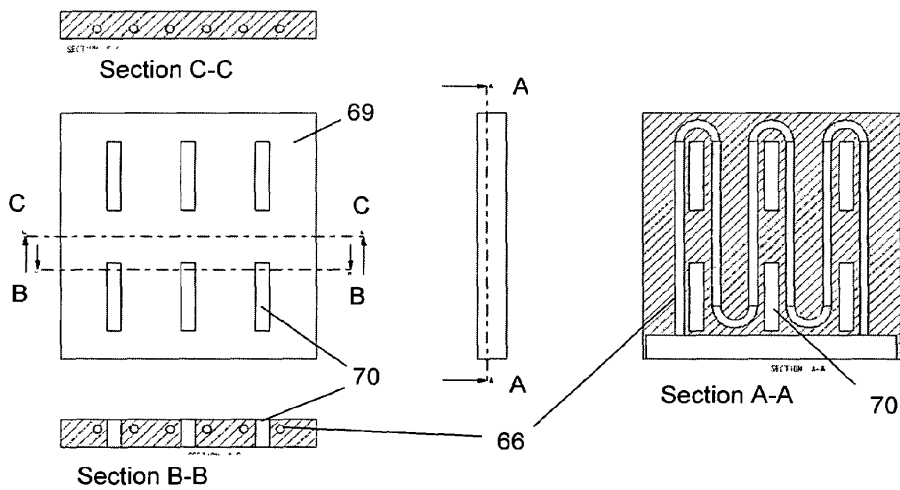


Fig. 9b

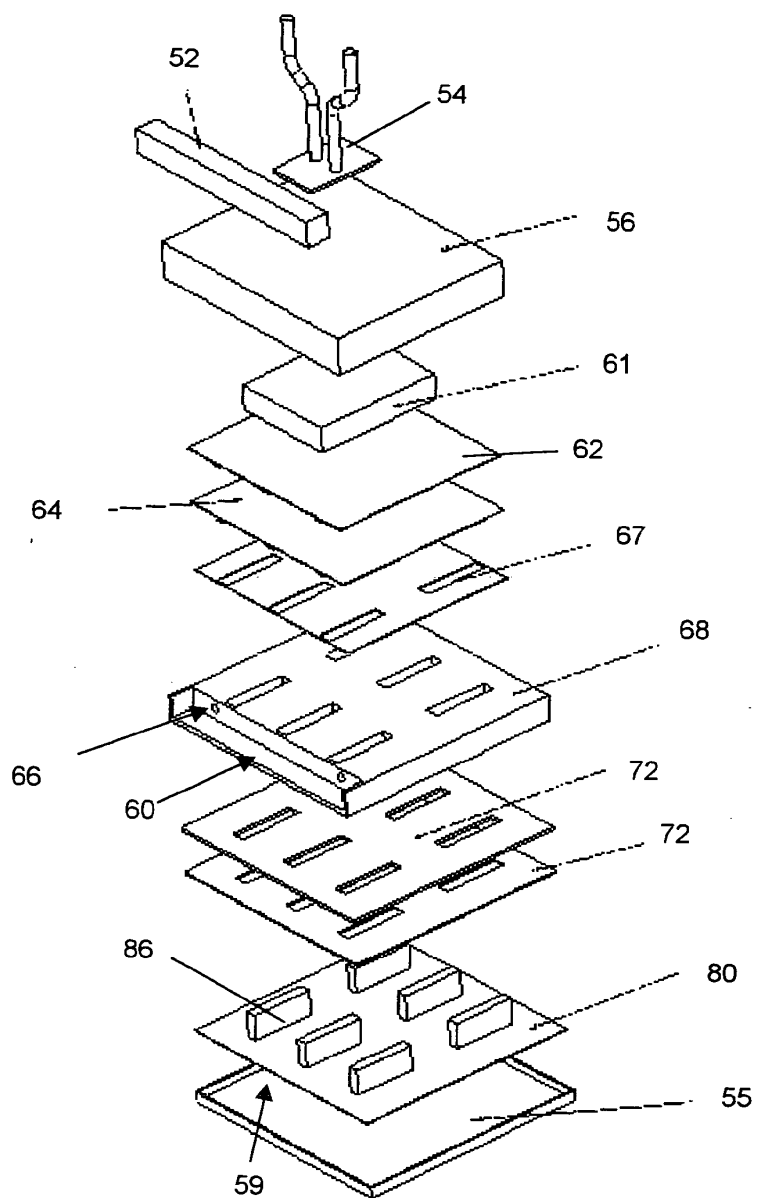


Fig. 10

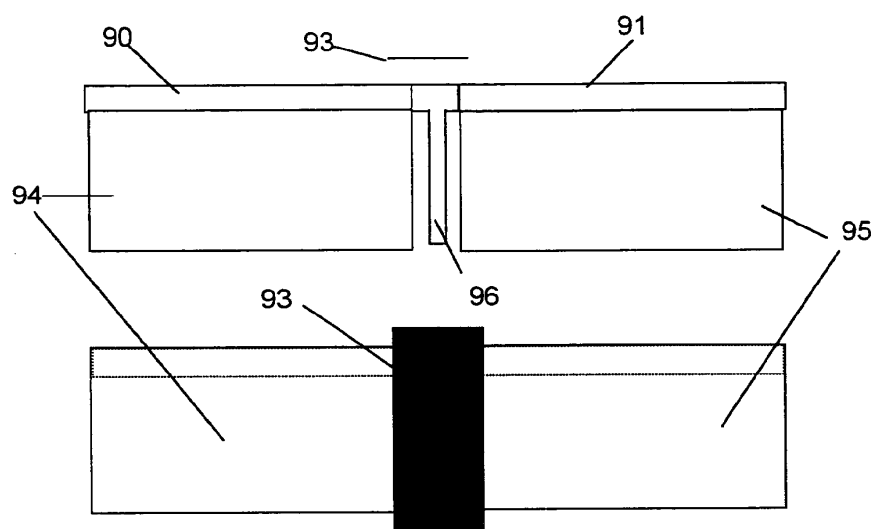


Fig. 11a

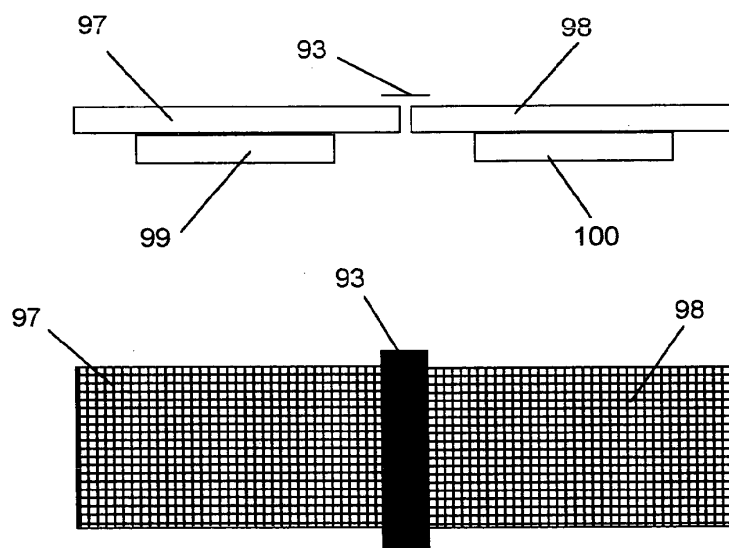


Fig. 11b



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EUROPEAN SEARCH REPORT

Application Number
EP 03 07 7965

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Place of search MUNICH		Date of completion of the search 15 January 2004	Examiner Krause, J
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 15 January 2004	Examiner Krause, J
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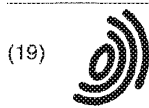
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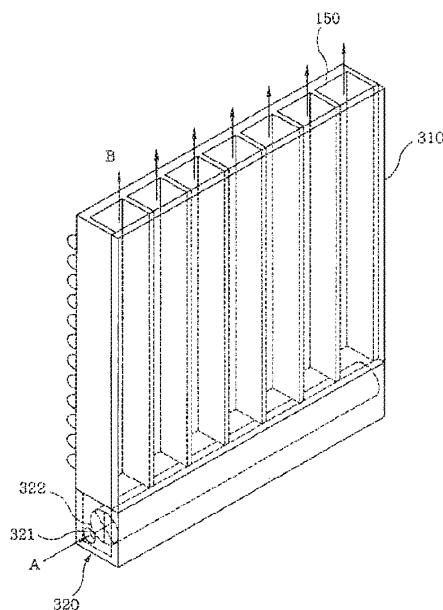
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(54) Light emitting device package and back light unit for liquid crystal display using the same

(57) A light emitting device package and a back light unit for liquid crystal display using the same wherein a fan (322) is used to forcibly cool an LED package and a back light unit for LCD to increase the heat radiation efficiency and to prevent the degradation of the device.

