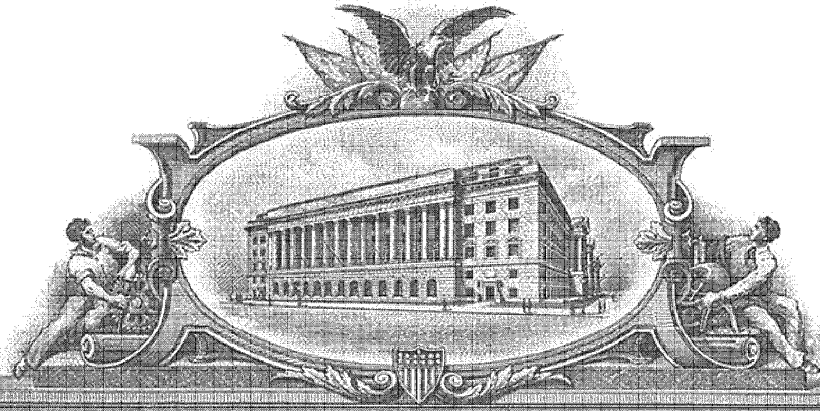


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MRI00320845

Provisional Application for Patent Cover Sheet					
This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)					
Inventor(s)					
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William		Dunn	Alpharetta	GA	US
All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the Add button.					Add
Title of Invention		ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY			
Attorney Docket Number (if applicable)		MAN2241-010			
Correspondence Address					
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.	
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Applicant claims small entity status under 37 CFR 1.27

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Isolated Gas Cooling System for an Electronic Display

Inventor: William Dunn

Cross-Reference to Related Applications

[0001] This application is a provisional patent application and does not claim priority to any co-pending applications.

Technical Field

[0002] This invention generally relates to cooling systems and in particular to cooling systems for electronic displays.

Background of the Art

[0003] Conductive and convective heat transfer systems for electronic displays are known. These systems of the past generally attempt to remove heat from the electronic components in a display through as many sidewalls of the display as possible. In order to do this, the systems of the past have relied primarily on fans for moving air past the components to be cooled and out of the display. In some cases, the heated air is moved into convectively thermal communication with fins. Some of the past systems also utilize conductive heat transfer from heat producing components directly to heat conductive housings for the electronics. In these cases, the housings have a large surface area, which is in convective communication with ambient air outside the housings. Thus, heat is transferred convectively or conductively to the housing and is then transferred into the ambient air from the housing by natural convection.

[0004] While such heat transfer systems have enjoyed a measure of success in the past, improvements to displays require even greater cooling capabilities.

Summary of the Invention

[0005] In particular, cooling devices for electronic displays of the past have generally used convective heat dissipation systems that function to cool an entire interior of the display by one or more fans and fins, for example. By itself, this is not adequate in many climates, especially when radiative heat transfer from the sun through a display window becomes a major factor. In many applications and locations 200 Watts or more of power through such a display window is common. Furthermore, the market is demanding larger screen sizes for displays. With increased electronic display screen size and corresponding display window size more heat will be generated and more heat will be transmitted into the displays.

[0006] In the past, many displays have functioned satisfactorily with ten or twelve inch screens. Now, many displays are in need of screens having sizes greater than or equal to twenty-four inches that may require improved cooling systems. For example, some outdoor applications call for forty-seven inch screens and above. With increased heat production with the larger screens and radiative heat transfer from the sun through the display window, heat dissipation systems of the past, which attempt to cool the entire interior of the display with fins and fans, are no longer adequate.

[0007] A large fluctuation in temperature is common in the devices of the past. Such temperature fluctuation adversely affects the electronic components in these devices. Whereas the systems of the past attempted to remove heat only through the non-

display sides and rear components of the enclosure surrounding the electronic display components, a preferred embodiment of the present invention causes convective heat transfer from the face of the display as well. By the aspects described below, the present invention has made consistent cooling possible for electronic displays having screens of sizes greater than or equal to twelve inches. For example, cooling of a 55 inch screen can be achieved, even in extremely hot climates. Greater cooling capabilities are provided by the device and method described and shown in more detail below.

[0008] An exemplary embodiment of the present invention relates to an isolated gas cooling system and a method for cooling an electronic display. An exemplary embodiment includes an isolated gas cooling chamber. The gas cooling chamber is preferably a closed loop which includes a first gas chamber comprising a transparent anterior plate and a second gas chamber comprising a cooling plenum. The first gas chamber is anterior to and coextensive with the viewable face of the electronic display surface. The transparent anterior plate may be set forward of the electronic display surface by spacers defining the depth of the first gas chamber. A cooling chamber fan, or equivalent means, maybe located within the cooling plenum. The fan may be used to propel gas around the isolated gas cooling chamber loop. As the gas traverses the first gas chamber it contacts the electronic display surface, absorbing heat from the surface of the display. Because the gas and the relevant surfaces of the first gas chamber are transparent, the image quality remains excellent. After the gas has traversed the transparent first gas chamber, the gas may be directed into the rear cooling plenum.

[0009] In order to cool the gas in the plenum, external convective or conductive means may be employed. In at least one embodiment, an external fan unit may also be included within the housing of the display. The external fan unit may be positioned to provide a flow of ingested air over the external surfaces of the plenum. The heated air in the housing may exit the housing as exhaust.

[0010] The foregoing and other features and advantages of the present invention will be apparent from the following more detailed description of the particular embodiments of the invention, as illustrated in the accompanying drawings.

Brief Description of the Drawings

[0011] A better understanding of an exemplary embodiment will be obtained from a reading of the following detailed description and the accompanying drawings wherein identical reference characters refer to identical parts and in which:

[0012] **FIGURE 1** is a perspective view of an exemplary embodiment in conjunction with an exemplary electronic display.

[0013] **FIGURE 2** is an exploded perspective view of an exemplary embodiment showing components of the isolated gas cooling system.

[0014] **FIGURE 3** is top plan view of an exemplary embodiment of the cooling chamber.

[0015] **FIGURE 4** is a front perspective view of an embodiment of the isolated cooling chamber, particularly the transparent anterior surface of first gas chamber.

[0016] **FIGURE 5** is a rear perspective view of an embodiment of the isolated cooling chamber, particularly the cooling plenum.

[0017] FIGURE 6 is a rear perspective view of an embodiment of the isolated cooling chamber showing surface features that may be included on the plenum

[0018] FIGURE 7 is a top plan view of an exemplary embodiment of the cooling chamber showing surface features that may be included on the plenum.

[0019] FIGURE 8 is a front perspective view of an embodiment of the isolated cooling chamber with included thermoelectric modules.

