

**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

SAMSUNG ELECTRONICS CO., LTD. AND SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners

v.

MANUFACTURING RESOURCES INTERNATIONAL, INC.,
Patent Owner

U.S. Patent Nos. 9,629,287

Title: System for Using Constricted Convection with Closed Loop Cooling System as the
Convection Plate

Inter Partes Review No. IPR2023-00255



DEMONSTRATIVE EXHIBIT—NOT EVIDENCE

Wednesday, April 24, 2024

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Patent Owner MRI



Ex. 2054 at 15.



Ex. 2045 at 6.



Ex. 2054 at 1.

POR at 49, 60.

The Challenging Environment for Outdoor Displays



Ex. 2038 at 8.

Display specialists focused on providing solutions for companies that wanted their messages outdoors were challenged by a variety of issues during the early years of a still-emerging specialty.

The biggest obstacle was heat – from inside and from the sun. Direct sunlight and its amplified heat could alter the properties of LCD crystals – the display layer of screens – and discolor or cause black blotches. Inside,

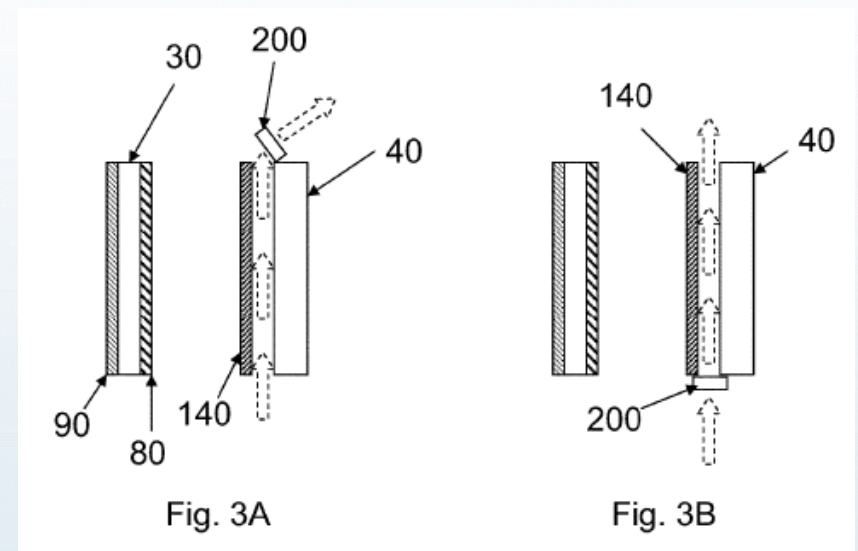
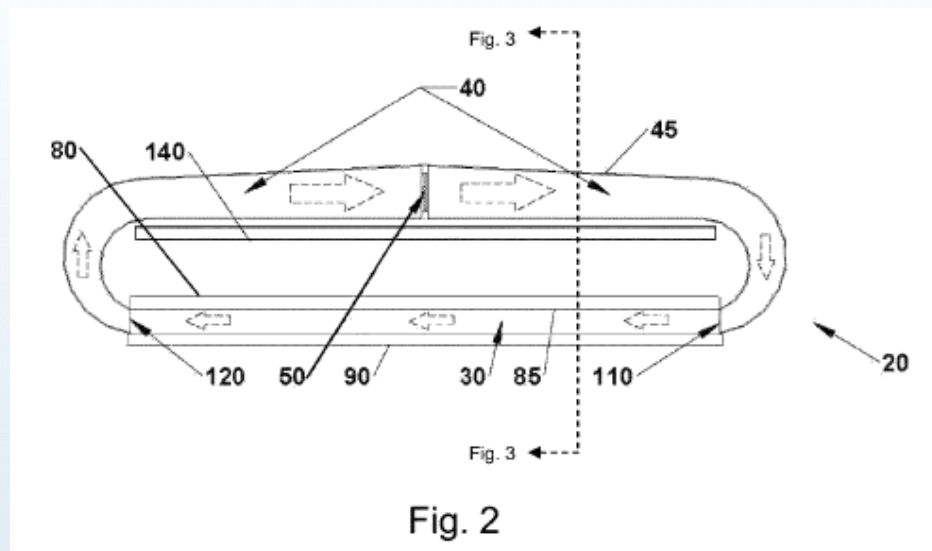
Ex. 2025 at 3.