FIG. 3



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EP 1 647 766 A2

Description**BACKGROUND OF THE INVENTION****Field of the Invention**

[0001] The present invention relates to a light emitting device package and a back light unit for liquid crystal display using the same.

Description of the Prior Art

[0002] In general, the light emitting diode (LED) is a device for transforming electricity to light by utilizing a theory that, if a current is made to flow in a forward direction in a junction comprising two different semiconductors, electrons and holes are coupled at a junction region to generate a light beam. The said LED has an advantage in that it is resistant to shock, and has an almost eternal life time under a specific condition.

[0003] An LED exceeding an incandescent lamp has been currently developed. Furthermore, efforts have been recently waged to use an LED of high efficiency as a lighting apparatus. However, the said LED does not match the efficiency of fluorescent light and it does not seem to be that easy to outperform the efficiency of the fluorescent light within a short period of time.

[0004] Although the efficiency of LED does not match that of the fluorescent light, the LED contains no mercury causing an environmental pollution as in the fluorescent light such that studies on the LED are briskly progressed in terms of protection of environments.

[0005] Typically, the light source providing back-illumination (backlight unit, BLU) to liquid crystal display (LCD) devices is a Cold Cathode Fluorescent Light (CCFL). However, the CCFL contains mercury and is not a white light, exposing a limit in color expression of crystal display.

[0006] Meanwhile, although the LED is a monochromatic light source, and if three red, green and blue LEDs are combined, a variety of color temperatures can be expressed to make an excellent LED.

[0007] One of the drawbacks of LED is that efficiency drops and lifetime dramatically shortens if temperature of elements, particularly the temperature at a junction is increased to a prescribed level by heat generated by optical transformation process. Therefore, it should be imperative that LED be kept in an operating temperature under 90 degrees Celsius because its weakness to increase in temperature. However, heat radiation efficiency or density becomes decreased because the heat flow from high temperature to low temperature is in proportion to the temperature difference. For that reason, a particular heat radiation design is required for high efficiency lighting or application of LED for backlight unit.

[0008] Particularly, in case of a light source providing backlight unit to LCD using LED, the strong point of LCD that it is thin and light should be made the most of, such

that it is necessary to design a heat radiation system to meet these conditions. In order to meet a luminance level required by an LCD of over 20 inches under the current element efficiency level, a heat radiation capacity of over 300W/m² is required.

[0009] FIG.1 is a schematic cross-sectional view of a backlight unit disposed at an LCD according to the prior art. Reference numeral 10 is an LCD. A dissipation sheet (20) is disposed at a rear surface of the LCD (10). At the rear surface of the dissipation sheet (10) there is positioned a substrate (30) and in front of the substrate (30) there is arrayed a plurality of LEDs (31). The substrate (31) is attached at the rear surface thereof with a rear surface sheet (40), and at the rear surface of the rear surface sheet (40) there is mounted a plurality of cooling fins (41).

[0010] The plurality of LEDs is a backlight source of the LCD (10) and the rear surface sheet (40) formed with the cooling fins (41) is cooling means for cooling the backlight source.

[0011] The LCD of a backlight unit using the LEDs according to the prior art can radiate approximately 8~9W/m²K even only with the thermal radiation and natural convection. However, the luminance required by a large display device is accompanied by a problem of heat generation four times that of the prior art, bring about a problem of the temperature of the rear surface sheet rising to almost 70 degrees Celsius if the ambient temperature is 30 degrees Celsius.

Summary of the Invention

[0012] The present invention is disclosed to solve the aforementioned problems and it is an object of the present invention to provide a light emitting device (LED) package and a back light unit for liquid crystal display (LCD) using the same adapted to forcibly cool the LED package and the back light unit of the LCD by using a fan and to increase a heat radiation efficiency and to prevent degradation of the devices.

[0013] In accordance with a first aspect of the present invention, an LED package comprises: a metal substrate; an insulation sheet formed at an upper surface of the metal substrate; a plurality of electrode lines formed on the insulation sheet; LEDs electrically bonded to an upper surface of the plurality of electrode lines and arrayed in rows and lines; a plurality of striped protruders fixed at one surface thereof to a lower surface of the metal substrate, each spaced a predetermined distance apart; a guide member fixed to the other surface of the protruders; and a fan case encased therein with a fan for sucking air through a suction inlet and disposed at a lateral surface of the metal substrate and the guide member for circulating the sucked air through spaces of the protruders.