[0020] FIGURE 9 is a top plan view of an exemplary embodiment of the cooling chamber with included thermoelectric modules.

[0021] FIGURE 10 is an exploded perspective view of an exemplary embodiment showing components of the isolated gas cooling system.

[0022] FIGURE 11 is a cross-sectional top view through one exemplary embodiment.

[0023] FIGURE 12 is a cross-sectional side view through the center of the display.

Detailed Description

[0024] Embodiments of the present invention relate to a cooling system for an electronic display and to combinations of the cooling system and the electronic display. Exemplary embodiments of the present invention provide an isolated gas cooling system for an electronic display.

[0025] Fig. 1 is an exemplary embodiment of the present invention. As may be appreciated, when the display 10 is exposed to outdoor elements, the temperatures inside the display 10 will vary greatly without some kind of cooling device. As such, the electronics including the display screen (e.g., LCD screen) will have a greatly reduced life span. By implementing certain embodiments of the cooling system disclosed herein,

temperature fluctuation is greatly reduced. This cooling capability has been achieved in spite of the fact that larger screens generate more heat than smaller screens.

[0026] The display shown is equipped with an innovative gas cooling system. Accordingly, it may be placed in direct sunlight. Although the cooling system may be used on smaller displays, it is especially useful for larger LCD, LED, or organic light emitting diodes (OLED) displays. These screens, especially with displays over 24 inches, face significant thermoregulatory issues in outdoor environments.

[0027] In Fig. 1, the display area of the electronic display shown includes a narrow gas chamber that is anterior to and coextensive with the electronic display surface. The display shown also is equipped with an optional air curtain device 114 which is the subject matter of co-pending U.S. Application No. 11/941,728, incorporated by reference herein. Optionally, the display also has a reflection shield 119, to mitigate reflection of the sunlight on the display surface. Additionally, in outdoor environments, housing 70 is preferably a color which reflects sunlight.

[0028] It is to be understood that the spirit and scope of the disclosed embodiments includes cooling of displays including, but not limited to LCDs. By way of example and not by way of limitation, the present invention may be used in conjunction with displays selected from among LCD (including TFT or STN type), light emitting diode (LED), organic light emitting diode (OLED), field emitting display (FED), cathode ray tube (CRT), and plasma displays. Furthermore, embodiments of the present invention may be used with displays of other types including those not yet discovered. In particular, it is contemplated that the present invention may be well suited for use with full color, flat panel OLED displays. While the embodiments described herein are well suited for

outdoor environments, they may also be appropriate for indoor applications (e.g., factory environments) where thermal stability of the display may be at risk.

[0029] As shown in Fig. 2 an exemplary embodiment 10 of the electronic display and gas cooling system includes an isolated gas cooling chamber 20 contained within an electronic display housing 70. A narrow transparent first gas chamber is defined by spacers 100 and transparent front plate 90. A second transparent front plate 130 may be laminated to front plate 90 to help prevent breakage of front glass 90. As shown in Fig. 2, cooling chamber 20 surrounds and LCD stack 80 and associated backlight panel 140.

[0030] The gas cooling system 10 shown in Fig. 2 may include means for cooling gas contained within the second gas chamber. These means may include a fan 60 which may be positioned at the base of the display housing 70. The fan will force the cooler ingested air over at least one external surface of a posterior cooling plenum 45. If desired, an air conditioner (not shown) may also be utilized to cool the air which contacts the external surface of plenum 45.

[0031] Referring to Fig. 3, in at least one embodiment the isolated gas cooling chamber 20 comprises a closed loop which includes a first gas chamber 30 (see Fig. 3) and a second gas chamber 40. The first gas chamber includes a transparent plate 90. The second gas chamber comprises a cooling plenum 45. The term “isolated gas” refers to the fact that the gas within the isolated gas cooling chamber 20 is essentially isolated from external air in the housing of the display. Because the first gas chamber 30 is positioned in front of the display image, the gas should be substantially free of dust or other contaminants that might negatively affect the display image.

[0032] The isolated gas may be almost any transparent gas, for example, normal air, nitrogen, helium, or any other transparent gas. The gas is preferably colorless so as not to affect the image quality. Furthermore, the isolated gas cooling chamber need not necessarily be hermetically sealed from the external air. It is sufficient that the gas in the chamber is isolated to the extent that dust and contaminants may not substantially enter the first gas chamber.

[0033] In the closed loop configuration shown in Fig. 3, the first gas chamber 30 is in gaseous communication with the second gas chamber 40. A cooling chamber fan 50 may be provided within the posterior plenum 45. The cooling fan 50 may be utilized to propel gas around the isolated gas cooling chamber 20. The first gas chamber 30 includes at least one front glass 90 mounted in front of an electronic display surface 85. The front glass 90 may be set forward from the electronic display surface 85 by spacers 100 (see Fig. 4). The spacing members 100 define the depth of the narrow channel passing in front of the electronic display surface 85. The spacing members 100 may be independent or alternatively may be integral with some other component of the device (e.g., integral with the front plate). The electronic display surface 85, the spacing members, and the transparent front plate 90 define a narrow first gas chamber 30. The chamber 30 is in gaseous communication with plenum 45 through entrance opening 110 and exit opening 120.

[0034] As shown in Fig. 3, a posterior surface of the first gas chamber 30 preferably comprises the electronic display surface 85 of the display stack 80. As the isolated gas in the first gas chamber 30 traverses the display it contacts the electronic display

surface 85. Contacting the cooling gas directly to the electronic display surface 85 enhances the convective heat transfer away from the electronic display surface 85.

[0035] Advantageously, in exemplary embodiments the electronic display surface 85 comprises the posterior surface of the first gas chamber 30. Accordingly, the term “electronic display surface” refers to the front surface of a typical electronic display (in the absence of the embodiments disclosed herein). The term “viewable surface” or “viewing surface” refers to that portion of the electronic display surface from which the electronic display images may be viewed by the user.

[0036] The electronic display surface 85 of typical displays is glass. However, neither display surface 85, nor transparent front plate 90, nor optional second transparent front plate 130 need necessarily be glass. Therefore, the term “glass” will be used herein interchangeably with the term plate. By utilizing the electronic display surface 85 as the posterior surface wall of the gas compartment 30, there may be fewer surfaces to impact the visible light traveling through the display. Furthermore, the device will be lighter and cheaper to manufacturer.