DEMONSTRATIVE EXHIBIT—NOT EVIDENCE

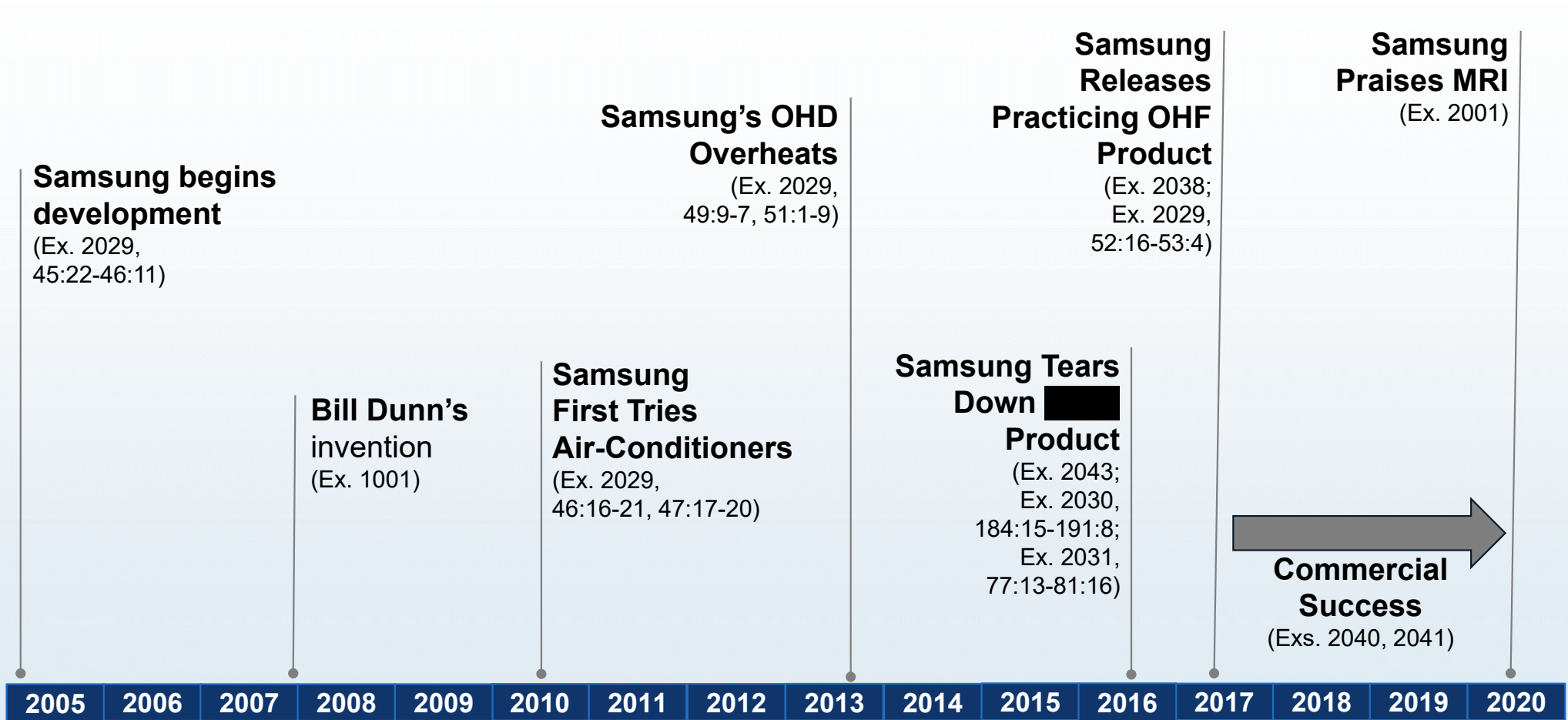
Ex. 1001.

4

The '287 Patent



Related Patents	Relevant Samsung Products
'287 Patent (IPR2023-00255) '595 Patent (IPR2023-00199) '322 Patent (IPR2023-00220)	Samsung's Mid-Sized 46/55-inch OHF products
'740 Patent (IPR2023-00254) '142 Patent (IPR2023-00221)	Samsung Large-Sized 75/85-inch OHF products



Samsung's 2020 Email

From: Romulus Sala Stoian [r.sstoian@samsung.com]
Sent: 4/24/2020 10:20:27 PM
To: Bill Dunn [BDunn@mri-inc.net]
Subject: Mutual NDA
Attachments: SDSA Template - NDA - Mutual - v20190809 1033 FINAL.DOC

Bill,

Good afternoon and many thanks for taking the time talking to me.

What you've done at MRI it's impressive and unique; I bet was not easy entering into a virgin space and then shortly after being able to pioneer a new business model based on turnkey solutions for DOOH, raising the bar for high quality standards.

Per our conversation, I see loads of opportunities for collaboration in the outdoor space (smart city, transit, rail, etc) where we can embrace the MRI technology and blended in with Samsung displays. Our customers will benefit from quality products and executions.

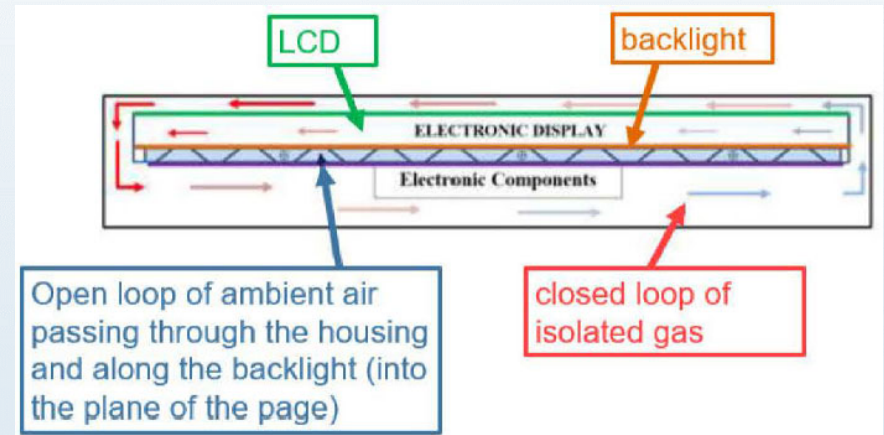
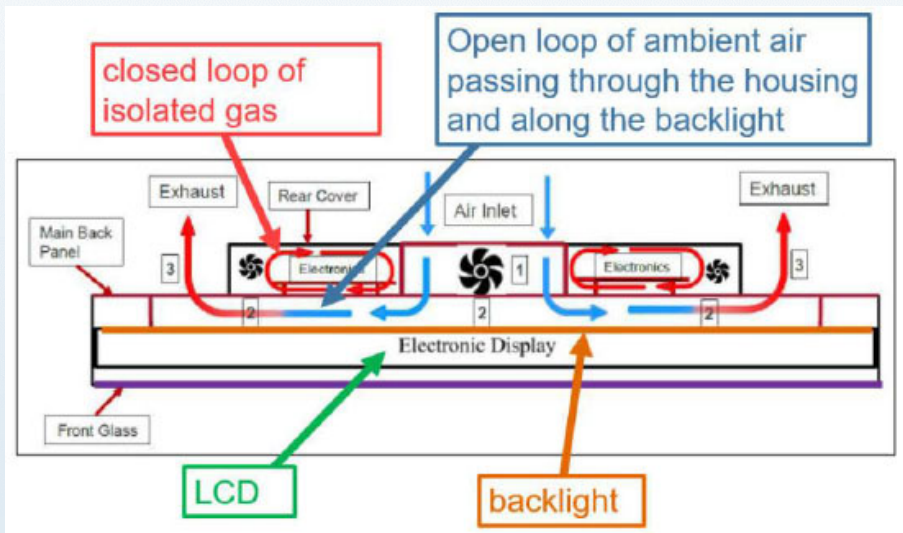
See attached our MNDA. Kindly review and add comments if needed too.
Thank you. Again, a real pleasure talking to you Sir.