[0014] In accordance with another aspect of the present invention, an LED package comprises: a body arrayed thereon with LEDs and formed thereunder with a plurality of striped protruders, each spaced a predetermined

mined distance apart; and a suction fan infusing air through spaces of the plurality of protruders for cooling a lower section of the body and the plurality of protruders by sucking the air.

[0015] In accordance with still another aspect of the present invention, a back light unit for liquid crystal display (LCD) using LEDs comprising: a dissipation sheet disposed at a rear surface of LCD having a front surface and a rear surface; a substrate disposed at a rear surface of the dissipation sheet and arrayed at a front thereof with a plurality of LEDs; and a cooling apparatus cooling the substrate by discharging the air sucked by a fan to a rear surface of the substrate.

Brief Description of the Drawings

[0016] The above objects and other advantages of the present invention will become more apparent by describing in detail preferred embodiments with reference to the attached drawings in which:

FIG.1 is a schematic cross-sectional view of a back-light unit disposed at an LCD according to the prior art;

FIG.2 is a schematic perspective view of LED package according to the present invention;

FIG.3 is a schematic perspective view of routes in which heat is generated from the LED package according to the present invention;

FIG.4 is a schematic block diagram for illustrating of air being circulated in a LED package further disposed with additional FIG.4 is a schematic block diagram for illustrating of air being circulated in a LED package further disposed with additional components according to the present invention;

FIGS. 5a and 5b are schematic cross-sectional views for describing formation of protruders on a metal substrate or a guide member according to the present invention;

FIG.6 is a conceptual view of airflow where a fan case is further disposed for discharging air according to the present invention;

FIG.7 is a schematic constitutional cross-sectional view of a back light unit for LCD according to the present invention;

FIGS. 8a and 8b are schematic constitutional cross-sectional views of layouts of a suction inlet formed at a cooling apparatus of a back light unit according to the present invention;

FIG.9 is a schematic perspective view of a cooling

apparatus mounted at a back light unit according to the present invention;

FIG.10 illustrates a graph of measurement of a cooling efficiency of forcibly cooling a back light unit using a fan according to the present invention; and

FIG.11 illustrates a graph of measurement of temperature changes of each part based on airflow according to the present invention.

Detailed Description of the Invention

[0017] Preferred embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

[0018] FIG.2 is a schematic perspective view of LED package according to the present invention.

[0019] The LED package comprises: a metal substrate (150); an insulation sheet (151) formed at an upper surface of the metal substrate (150); a plurality of electrode lines (152a, 152b) formed on the insulation sheet (151); LEDs (160) electrically bonded to an upper surface of the plurality of electrode lines (152a, 152b) and arrayed in rows and lines; a plurality of striped protruders (301) fixed at one surface thereof to a lower surface of the metal substrate, each spaced a predetermined distance apart; and a guide member (310) fixed to the other surface of the protruders (301).

[0020] Referring to FIG.3, the LED package is mounted therein with a fan (322) for sucking air through a suction inlet (321) and is further disposed with a fan case (320) encased therein with the fan (322) for sucking air through a suction inlet (321) and disposed at a lateral surface of the metal substrate (150) and the guide member (301) for circulating the sucked air through spaces of the protruders (301). Preferably, the fan (322) is a cross flow fan.

[0021] LED package thus constructed is such that the fan (322) is operated to suck the air through the suction inlet (321), and the sucked air is circulated among the spaces of the protruders (301) to forcibly cool the heat generated by the LEDs (160), thereby improving the cooling efficiency and preventing the degradation of the devices.

[0022] At this time, the heat generated by the LEDs (160) is transmitted to the metal substrate (150) and cooled by the air circulated along the bottom surface of the metal substrate (150).

[0023] Now, referring to FIG.3, the air sucked in the 'A' direction through the suction inlet (321) of the fan case (320) serves to cool the metal substrate (150) and is discharged in the 'B' direction.

[0024] Furthermore, the heat radiated from the metal substrate (150) is also transmitted to the protruders (301) which in turn are cooled by the contacted air to carry out the fin function.