[0037] Although the embodiment shown utilizes the electronic display surface 85, certain modifications and/or coatings (e.g., anti-reflective coatings) may be added to the electronic display surface 85, or to other components of the system in order to accommodate the coolant gas or to improve the optical performance of the device. In the embodiment shown, the electronic display surface 85 may be the front glass plate of a liquid crystal display (LCD) stack. However, almost any display surface may be suitable for embodiments of the present cooling system. Although not required, it is preferable to allow the cooling gas in the first gas chamber 30 to contact the electronic

display surface 85 directly. In this way, the convective effect of the circulating gas will be maximized. Preferably the gas, which has absorbed heat from the electronic display surface 85 may then be diverted to the cooling plenum 45 where the collected heat energy in the gas may be dissipated into the air within the display housing 70 by conductive and or convective means.

[0038] To prevent breakage, the optional second surface glass 130 may be adhered to the front surface of glass 90. Alternatively surface glass 90 may be heat tempered to improve its strength. As shown in Fig. 3, fan 50 propels a current of air around the loop (see arrows) of the isolated gas cooling chamber 20. The plenum 45 defining the second gas chamber 40 is adapted to circulate the gas behind the electronic display surface 85. The plenum 45 preferably surrounds most of the heat generating components of the electronic display, for example, backlight panel 140 (e.g., an LED backlight).

[0039] Fig. 4 shows that the anterior surface 90 of the first gas chamber 30 is transparent and is positioned anterior to and at least coextensive with a viewable area of an electronic display surface 85. The arrows shown represent the movement of the isolated gas through the first gas chamber 30. As shown, the isolated gas traverses the first gas chamber 30 in a horizontal direction. Although cooling system 20 may be designed to move the gas in either a horizontal or a vertical direction, it is preferable to propel the gas in a horizontal direction. In this way, if dust or contaminants do enter the first gas chamber 30, they will tend to fall to the bottom of chamber 30 outside of the viewable area of the display. The system may move air left to right, or alternatively, right to left.

[0040] As is clear from Fig. 4, to maximize the cooling capability of the system, the first gas chamber 30 preferably covers the entire viewable surface of the electronic display surface 85. Because the relevant surfaces of the first gas chamber 30 as well as the gas contained therein are transparent, the image quality of the display remains excellent. Anti-reflective coatings may be utilized to minimize specular and diffuse reflectance. After the gas traverses the first gas chamber 30 it exits through exit opening 120. Exit opening 120 defines the entrance junction into the rear cooling plenum 45.

[0041] Fig. 5 shows a schematic of the rear cooling plenum 45 (illustrated as transparent for explanation). One or more fans 50 within the plenum may provide the force necessary to move the isolated gas through the isolated gas cooling chamber. Whereas the first gas chamber 30 was designed to collect heat from the surface 85 of the display, the second gas chamber 40 is designed to dissipate that heat into the housing 70. Plenum 45 may have various contours and features to accommodate the internal structures within a given electronic display application. Figure 11 and 12 demonstrates one such alternative embodiment.

[0042] As can be discerned in Figs. 6 and 7, various surface features 150 may be added to improve heat dissipation from the plenum 45. These surface features 150 provide more surface area to radiate heat away from the gas within the second gas chamber 40. These features 150 may be positioned at numerous locations on the surface of the plenum 45.

[0043] Referring to Figs. 8 and 9, one or more thermoelectric modules 160 may be positioned on at least one surface of the plenum 45 to further cool the gas contained in

the second gas chamber 40. The thermoelectric modules 160 may be used independently or in conjunction with surface features 150. Alternatively, thermoelectric modules 160 may be useful to heat the gas in the rear plenum if the unit is operated in extreme cold conditions.

[0044] Fig. 10 shows an exemplary method for removing heat in the gas contained in the rear plenum 45. Fan 60 may be positioned to ingest external air and blow that air into the display housing 70. Preferably, the air will contact the anterior and posterior surfaces of the plenum 45. Furthermore, in this configuration, fan 60 will also force fresh air past the heat generating components of the electronic display (e.g., the TFT layer and the backlight) to further improve the cooling capability of the cooling system. The heated exhaust air may exit through one or more apertures 179 located on the display housing 70.

[0045] Besides thermoelectric modules 160, there are a number of ways to cool the gas in the second gas chamber. For example air conditioners or other cooling means known by those skilled in the art may be useful for cooling the gas contained in plenum 45.

[0046] Fig. 13 is a cross-sectional top view of an exemplary embodiment. Note that plenum 45 may have many possible shapes without departing from the present invention. In Fig. 13, the plenum tapers to allow for the placement of DC power converters.

[0047] Fig. 14. shows a side cross-section view of the embodiment shown in Fig. 13. In the arrangement shown, a fan unit 60 forces a flow of ingested air into the display housing 70. The air travels upward along both sides of plenum 45. In the exemplary

embodiment shown in Fig. 14, the exhaust air is directed to exit toward the top-front of the display housing. In the embodiment shown, an optional air curtain device 114, described in Co-pending Application No. 11/941,728, is included to direct the exhaust air back across the external surface of the front glass 90 (or second front glass 130) of the cooling chamber. The external current of exhaust air may assist in removing even more heat from the electronic display surface 85. This embodiment also has an optional reflection shield 119 to help reduce reflection caused by the sun.

[0048] While the display is operational, the isolated gas cooling system may run continuously. However, if desired, a temperature sensor (not shown) and a switch (not shown) may be incorporated within the electronic display 10. The thermostat may be used to detect when temperatures have reached a predetermined threshold value. In such a case, the isolated gas cooling system may be selectively engaged when the temperature in the display reaches a predetermined value. Predetermined thresholds may be selected and the system may be configured with a thermostat (not shown) to advantageously keep the display within an acceptable temperature range.

[0049] An optional air filter (not shown) may be employed within the plenum to assist in preventing contaminants and dust from entering the first gas chamber 30.

[0050] Having shown and described a preferred embodiment of the invention, those skilled in the art will realize that many variations and modifications may be made to affect the described invention and still be within the scope of the claimed invention. Additionally, many of the elements indicated above may be altered or replaced by different elements which will provide the same result and fall within the spirit of the

claimed invention. It is the intention, therefore, to limit the invention only as indicated by the scope of the claims.

CLAIMS

1. A gas cooling system for an electronic display, the system comprising:

an isolated gas cooling chamber including

a first gas chamber positioned anterior to and at least coextensive with a viewable area of an electronic display surface;

a second gas chamber adapted to cool gas behind the viewable area of the electronic display;

a cooling chamber fan to propel gas around the isolated gas cooling chamber;

and

means for cooling gas contained within the second gas chamber.