Romulus Stoian
Director, DOOH Leader
Digital Innovation Solutions
Display B2B Team

Samsung SDS America

Undisputed

- Samsung's Mid-Sized Products practice the '287 Patent.
- MRI's 55-, 75-, and 85-inch Products practice the '287 Patent.
- Samsung and MRI's products are commercially successful.



Nexus – Commercial Success is Attributable to the Cooling Systems



John Palmer
*Product Integrator for
Samsung DOOH*

A. Just from a reputation standpoint, from feedback from customers. These things sit outside in sometimes a very difficult environment; bright sun, very hot, very cold. And the feedback we get from customers is that, you know, some of the other displays don't work well. They'll tell us, Do not provide us, you know, a particular type of display. We want Samsung.

Nexus – Commercial Success is Attributable to the Cooling Systems



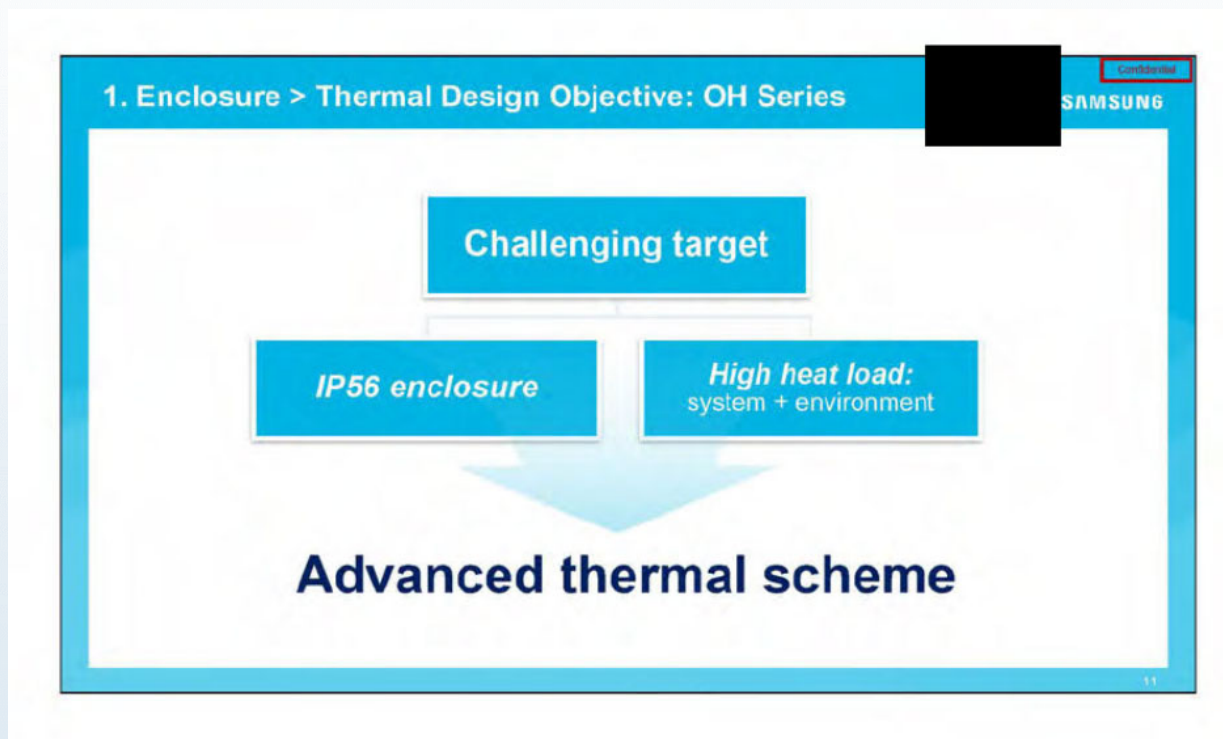
John Palmer
*Product Integrator for
Samsung DOOH*

A. Typically, it has to do with sunlight. I'm forgetting the term now. But when the monitors get hot, they develop black spots on the display. Sometimes they're like blotches, like just an irregular-shaped black spot where the crystals get overheated. Some displays are much better at preventing that than others.

