

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION**

MIDAS GREEN TECHNOLOGIES, LLC,	§	
	§	
Plaintiff,	§	
	§	
v.	§	CIVIL ACTION NO. 6:24-CV-166-ADA
	§	
GREEN REVOLUTION COOLING, INC.	§	
	§	
Defendant.	§	
	§	

**GREEN REVOLUTION COOLING, INC.’s DISCLOSURE OF PRIOR ART AND
PRELIMINARY INVALIDITY CONTENTIONS**

Pursuant to the Standing Order Governing Proceedings (OGP) 4.4-Patent Cases and the Scheduling Order entered by the Court (Dkt. 23), Defendant Green Revolution Cooling, Inc. (“GRC” or “Defendant”) hereby provides its Preliminary Invalidity Contentions and accompanying document production with respect to the claims identified by Plaintiff Midas Green Technologies, LLC (“Midas” or “Plaintiff”) in its Preliminary Infringement Contentions served on August 9, 2024.

Defendant’s Invalidity Contentions include the accompanying claim charts concerning U.S. Patent No. 10,405,457 (“the ’457 Patent” or the “Asserted Patent”). Defendant also submits its identification of the claim limitations that are indefinite and/or lack written description under section 112 and the claims that are directed to ineligible subject matter under section 101.

I. INTRODUCTION

As disclosed in its Preliminary Infringement Contentions served on Defendant, Midas asserts claims 1-3 and 6 of the ’457 Patent (the “Asserted Claims”). Midas alleges that all of the

Asserted Claims have a priority date of “at least as early as March 14, 2012” and an effective filing date of December 14, 2012.

By identifying Plaintiff’s alleged priority date for the Asserted Claims of the Asserted Patent above, GRC does not concede that Plaintiff’s claims of priority are correct. Further, the citation of prior art herein and the accompanying exhibits are not intended to reflect GRC’s claim construction contentions, which will be disclosed in due course in accordance with the Scheduling Order (Dkt. 23). Instead, GRC’s Preliminary Invalidity Contentions as set forth herein and in the accompanying exhibits may reflect Plaintiff’s apparent claim construction based on its Infringement Contentions, with which GRC disagrees.

As further detailed in and supported by these Preliminary Invalidity Contentions, GRC contends that each of the Asserted Claims is invalid under at least 35 U.S.C. §§ 102-103 and 112. GRC reserves the right to prove the invalidity of the Asserted Claims on bases other than those required to be disclosed in these disclosures pursuant to the Scheduling Order (Dkt. 23).

II. AMENDMENT / SUPPLEMENTATION

GRC’s Preliminary Invalidity Contentions pertain to the Asserted Claims as identified in Plaintiff’s Preliminary Infringement Contentions. To the extent the Court later allows Plaintiff to amend its infringement contentions and/or assert one or more claims other than the Asserted Claims, GRC reserves the right to modify, amend, or supplement these Preliminary Invalidity Contentions accordingly—for example, to show the invalidity and/or ineligibility of any such newly Asserted Claims.

These Preliminary Invalidity Contentions are based on GRC’s current understanding of the Asserted Claims and Plaintiff’s apparent view of the scope of those claims as shown, for example, in Plaintiff’s Preliminary Infringement Contentions. A Markman Order in this case has not yet been issued, and in no way should these Preliminary Invalidity Contentions be taken as any

admission or acquiescence by GRC as to the proper scope of the Asserted Claims and/or proper claim constructions of terms and phrases recited in those claims. By identifying prior art that anticipates and/or renders obvious the Asserted Claims, GRC does not admit that the claim limitations are capable of construction, does not admit that any claim limitations are supported with an appropriate written description and enabling disclosure in the applicable patent specifications, and does not adopt Plaintiff's apparent claim constructions or admit the accuracy of any particular claim construction. GRC reserves all rights to later challenge or oppose any claim constructions advanced by Plaintiff and to present their own claim construction positions as permitted by the Court.