2. The gas cooling system of claim 1, wherein:

the first gas chamber includes a transparent anterior plate;

the second gas chamber comprises a cooling plenum; and

wherein the first gas chamber is in gaseous communication with the second gas chamber.

3. The air cooling system of claim 2, wherein:

the first gas chamber further includes the electronic display surface and spacers;

and

wherein the first gas chamber includes an entrance opening and an exit opening.

4. The air cooling system of claim 3, wherein:

the first gas chamber further includes a second transparent plate laminated in front of the transparent anterior plate.

5. The air cooling system of claim 3, wherein:

the plenum includes a gas entrance junction and a gas exit junction for exchanging gas with the first gas chamber.

6. The air cooling system of claim 3, wherein:

the spacers extend along the top and bottom of the first gas chamber and define the depth of the first gas chamber.

7. The system of claim 1, wherein the first gas chamber is adapted to facilitate convection from the electronic display surface.

8. The system of claim 1, wherein:

the fan runs continuously when the electronic display is operating.

9. The system of claim 1, further comprising:

a thermostat;

a switch; and

wherein the fan within the isolated gas cooling system is switched on when the thermostat detects a threshold temperature.

10. The system of claim 2, wherein:

the plenum includes fins to increase the surface area for heat transfer.

11. The system of claim 2, wherein:

the plenum defining the second gas chamber includes a thermoelectric module.

12. The system of claim 2, wherein:

the second gas chamber includes a filter.

13. The system of claim 2, wherein:

the means for cooling gas contained within the second gas chamber include

a fan at the base of the display housing to force air over an external
surface of the plenum;

an exhaust aperture defined by the housing adapted to allow the heated gas to exit the housing.

14. The system of claim 1 wherein the system further comprises:

an air curtain device to direct exhaust air across the external surface of the gas cooling chamber.

15. A gas cooling system for an electronic display, the system comprising:

an isolated gas cooling chamber including an anterior first gas chamber and a posterior second gas chamber;

wherein the first gas chamber includes a transparent anterior plate;

wherein the second gas chamber comprises a cooling plenum;

wherein the first and second gas chambers form a closed loop;

wherein the first gas chamber is in gaseous communication with the second gas chamber.

a cooling chamber fan positioned within the second gas chamber to circulate gas around the isolated gas cooling chamber; and

means cooling the gas contained within the second gas chamber.

16. A method for cooling an electronic display with isolated gas, comprising:

providing a gas cooling chamber including a first gas chamber comprising a transparent plate and a second gas comprising a posterior cooling plenum;

wherein the first and second gas chambers are in gaseous communication;

fanning isolated gas around the first and second gas chambers;

contacting the isolated gas in the anterior first gas chamber to a viewable surface of the electronic display surface and, after the gas has traversed the first gas chamber,

directing the gas into a posterior cooling plenum;

cooling the isolated gas in the plenum; and

reintroducing the cooled air in the plenum into the first gas chamber.

17. The method of claim 16, wherein the cooling step comprises the steps of:

forcing fresh air into the display housing;

contacting the fresh air to a surface of the plenum; and

removing exhaust air in the housing through an exhaust port.

18. The method of claim 16, wherein:

the gas in the isolated gas cooling chamber moves in an about horizontal direction; and

the air in the housing moves in an about vertical direction.

19. The method of claim 16, further comprising the steps of:

providing an air curtain device; and

redirecting exhaust air along the viewing surface of the electronic display.

ABSTRACT

[0051] A preferred embodiment of the present invention relates to a cooling system and a method for cooling an electronic display. A preferred embodiment includes a transparent gas cooling chamber. The components in the system are preferably housed within the electronic display housing. The cooling chamber defines a gas compartment that is anterior to and coextensive with the electronic display surface. Fans may be used to propel the isolated gas through the cooling chamber. The circulating gas removes heat directly from the electronic display surface by convection. The isolated gas is transparent or at least semi-transparent. The image quality of an exemplary embodiment remains essentially unchanged, even though the gas is flowing through a narrow channel over the visible face of the electronic display surface.