Q. Okay. So the ability to keep the monitors cool is very important?

Nexus – Commercial Success is Attributable to the Cooling Systems

Samsung marketing focuses on cooling—the features that distinguish outdoor displays from ordinary LCD displays. Ex. 2038, at 7-27.



Ex. 2038 at 8.

Nexus – Commercial Success is Attributable to the Cooling Systems

- Cooling drives value of the display. Ex. 2025, at 2, 5 (pricing for outdoor display is “many multiples of their indoor cousins”).

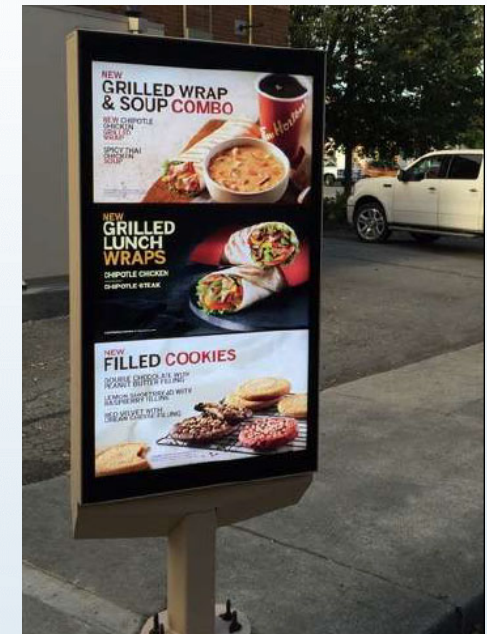
	48" Digital Indoor Signage Display • \$1,000+ per unit • 300-500 nits	VS	46" Digital Outdoor Signage Display • \$4,000+ per unit • 2500-3000 nits 
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Nexus – Presumption of Nexus:

- “Features & benefits” that Samsung identifies are features and benefits of MRI’s invention.
 - “Slim Design”
 - Water and dust resistant “IP56” certification
 - “Brightness Greater than 3,500 nits”
 - “Extreme Outdoor Durability”



Ex. 2038 at 8



Ex. 2054 at 15.

Claim 12

12. An electronic display assembly comprising:
a housing;
a liquid crystal display (LCD) positioned within the housing and having a backlight;
wherein the electronic display is coolable by a combination of a closed loop of **isolated gas** which circulates within the housing and an **open loop of ambient air which passes through the housing and along the backlight.**

Claim 15

15. The electronic display assembly of claim 12 further comprising:
one or more electronic components **for driving the LCD positioned within the rear cooling chamber.**

Petitioner's Grounds

Obviousness

Ground I	Claims 12-23	Karppanen (Ex. 1006)
Ground II	Claims 1, 4-5, 8-12, 14-17, 21-23	Nagashima (Ex. 1007) in view of Karppanen (Ex. 1006)
Ground III	Claims 1, 4-5, 8-23	Ohta (Ex. 1004) in view of Marumoto (Ex. 1005)
Ground IV	Claims 1, 4-5, 8-23	Ohta (Ex. 1004) in view of Marumoto (Ex. 1005) and further in view of Yare (Ex. 1013)
Ground V	Claims 12-20	Kitamura (Ex. 1017) in view of Harris (Ex. 1018)

Karppanen (Ex. 1006)

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(19) World Intellectual Property Organization
International Bureau

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G09F 9/33 (2006.01) G09F 19/22 (2006.01)

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(71) Applicant (for all designated States except US): SYMBI-
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(72) Inventors and
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SUOMELA, Nika (FI01); Karolintie 20 A1, FI-87200
Kaajani (FI); PYYKÖNEN, Markku (FI01); Karh-
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Oulu (FI)

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
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KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV,
LY, MA, MD, MG, MK, MN, MW, MX, MY, NA, NG, NI,
NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG,
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ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
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FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,
RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA,
GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
with international search report

(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.