[0025] FIG.4 is a schematic block diagram for illustrat-

ing of air being circulated in a LED package further disposed with additional components according to the present invention, where the air sucked by the fan of the fan case (320) is the air cooled by a cooling unit (400), and the cooled air flows along a bottom surface (150a) of the metal substrate to further enhance the radiating effect of the LED package.

[0026] In other words, preferably, the LED package of FIGS. 2 and 3 is further disposed with the cooling unit (400) for cooling the air and supplying the cooled air to the suction inlet of the fan case (320). Preferably, a circulation pipe (410) is further mounted for supplying to the cooling unit (400) the air which has flowed along the bottom surface (150a) of the metal substrate and then is discharged. Of course, the cooling unit (400) and the suction inlet of the fan case (320) are connected via a pipe such that the cooled air of the cooling unit (400) is introduced into the suction inlet of the fan case via the pipe.

[0027] FIGS. 5a and 5b are schematic cross-sectional views for describing formation of protruders on a metal substrate or a guide member according to the present invention. The metal substrate (150) of FIG. 5a is etched to form the protruders (301), and the protruders (301) and the metal substrate (150) are integrally formed. The guide member (310) and the protruders (301) of FIG. 5b are integrally formed.

[0028] FIG. 6 is a conceptual view of airflow where a fan case is further disposed for discharging air according to the present invention, where the metal substrate (150) is mounted thereunder with the fan case (320) for air suction, and the metal substrate (150) is formed thereon with a fan case (450) for discharging the air.

[0029] In other words, the fan (322) of the fan case (320) for sucking the air serves to facilitate the suction of the air via the suction inlet (321), and the fan (352) of the fan case (350) functions to facilitate the discharge of the air via a discharge outlet (351). The air swiftly flows along the metal substrate (150) by the fan (322) of the fan case (350) for discharge of the air to cool the metal substrate (150) more efficiently.

[0030] Meanwhile, an LED package according to the present invention comprises: a body arrayed thereon with LEDs and formed thereunder with a plurality of striped protruders, each spaced a predetermined distance apart; and a suction fan infusing air through spaces of the plurality of protruders for cooling a lower section of the body and the plurality of protruders by sucking the air. Furthermore, the suction fan is formed at one lateral surface of the body, and is formed at the other lateral surface of the body with a discharge fan for sucking the air introduced through the plurality of protruders.

[0031] Preferably, the suction fan, the plurality of protruders and the discharge fan are hermetically sealed from the outside so that the air sucked from the suction fan is discharged via the plurality of protruders by the discharge fan and again sucked by the suction fan.

[0032] Between the suction fan and the discharge fan, there is further mounted a cooling unit for cooling the air

discharged by the discharge fan and for supplying the cooled air to the suction fan.

[0033] FIG. 7 is a schematic constitutional cross-sectional view of a back light unit for LCD according to the present invention.

[0034] The back light unit for liquid crystal display (LCD.100) using LEDs comprising: a dissipation sheet (120) disposed at a rear surface of the LCD (100) having a front surface and a rear surface; a substrate (130) disposed at a rear surface of the dissipation sheet (120) and arrayed at a front thereof with a plurality of LEDs (131); and a cooling apparatus (200) cooling the substrate (130) by discharging the air sucked by a fan (250) to a rear surface of the substrate (130).

[0035] The back light unit according to the present invention serves to forcibly cool the substrate (130) on which a plurality of LEDs (131) are arranged by sucking the air with the fan (250). The substrate (130) is made of metal and enhances the radiation efficiency of heat generated by the LEDs (131).

[0036] The cooling unit (200) comprises: a back surface sheet (210) attached at one side thereof to a rear surface of the substrate (130) where the plurality of LEDs (131) are frontally arranged and protruded at the rear surface thereof with a plurality of fins (211) each spaced at a predetermined distance apart; a guide member (220) attached to a distal end of the plurality of pins (211) and forming spaces among the pins; the fan (250) disposed underneath the substrate (130) for discharging the air sucked through the back surface sheet (210) and the guide member (220); and a fan case (270) fixed underneath the LCD (100) and the guide member (220) and having a suction inlet for sucking the air and mounted therein with the fan (250).

[0037] Preferably, the plurality of fins (211), the back surface sheet (210) and the guide member (220) are made of metal for enhancing the cooling efficiency.

[0038] FIGS. 8a and 8b are schematic constitutional cross-sectional views of layouts of a suction inlet formed at a cooling apparatus of a back light unit according to the present invention.