GRC further reserves the right to revise these Preliminary Invalidity Contentions in view of the Court's construction of terms and phrases recited in one or more of the Asserted Claims, additional information obtained during discovery, additional infringement theories put forth by Plaintiff during fact and/or expert discovery, any findings as to the priority date(s) of the Asserted Claims, and/or positions that Plaintiff, its fact witnesses, or its expert witness(es) may take concerning claim construction, infringement, and/or invalidity issues, as permitted by the Court. GRC further reserve the right to supplement their accompanying document productions should they later discover additional prior art documents, information, testimony, prior art systems and related documentation, and/or software or hardware code, including information provided by third parties after the date of service of these Preliminary Invalidity Contentions.

Additionally, Plaintiff has not identified its contentions regarding the level of ordinary skill in the art for the Asserted Patent. Thus, GRC has based its Preliminary Invalidity Contentions on the level of skill in the art apparent from the face of the asserted patent. For the avoidance of doubt, GRC contends that the asserted claims are invalid for the reasons set forth in its Preliminary

Invalidity Contentions under any plausible definition of the level of ordinary skill for the Asserted Patent. Nevertheless, GRC reserves the right to revise these Preliminary Invalidity Contentions in response to any position taken by Plaintiff on the level of ordinary skill in the art applicable to the Asserted Patent.

GRC may further rely on inventor admissions concerning the scope or state of the prior art relevant to the Asserted Claims, the patent prosecution history of the Asserted Patent, related patents and/or patent applications, any deposition or trial testimony of the named inventors on the Asserted Patent, and the papers filed and any evidence produced or submitted by Plaintiff in connection with these cases or other related litigation. GRC reserves the right to contend that one or more of the Asserted Claims are invalid under 35 U.S.C. § 102(f) in the event GRC obtains evidence that one or more of the named inventors did not invent the subject matter in the Asserted Claims.

Prior art not included in these Preliminary Invalidity Contentions, whether known or not known to GRC, may become relevant. In particular, GRC is currently unaware of the extent, if any, to which Plaintiff will contend that limitations of the Asserted Claims are not disclosed in the prior art identified in these Preliminary Invalidity Contentions. Accordingly, GRC reserves the right to identify other references that would disclose the allegedly missing limitation(s) of the claimed method, device, or system.

The references identified in these Preliminary Invalidity Contentions, which include the attached claim charts, may disclose the elements of the Asserted Claims explicitly and/or inherently, render those elements alone or in combination obvious to those of ordinary skill in the art even absent an explicit or inherent disclosure, and/or they may be relied upon to show the state of the art in the relevant time frame. References identified in these Preliminary Invalidity

Contentions, as well as the “References Cited” on the face of the Asserted Patent and the patents cited within the body of the Asserted Patent, may be used to illustrate, but not limit the scope of, the state of the art to which the Asserted Patent pertains (i.e., at a time prior to the date of alleged inventions of the Asserted Claims of the Asserted Patent). Moreover, GRC reserves the ability to rely on later-identified sources of information, including but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patent.

Because discovery has not begun, GRC anticipates that additional prior art and invalidity bases may be found. GRC’s investigation and analysis of the prior art is continuing, and thus GRC reserves the right to supplement, amend, and/or revise the information provided herein as GRC conducts further investigation and/or analysis, including identifying, charting, and relying on additional references.

Additionally, in view of likely third-party discovery that will be taken, GRC reserves the right to present additional items of prior art under 35 U.S.C. §§ 102(a), (b), (e), and/or (g) and/or § 103 located during discovery or further investigation, and to assert contentions of invalidity under 35 U.S.C. §§ 102(c), (d), or (f). For example, GRC expects to issue subpoenas to third parties, such as Riot Platforms, Inc., believed to have knowledge, documents, and/or other evidence concerning invalidity of one or more of the Asserted Claims.

In addition to the positions and prior art identified in these Preliminary Invalidity Contentions (including the accompanying claim charts), GRC also incorporates by reference all invalidity contentions, prior art, invalidity claim charts (including, without limitation, all anticipation positions, obviousness positions [including all prior art combinations and motivations to combine], indefiniteness positions, written description positions, and non-enablement

positions), expert reports, and invalidity theories otherwise disclosed to or by Plaintiff at any time concerning the Asserted Patent. This includes without limitation disclosures in previous or related litigation, in United States Patent & Trademark Office (“USPTO”) proceedings, by the Plaintiff, by any other parties accused of patent infringement by the Plaintiff, or by the named inventors or any individuals associated with the prosecution and/or any form of post-grant review or reexamination of the Asserted Patent. For avoidance of doubt, such related litigations and proceedings include without limitation:

- *Midas Green Technologies, LLC v. Rhodium Enterprises, Inc.*, 6:22-cv-00050 (W.D. Tex.) (including without limitation Rhodium’s final invalidity contentions, MIDAS-0000060-125);
- *Midas Green Technologies, LLC v. Immersion Systems LLC*, 4:20-cv-00555 (N.D. Tex.);
- *Green Revolution Cooling, Inc. v. Riot Platforms, Inc.*, 6:24-cv-00152 (W.D. Tex.);
- IPR2021-01176;
- PGR2021-00104.

GRC reserves the right to supplement or otherwise amend these Preliminary Invalidity Contentions in response to any relevant discovery provided by third parties, Plaintiff, opening or rebuttal expert reports, fact or expert depositions, or in response to any claim construction ruling(s) issued by this Court (regardless of how and when such ruling is made). GRC also reserves the right to supplement or otherwise amend these Preliminary Invalidity Contentions in response to any rebuttal evidence disclosed by Plaintiff or as otherwise may be necessary or appropriate under the circumstances.

III. PRIOR ART

Pursuant to the Scheduling Order (Dkt. 23), and subject to GRC’s reservations of rights,

GRC identify each item of prior art that anticipates or renders obvious the Asserted Claims below.¹

Invalidity claim charts identifying disclosures in the references identified in the tables below as to the Asserted Claims of the Asserted Patent are provided in attached Exhibits A1 and A2.

Table 1-A: Prior Art Patents and Printed Publications for the Asserted Patent

Patent No. or Title (Primary Inventor/Author)	Date of Issue/ Publication	Filing Date
U.S. Patent Application Publication No. 2006/0126292 to Pfahnl et al. (Andreas C. Pfahnl)	June 15, 2006	December 14, 2004
U.S. Patent Application Publication No. 2011/0132579 to Best et al. (Christiaan Best)	June 9, 2011	August 11, 2008 (Prov filing) / August 10, 2009 (PCT filing)
Japanese Patent No. 2001-181898 to Osada et al. (Osada Osamu)	July 30, 2001	December 27, 1999
U.S. Patent Application Publication No: 2014/0211412 to Best (Christiaan Best)	July 31, 2014	August 5, 2011 (Prov filing) / August 4, 2012 (PCT filing)
U.S. Patent No. 3,406,244 to Oktay (Sevgin Oktay)	October 15, 1968	June 7, 1966
U.S. Patent No. 4,590,538 to Cray (Seymour R. Cray, Jr.)	May 20, 1986	November 18, 1982
U.S. Patent No. 5,341,825 to Kobayashi (Satoshi Kobayashi)	August 30, 1994	October 16, 1991
U.S. Patent No. 5,054,519 to Berman (Allan Berman)	October 8, 1991	December 26, 1990

¹ GRC's disclosure of prior art is premised on the alleged priority dates of the Asserted Patent as identified in Plaintiff's Preliminary Infringement Contentions. GRC contends Plaintiff is not entitled to the alleged priority dates and reserve the right to modify, amend, or supplement its invalidity contentions with additional prior art references if any Asserted Claim is shown to not be entitled to the respective alleged priority date or if Plaintiff alleges any other priority date for any of the Asserted Claims. Notwithstanding that reservation of rights, GRC also reserves the right to argue that they have been unduly prejudiced should Plaintiff allege a different priority date for any of the Asserted Claims, and that accordingly Plaintiff should not be allowed to do so.