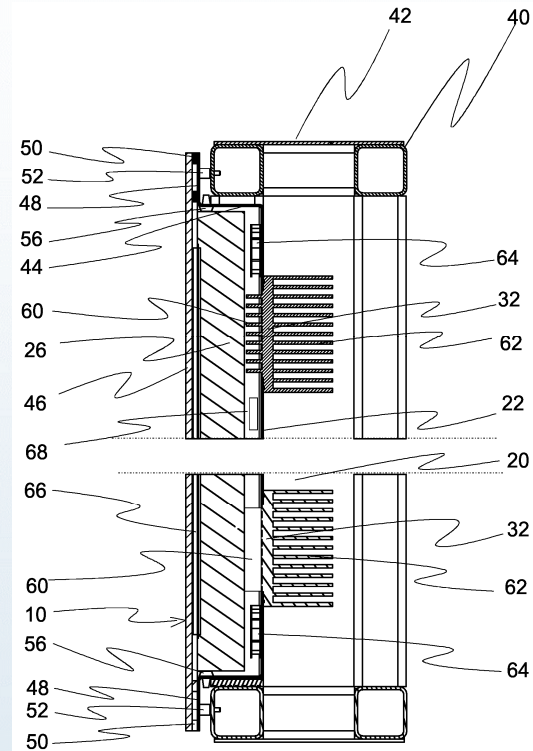


Fig. 2

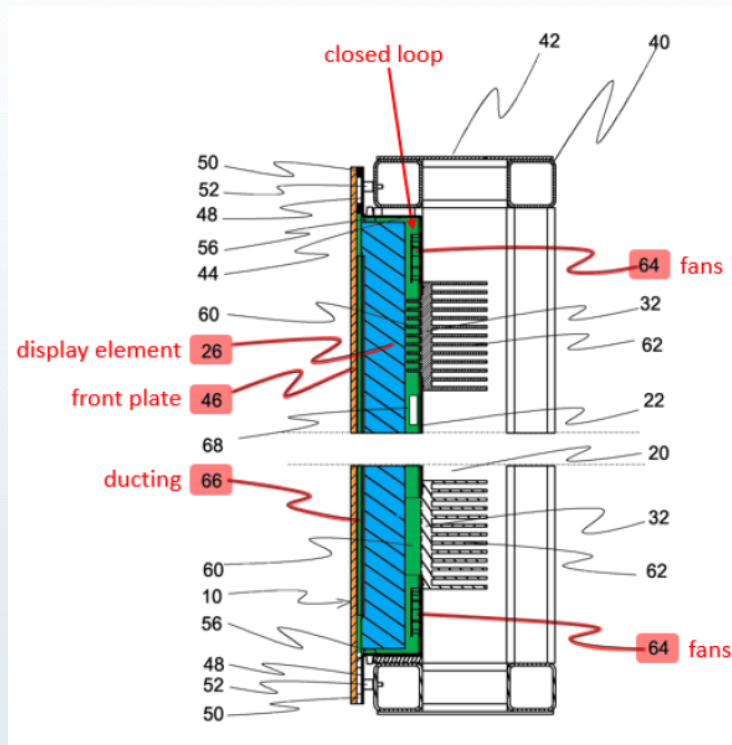
Petitioners Attempt to Rewrite the Claim with Functional Language

“along”

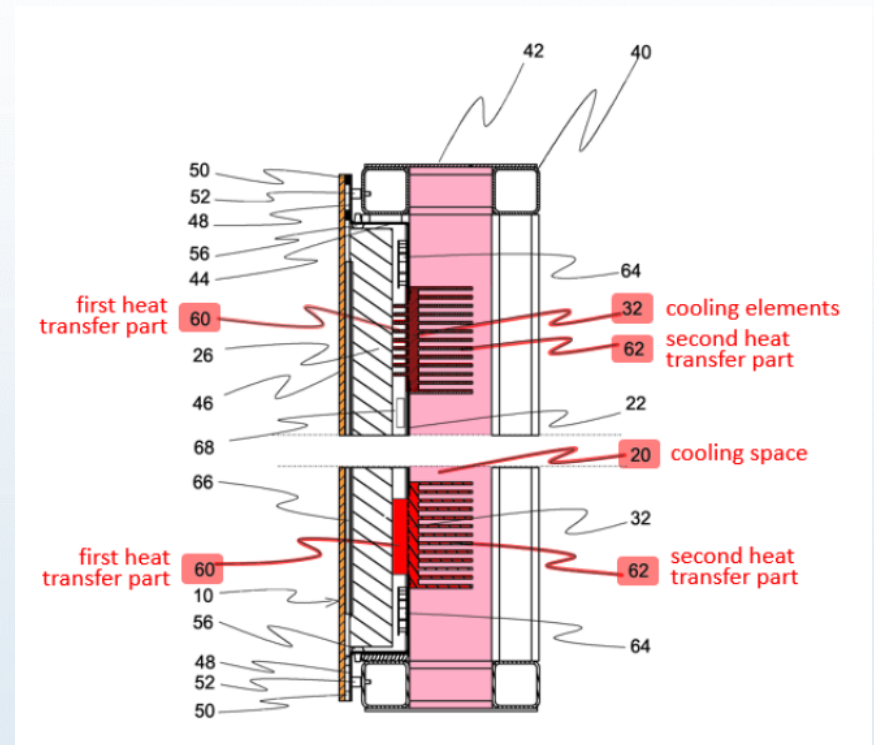


**“is in thermal
communication
with,”**

Claim 12—No Ambient Air Along the Backlight

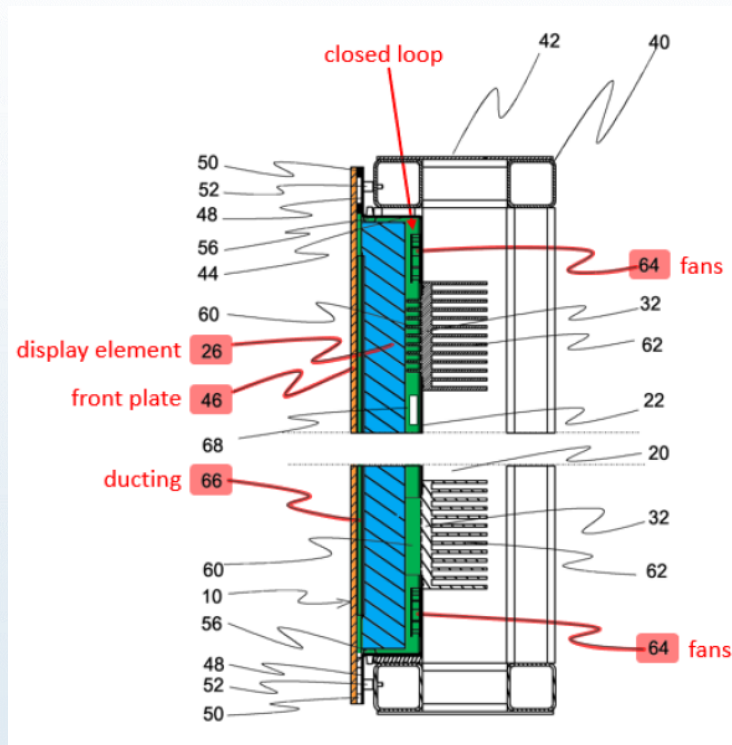


Petition at 29



Petition at 30

Claim 15— No “Electronic Components for Driving the LCD Positioned Within the Rear Cooling Chamber”



Petition at 29

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 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.