[0039] Referring to FIG. 8a, a suction inlet (261) of the cooling unit (200) is formed underneath the fan case (270), or as illustrated in FIG. 8b, a suction inlet (262) is formed at a front surface of the fan case (270) which is in parallel with a front surface of the LED (100).

[0040] FIG. 9 is a schematic perspective view of a cooling apparatus mounted at a back light unit according to the present invention. The back surface sheet (210) disposed at the cooling apparatus (200) of the back light unit according to the present invention is attached to a rear surface of the substrate (130) on which the plurality of LEDs (131) are frontally arranged.

[0041] Furthermore, the distal end of the plurality of fins (211) formed at the back surface sheet (210) is attached with a guide member, and there are formed spaces among the pins.

[0042] If the fan (250) disposed underneath the sub-

strate (130) charges the sucked air among the back surface sheet (210) and the guide member (220), the sucked air passes the spaces formed by the fins along the back surface sheet (210) and is discharged outside via a discharge outlet (265).

[0043] Preferably, the fan is a cross flow fan. In other words, the cross flow fan makes less noise than an axial flow fan but produces a larger amount of airflow such that the cross flow fan is adopted for the present invention.

[0044] FIG. 10 illustrates a graph of measurement of a cooling efficiency of forcibly cooling a back light unit using a fan according to the present invention.

[0045] Referring back to FIG. 9, first of all, substrate temperature rises as fin height (h) and gap (d) are increased. Although increase and decrease of the fin thickness (T) do not affect the substrate temperature, the increase of the airflow at the fan can decrease the substrate temperature remarkably as in the present invention.

[0046] Subsequently, it can be noticed that a structure of the fan being used to forcibly cool the air increases the cooling efficiency according to the present invention as against the conventional art where the fin is used to cool the back light unit.

[0047] FIG. 11 illustrates a graph of measurement of temperature changes of each part based on airflow according to the present invention.

[0048] Referring to FIG. 11, the substrate temperature frontally arranged with the plurality of LEDs, the air temperature discharged by the discharge outlet and the maximum temperature of the back surface sheet decrease as the airflow increases.

[0049] In other words, it should be apparent that if the air is forcibly cooled using the fan, the cooling efficiency of the back light unit can be increased.

[0050] For reference, the heat radiation amount of the back light unit in the graph is 680W/m^2 , and the reason data value of each part is distributed to several pieces relative to each airflow is that measurements have been conducted by moving relevant parts.

[0051] As apparent from the foregoing, there is an advantage in the light emitting device (LED) package and a back light unit for liquid crystal display (LCD) using the same according to the present invention in that the fan is used to forcibly cool the LED package and the back light unit for LCD to increase the heat radiation efficiency and to prevent the degradation of the device.

[0052] While the present invention has been described in detail, it should be understood that various changes, substitutions and alterations can be made hereto without departing from the spirit and scope of the invention by persons skilled in the art.

Claims

1. An LED package comprising:

a metal substrate;

an insulation sheet formed at an upper surface of the metal substrate;

a plurality of electrode lines formed on the insulation sheet;

LEDs electrically bonded to an upper surface of the plurality of electrode lines and arrayed in rows and lines;

a plurality of striped protruders fixed at one surface thereof to a lower surface of the metal substrate, each spaced a predetermined distance apart;

a guide member fixed to the other surface of the protruders; and

a fan case encased therein with a fan for sucking air through a suction inlet and disposed at a lateral surface of the metal substrate and the guide member for circulating the sucked air through spaces of the protruders.

2. The LED package as defined in claim 1 further comprising a cooling unit for cooling air and for supplying the cooled air to the suction inlet of the fan case.

3. The LED package as defined in claim 1 further comprising a circulation pipe for supplying the air discharged from spaces among the plurality of protruders to the cooling unit.

4. The LED package as defined in claim 1, wherein the fan is a cross flow fan.

5. The LED package as defined in claim 1, wherein the metal substrate and the protruders are integrally formed.

6. The LED package as defined in claim 1, wherein the guide member and the protruders are integrally formed.

7. An LED package comprising:

a body arrayed thereon with LEDs and formed thereunder with a plurality of striped protruders, each spaced a predetermined distance apart; and

a suction fan infusing air through spaces of the plurality of protruders for cooling a lower section of the body and the plurality of protruders by sucking the air.