1/8

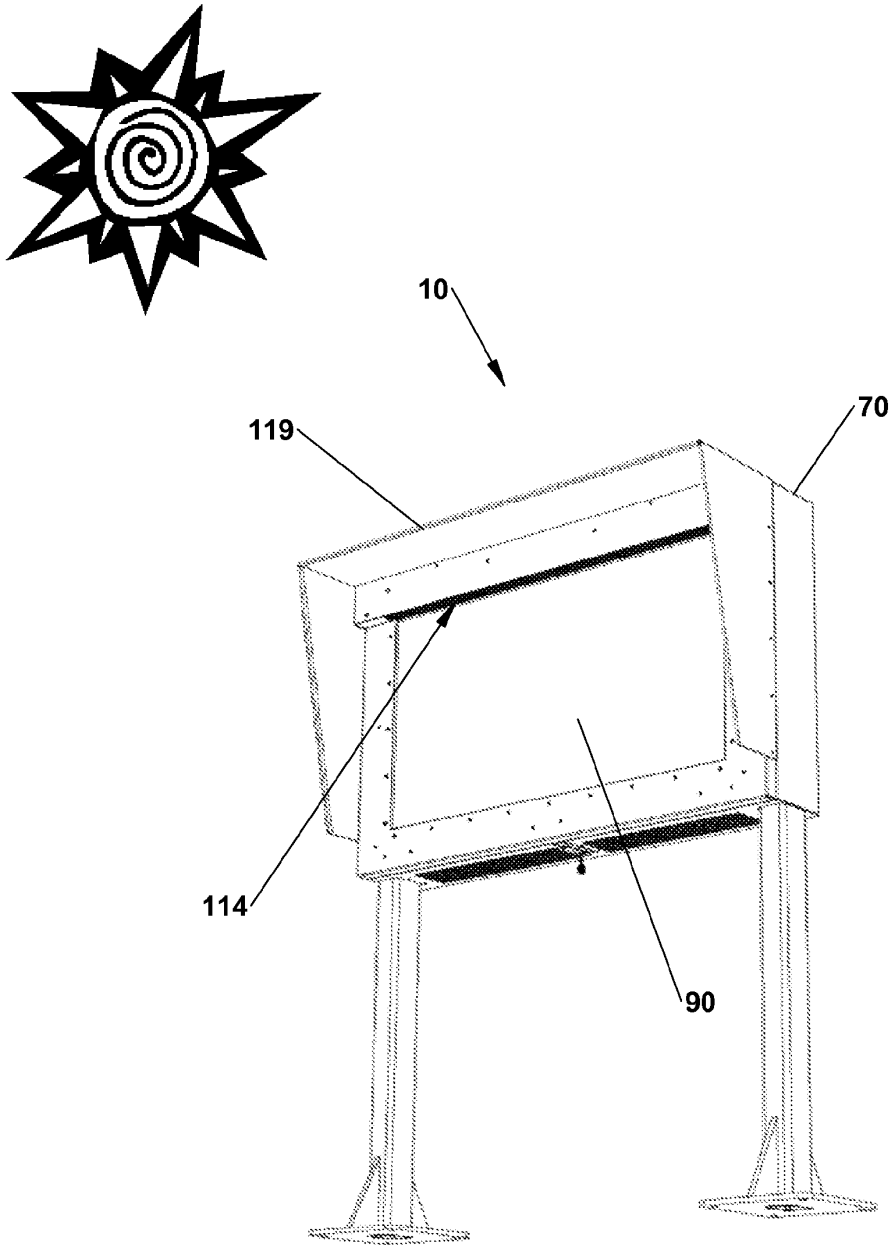


Fig. 1

2/8

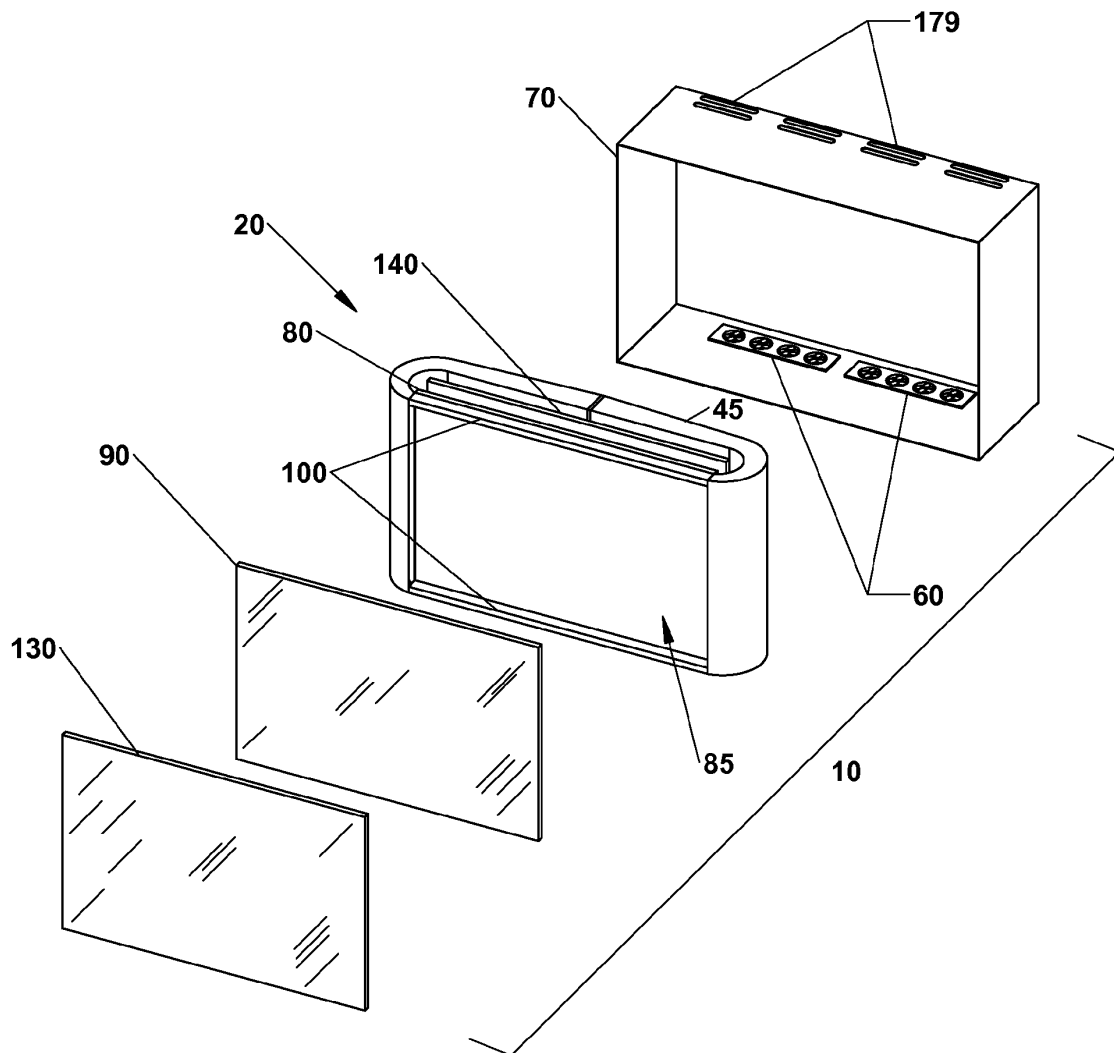


Fig. 2

3/8

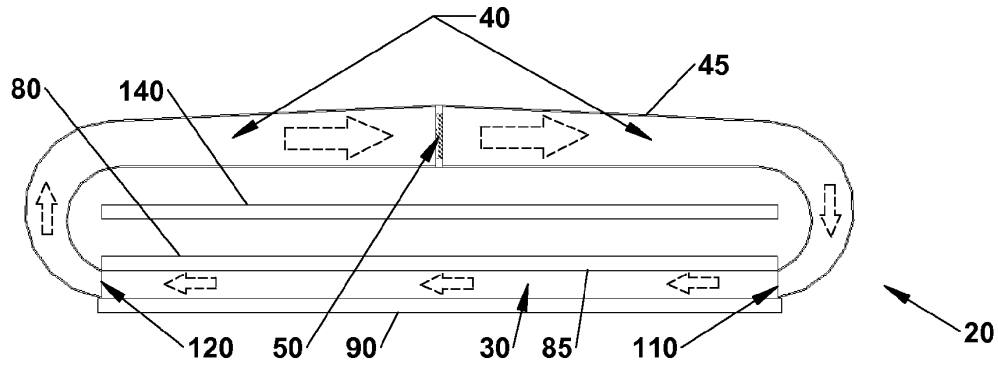


Fig. 3

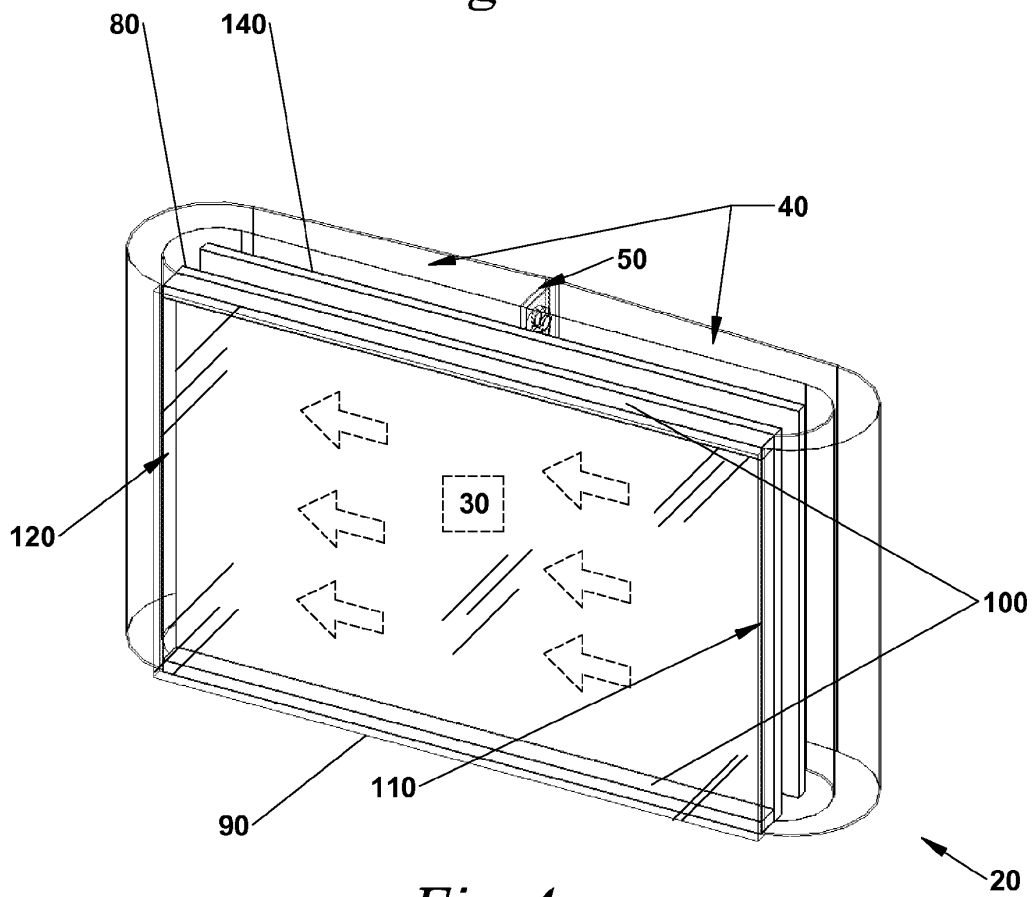


Fig. 4

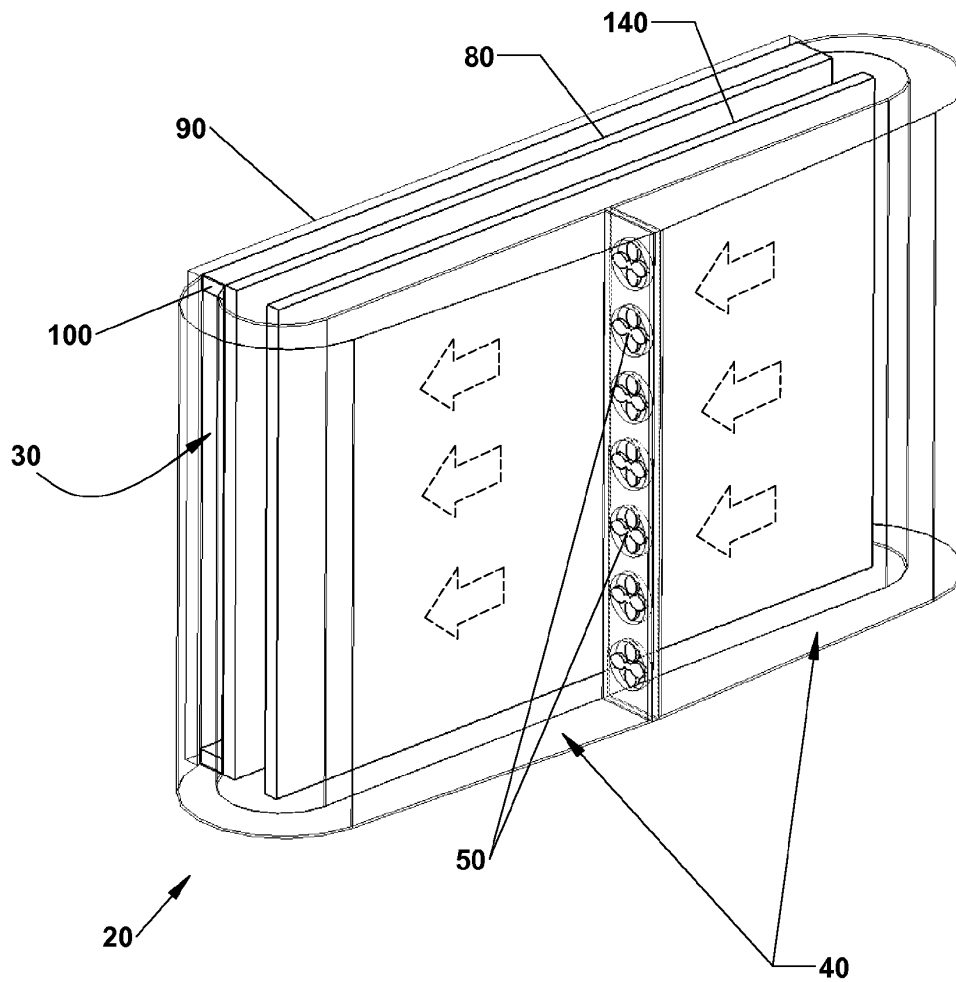


Fig. 5

5/8

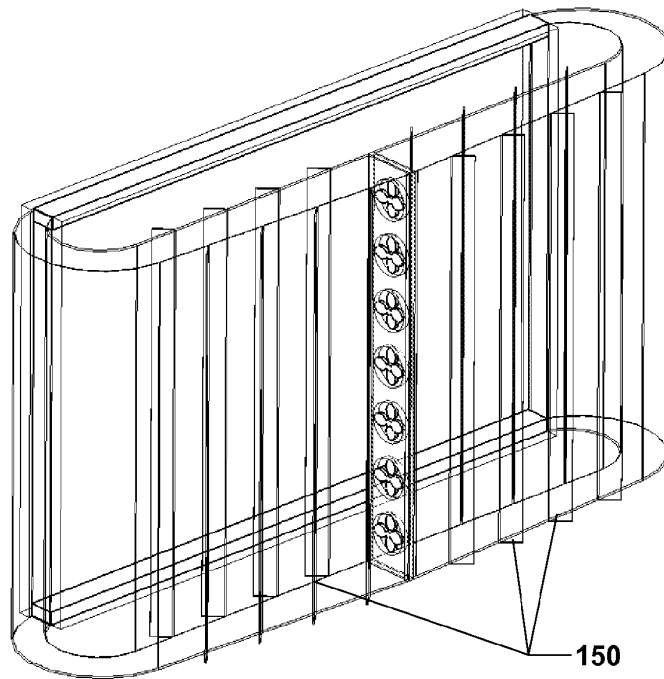


Fig. 6

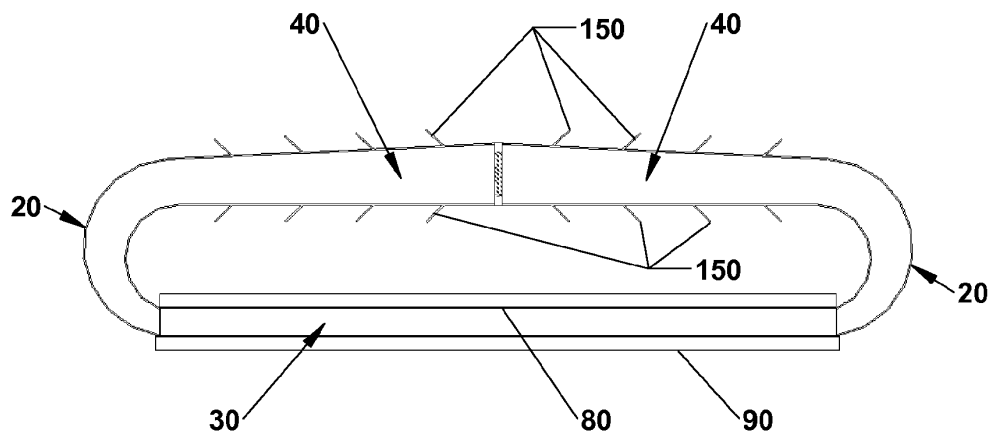


Fig. 7

6/8

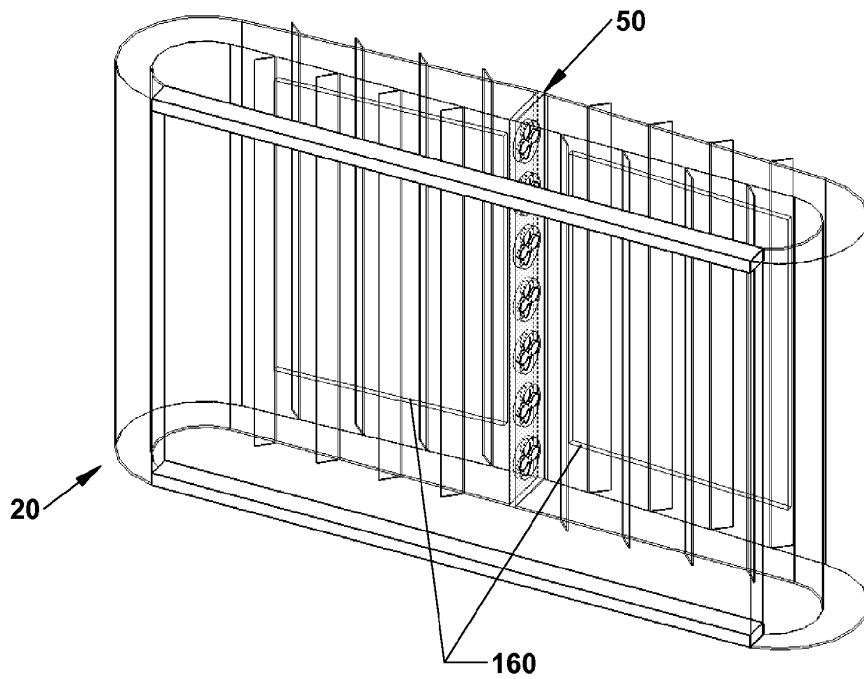


Fig. 8

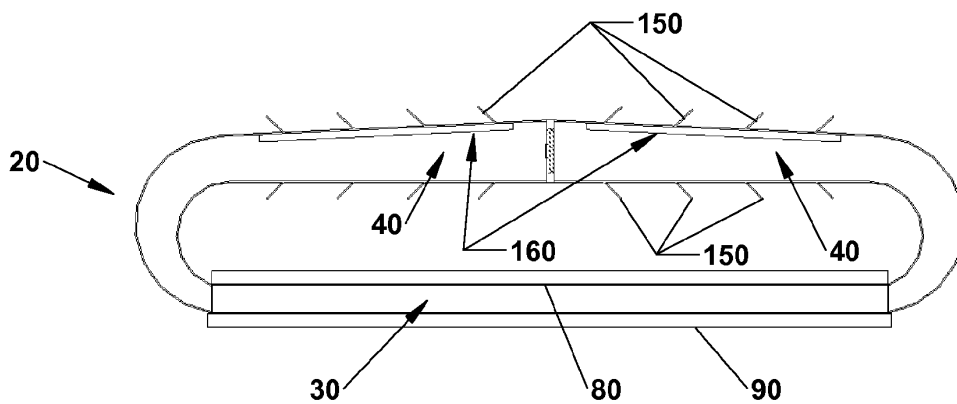


Fig. 9

7/8

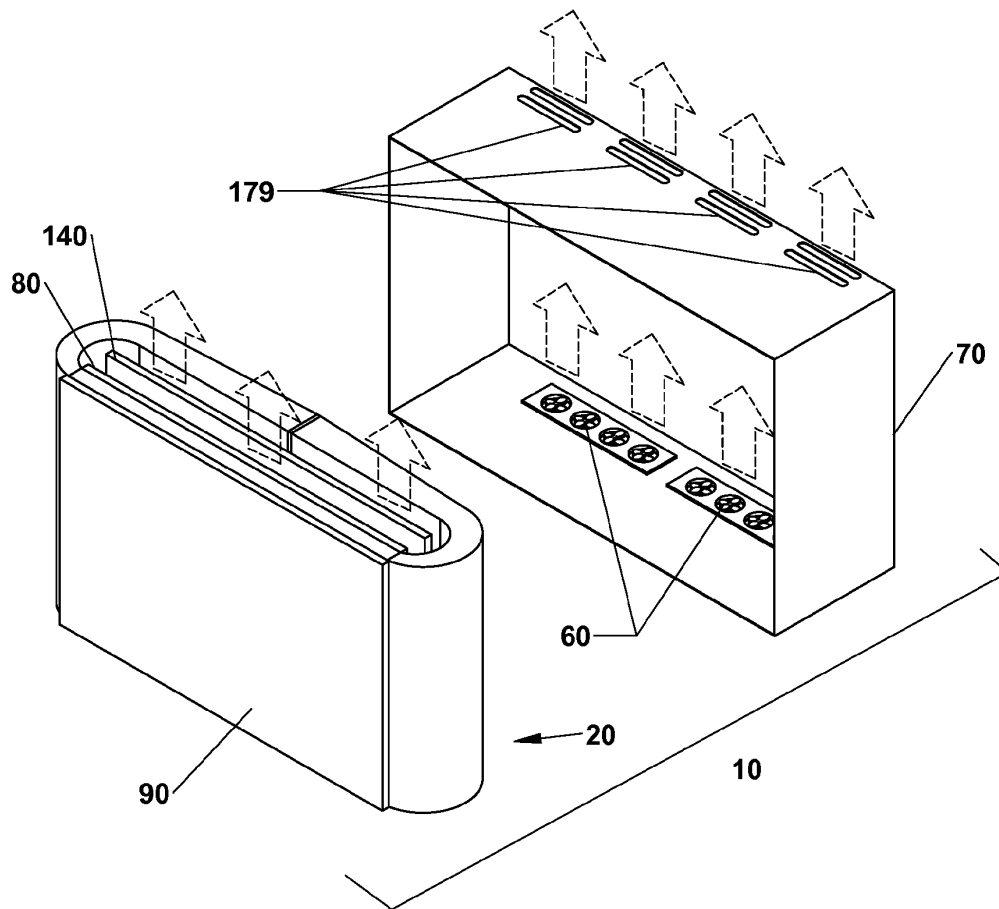


Fig. 10

8/8

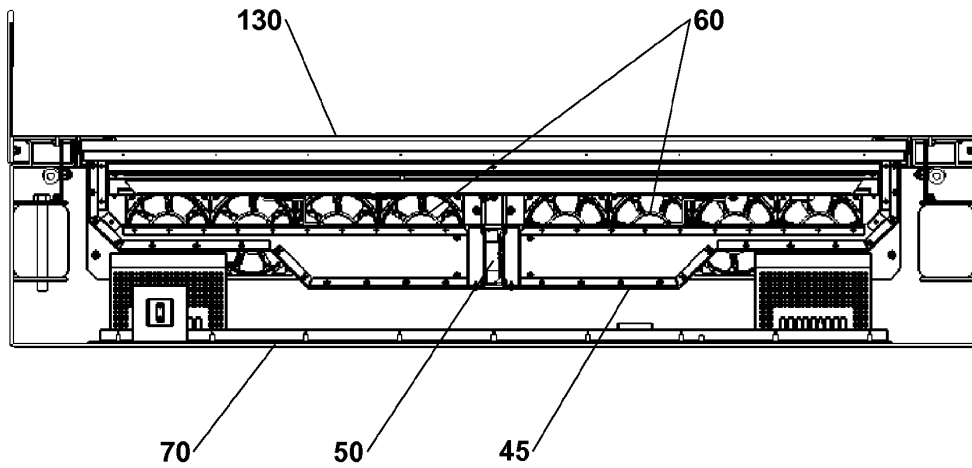


Fig. 11

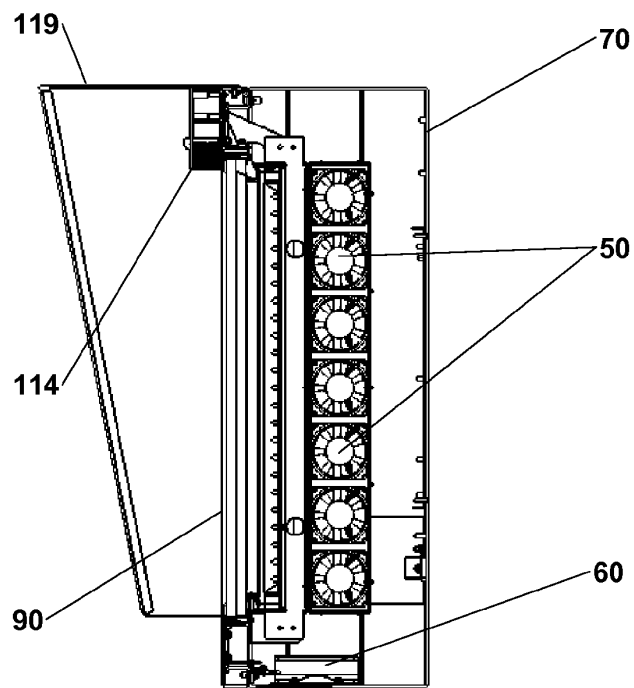


Fig. 12

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY		