Ex. 1006 at 3:28-35

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 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

Ex. 1006 at 8:21-26.

Nagashima (Ex. 1007)

(12) **United States Patent**
Nagashima et al.

(10) Patent No.: **US 6,798,655 B2**
(45) Date of Patent: **Sep. 28, 2004**

(54) **LIQUID COOLING SYSTEM FOR
ALL-IN-ONE COMPUTER**

(56) **References Cited**

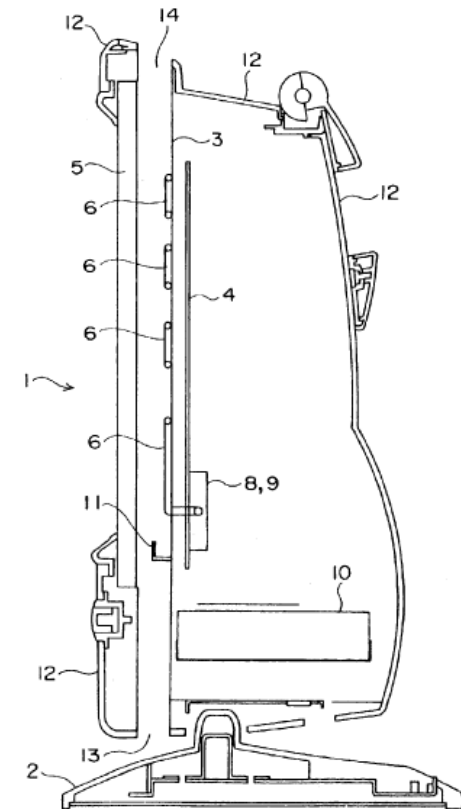
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6,263,957	B1 *	7/2001	Chen et al.	165/80.4
6,510,052	B2 *	1/2003	Ishikawa et al.	361/687
6,519,148	B2 *	2/2003	Nakagawa et al.	361/687
6,556,439	B2 *	4/2003	Shibasaki	361/687

FOREIGN PATENT DOCUMENTS

(73) Assignee: **Hitachi, Ltd., Tokyo (JP)**

FIG. 1



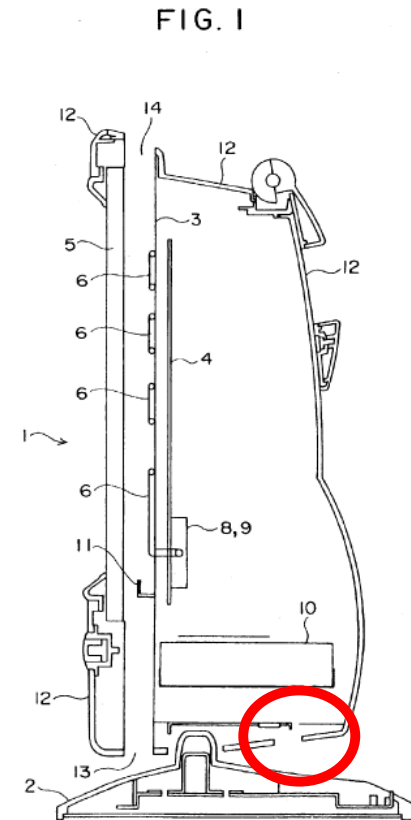
All-in-One Computers



Claim 12—No “Closed Loop of Isolated Gas”

the operation of the computer. On the back side of the LCD panel **5**, i.e. on its side facing the main chassis **3** are arranged a large number of connectors, and electric wiring lines, connected to the connectors, extend through an opening in the main chassis **3** and are connected to terminals of the mother board **4**. Thus, a space is formed between the main chassis **3** and the LCD panel **5** for routing the electric wiring lines etc.

Ex. 1007 at 3:63-4:3.



Ex. 1007 at Fig. 1

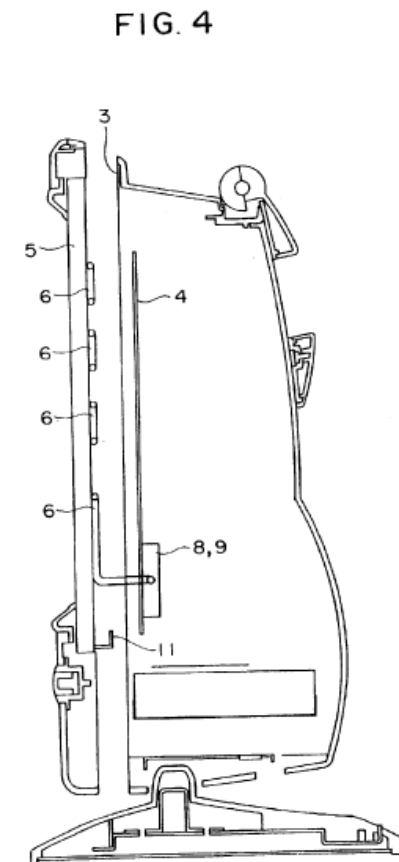
Claim 12—Nagashima Does not Teach the Display is Cooled by the Closed Loop

embodiment of the invention. As shown in FIG. 4, this embodiment is so constructed that a tube goes through a pump, a heat receiving head, and an opening in a main chassis and is fixed on the back surface of an LCD panel to form a heat radiating portion. The back surface of the LCD panel is made of a metal material, and the heat of a cooling medium liquid from the tube, which is arranged spirally or in a zigzag or serpentine manner, can be transferred effectively onto the back surface of the LCD panel and radiated.