8. The LED package as defined in claim 7, wherein the suction fan is formed at a lateral surface of the body and a discharging fan is further mounted at the other lateral surface of the body for sucking the air introduced among the plurality of protruders and discharging the air.

9. The LED package as defined in claim 8, wherein the

suction fan, the plurality of protruders and the discharge fan are hermetically sealed from the outside so that the air sucked from the suction fan is discharged via the plurality of protruders by the discharge fan and again sucked by the suction fan.

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10. The LED package as defined in claim 9, wherein, between the suction fan and the discharge fan, there is further mounted a cooling unit for cooling the air discharged by the discharge fan and for supplying the cooled air to the suction fan.

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11. The LED package as defined in claim 9, wherein the fan is a cross flow fan.

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12. A back light unit for liquid crystal display (LCD) using LEDs comprising:

a dissipation sheet disposed at a rear surface of LCD having a front surface and a rear surface;
a substrate disposed at a rear surface of the dissipation sheet and arrayed at a front thereof with a plurality of LEDs; and
a cooling apparatus cooling the substrate by discharging the air sucked by a fan to a rear surface of the substrate.

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13. The back light unit as defined in claim 12, wherein The cooling unit comprises:

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a back surface sheet attached at one side thereof to a rear surface of the substrate where the plurality of LEDs are frontally arranged and protruded at the rear surface thereof with a plurality of fins each spaced at a predetermined distance apart;
a guide member attached to a distal end of the plurality of pins and forming spaces among the pins;
the fan disposed underneath the substrate for discharging the air sucked through the back surface sheet and the guide member; and
a fan case fixed underneath the LEDs and the guide member and having a suction inlet for sucking the air and mounted therein with the fan.

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14. The back light unit as defined in claim 13, wherein the suction inlet a suction inlet of the cooling unit is formed underneath the fan case, or is formed at a front surface of the fan case which is in parallel with a front surface of the LED.

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15. The back light unit as defined in claim 12, wherein the fan is a cross flow fan.

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16. The back light unit as defined in claim 12, wherein the substrate is made of metal.

17. The back light unit as defined in claim 13, wherein the plurality of fins and the rear surface, and the guide member are made of metal.

FIG. 1
(PRIOR ART)

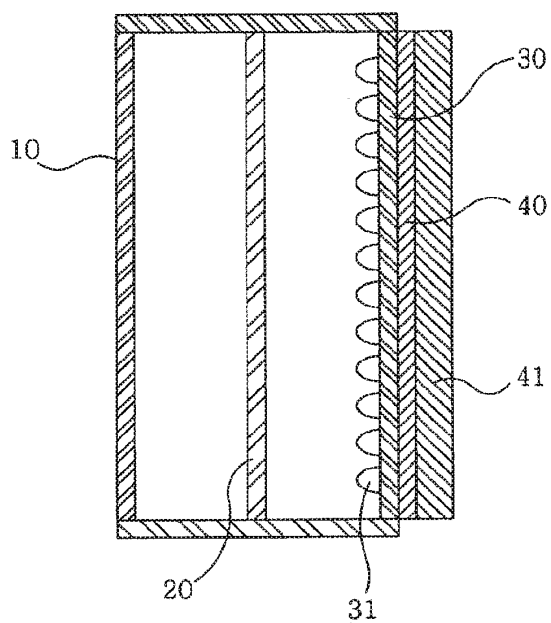


FIG. 2

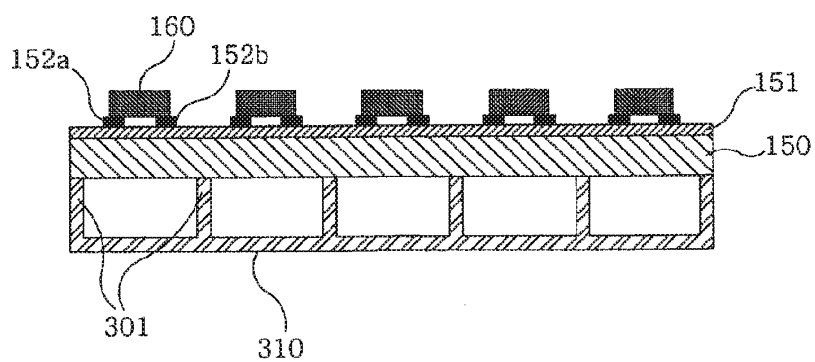


FIG. 3