First Named Inventor/Applicant Name:		William Dunn		
Filer:		Mark Ryan Engle/Emily Shultz		
Attorney Docket Number:		MAN2241-010		
Filed as Large Entity				
Provisional Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional application filing	1005	1	210	210
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				210

Electronic Acknowledgement Receipt	
EFS ID:	2938490
Application Number:	61033064
International Application Number:	
Confirmation Number:	1562
Title of Invention:	ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
First Named Inventor/Applicant Name:	William Dunn
Customer Number:	08698
Filer:	Mark Ryan Engle/Emily Shultz
Filer Authorized By:	Mark Ryan Engle
Attorney Docket Number:	MAN2241-010
Receipt Date:	03-MAR-2008
Filing Date:	
Time Stamp:	11:55:16
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$210
RAM confirmation Number	9035
Deposit Account	194076
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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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1	Provisional Cover Sheet (SB16)	ProvisionalSB.pdf	1000963	no	3
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2		Provisional_Application.pdf	75360	yes	23
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	Specification		1	14	
	Claims		15	22	
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Total Files Size (in bytes):			1703783		

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
61/033,064	03/03/2008		210	MAN2241-010		

CONFIRMATION NO. 1562

8698
STANDLEY LAW GROUP LLP
495 METRO PLACE SOUTH
SUITE 210
DUBLIN, OH 43017

FILING RECEIPT



OC000000028794380

Date Mailed: 03/14/2008

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

William Dunn, Alpharetta, GA;

Power of Attorney:

Mark Engle--58927

If Required, Foreign Filing License Granted: 03/12/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/033,064**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY

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MRI00320885

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MRI00320886

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