Ex. 1007 at 5:45-49.

The tube 6 for transporting the cooling medium liquid goes through the heat receiving head 8, the pump 7, and the opening in the main chassis up to the front side of the main chassis (see FIG. 2), i.e. up to the space between the main chassis 3 and the LCD panel 5, and is fixed to the main chassis front side by screwing, bury-in, or any other appropriate fixing method, thus forming a heat radiating portion.

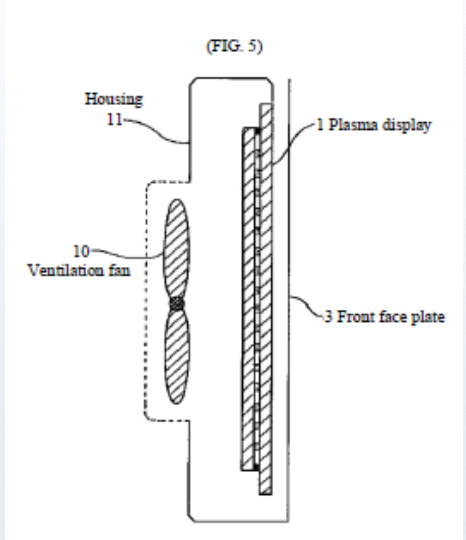
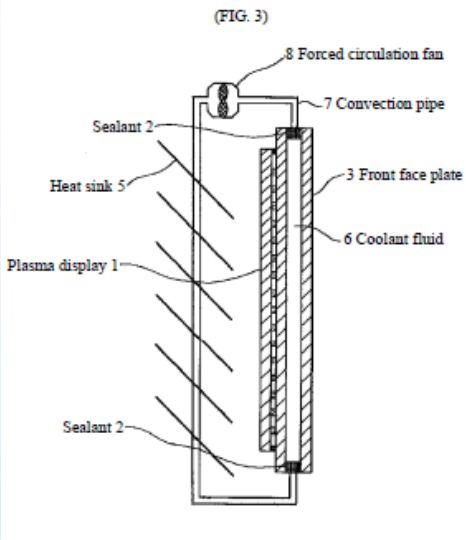
Ex. 1007 at 4:35-42.



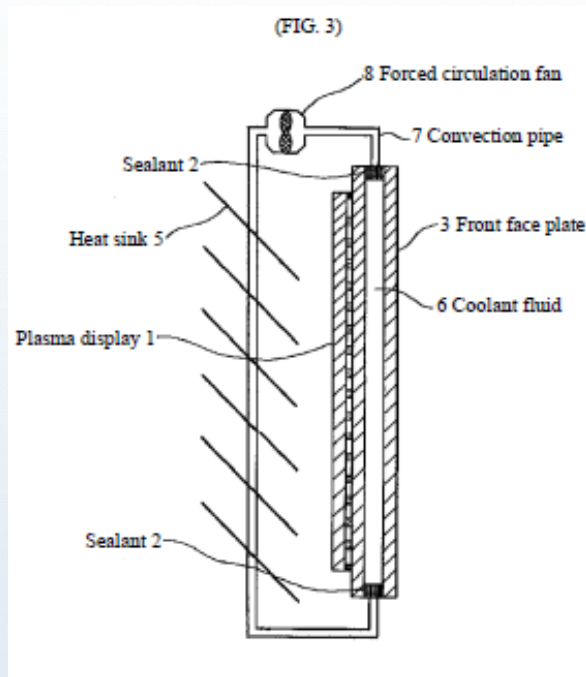
Ex. 1007, page 5, at Fig. 4

Ohta (Ex. 1004)

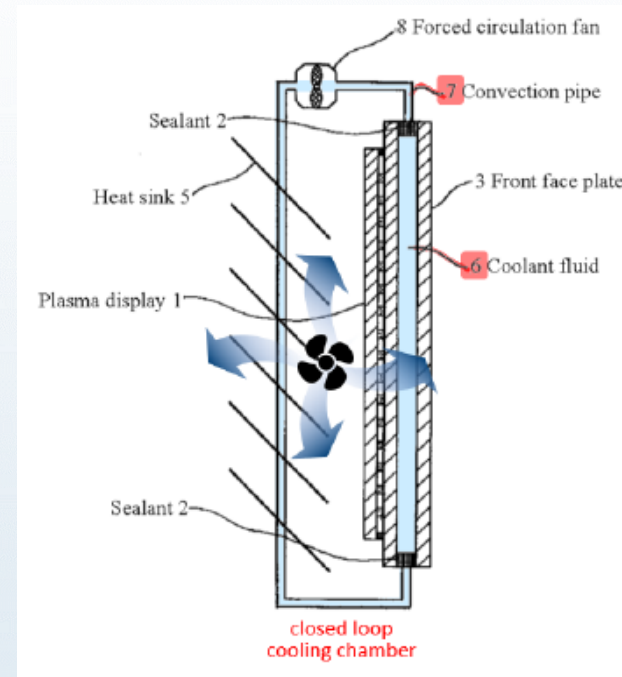
(19) Japan Patent Office (JP)		(12) Japanese Granted Patent Publication (B2)		(11) Patent Number
		Patent No. 3118907 (P3118907)		
(45) Issuance date December 18, 2000 (2000.12.18)		(43) Registration date October 13, 2000 (2000.10.13)		
(51) Int. Cl. ⁷ H 01 J 17/28	Identification codes	FI H 01 J 17/28		
Number of claims 5 (Total of 6 pages)				
(21) Application number	Japanese Patent Application H3-279363	(73) Rights holder	000004237 NEC CORPORATION 7-1 Shiba 5-chome, Minato-ku, Tokyo	
(22) Date of application	October 25, 1991 (1991.10.25)	(72) Inventor	TATSUKI OHTA 5% NEC Corporation, 7-1 Shiba 5-chome, Minato-ku, Tokyo	
(65) Publication number	Japanese Unexamined Patent Application Publication H5-121005	(74) Agent	100082935 Patent attorney NACKI KYOMOTO (and 2 others)	
(43) Publication date	May 18, 1993 (1993.5.18)	Examiner	Hirofumi KOJIMA	
Date of examination request	December 10, 1997 (1997.12.10)	(56) Reference literature	Japanese Unexamined Patent Application Publication H4-1693 (JP,A)	
Pre-trial examination		(58) Fields searched	(Int. Cl. 7, DB name) H01J 17/28	
(54) (TITLE OF THE INVENTION) COOLING DEVICE FOR PLASMA DISPLAY PANEL				
(57) (SCOPE OF PATENT CLAIMS)				
(CLAIM 1) Cooling device for plasma display panel having a front face plate that is directly mounted at an appropriate space from the plasma display panel so as to form an airtight container between itself and the plasma display panel, and coolant that either flows in/out of the aforesaid airtight container or is sealed within the same, characterized in that: the aforesaid airtight container is formed on the display face side of the plasma display panel; part or all of the container forming the aforesaid airtight container, along with the aforesaid coolant, is permeable to visible light; and the portion of container forming the aforesaid airtight container that is permeable to visible light is colored.		airtight container or is sealed within the same, characterized in that: the aforesaid airtight container is formed on the display face side of the plasma display panel; part or all of the container forming the aforesaid airtight container, along with the aforesaid coolant, is permeable to visible light; and the portion of container forming the aforesaid airtight container that is permeable to visible light is colored.		
(CLAIM 2) Cooling device for plasma display panel having a front face plate that is directly mounted at an appropriate space from the plasma display panel so as to form an airtight container between itself and the plasma display panel, and coolant that either flows in/out of the aforesaid		(CLAIM 3) Cooling device for plasma display panel having a front face plate that is directly mounted at an appropriate space from the plasma display panel and a fan for ventilating the aforesaid space, characterized in that: the aforesaid front face plate is formed on the display side of the plasma display panel, and the aforesaid front face plate is permeable to visible light as well as colored.		
		(CLAIM 4) Cooling device for plasma display panel having a front face plate that is directly mounted at an appropriate		



Claim 12 – No “Open Loop of Ambient Air which Passes Through the Housing and Along the Backlight”



Ex. 1004 at Fig. 3.



Petition at 72.

Marumoto (Ex. 1005)

(19) Japan Patent Office (JP) (12) Japanese Unexamined Patent Application Publication (A) (11) Japanese Unexamined Patent Application Publication Number
H8-152604
 (43) Publication date: June 11, 1996

(51) Int. Cl. ⁶	Identification codes	JPO file numbers	FI	Technical indications
G02F 1/133	580			
1/1333				
G05D 23/00	A			

Request for examination: Not yet requested Number of claims: 4 FD (Total of 3 pages)

(21) Application number	Japanese Patent Application H6-319212	(71) Applicant	000227836 Nippon Avionics Co., Ltd. 20-1 Nishi Shimbashi 3-chome, Minato-ku, Tokyo
(22) Date of application	November 29, 1994	(72) Inventor	Yukio MARUMOTO % Nippon Avionics Co., Ltd., 20-1 Nishi Shimbashi 3-chome, Minato-ku, Tokyo
		(74) Agent	Patent Attorney Yoshihiro YAHATA

(54) (TITLE OF THE INVENTION) HEATING/COOLING SYSTEM FOR LIQUID CRYSTAL PANEL

(57) (ABSTRACT)
 (OBJECTIVE) Enable the use of a liquid crystal panel beyond its operating temperature range.
 (CONFIGURATION) A panel heating/cooling plate 4 is adjointly provided on the back face of a liquid crystal panel 1, and a temperature control component 3 performs control according to the temperature reported by a temperature sensor 2, raising or lowering the temperature of the heating/cooling material passed through a channel 5 so as to heat or cool the panel heating/cooling plate 4. As a result, the liquid crystal panel 1 is heated or cooled in the same way when the panel heating/cooling plate 4 is heated or cooled, such that the temperature of the liquid crystal panel is adjusted to within the operating temperature range even if the temperature of the environment in which the panel is installed is beyond the operating temperature range.