U.S. Patent No. 5,167,511 to Krajewski et al. (Nicholas Krajewski)	December 1, 1992	November 27, 1990
U.S. Patent No. 5,448,108 to Quon et al. (William Quon)	September 5, 1995	November 2, 1993
U.S. Patent No. 5,651,836 to Suzuki (Kuniyoshi Suzuki)	July 29, 1997	February 27, 1995
U.S. Patent No. 6,001,189 to Rolfson (J. Brett Rolfson)	December 14, 1999	September 30, 1996
U.S. Patent No. 6,555,298 to Rolfson (J. Brett Rolfson)	April 29, 2003	August 22, 2000
U.S. Patent No. 6,752,897 to Jang et al. (Ruei-Hung Jang)	June 22, 2004	October 22, 2002
U.S. Patent No. 6,840,250 to Kashkoush et al. (Ismail Kashkoush)	January 11, 2005	April 6, 2001 (Prov filing) / April 5, 2002 (Filing)
U.S. Patent No. 6,872,262 to Chong et al. (Kam Beng Chong)	March 29, 2005	September 27, 2000
U.S. Patent No. 7,532,699 to Meseth (Johann Meseth)	May 12, 2009	April 16, 2004 (PCT filing)
U.S. Patent. No. 9,992,914 to Best et al. (Christiaan Scott Best)	June 5, 2018	August 11, 2008 (Prov filing) / August 10, 2009 (PCT filing)
U.S. Patent No. 10, 123,463 to Best et al. (Christiaan Scott Best)	November 6, 2018	August 11, 2008 (Prov filing) / August 10, 2009 (PCT filing)
Japanese Patent Publication No. 2001207296 to Osada et al. (Osada Osamu)	July 31, 2001	January 26, 2000
Japanese Patent Publication No. 2008086900 to Sato et al. (Sato Fumiatsu)	April 17, 2008	September 30, 2006
Japanese Patent Publication No. 2007301529 to Miyamoto (Miyamoto Makoto)	November 22, 2007	May 15, 2006
Japanese Patent Publication No. 2007201330 to Kimura (Kimura Masahiro)	August 9, 2007	January 30, 2006

Presentation Slides, titled “Data Center Immersion Cooling” by Chris Boyd of Midas Green Technologies, LLC, dated November 2011, slides available at https://www.slideserve.com/gita/data-center-immersion-cooling#google_vignette	November 2011	
Japanese Patent Publication No. 2012204546 to Tsukamoto et al. (Tsukamoto Kazumi)	October 22, 2012	March 24, 2011
Japanese Patent Publication No. 2010022885 to Ishida (Ishida Motohiro)	February 4, 2010	July 15, 2008
Japanese Patent Publication No. 2010212363 to Koyoma et al. (Koyoma Norihiko)	September 24, 2010	March 9, 2009
Japanese Patent Publication No. 2009202156 to Urano (Urano Koichi)	September 10, 2009	June 5, 2009
Japanese Patent Publication No. 2008251779 to Takahashi et al. (Takahashi Hisato)	October 16, 2008	March 30, 2007
Japanese Patent Publication No. 2008043938 to Tsutsui et al. (Tsutsui Norihisa)	February 28, 2008	March 14, 2007
Japanese Patent Publication No. 2007152231 to Sato et al. (Sato Shiro)	June 21, 2007	December 5, 2005
Japanese Patent Publication No. 2006013015 to Shinchu et al. (Shinchu Hiroyuki)	January 12, 2006	June 24, 2004
Japanese Patent Publication No. 2004211111 to Tsuboi et al. (Tsuboi Takashi)	July 29, 2004	December 26, 2002
Japanese Patent Publication No. 2002184747 to Ogasawara et al. (Ogasawara Kazuhisa)	June 28, 2002	December 12, 2000
Japanese Patent Publication No. 2002093769 to Muraoka (Muraoka Yusuke)	March 29, 2002	September 12, 2000
Japanese Patent Publication No. 2001304937 to Mokuo (Mokuo Katsutoshi)	October 31, 2001	April 27, 2000
Japanese Patent Publication No. 2001118820 to Shindo (Shindo Akinori)	April 27, 2001	October 20, 1999
Japanese Patent Publication No. 2000183024 to Nishizaki (Nishizaki Mitsuhiro)	June 30, 2000	December 17, 1998

Japanese Patent No. 10289894 to Shindo (Shindo Naoki)	October 27, 1998	April 15, 1997
Japanese Patent No. 10135173 to Tanabe (Tanabe Madoka)	May 22, 1998	November 1, 1996
Japanese Patent No. 10085683 to Yamazawa et al. (Yamazawa Toshiharu)	April 7, 1998	September 18, 1996
Miller, R., "Colocation Company Will Submerge Servers," August 25, 2010, available at https://www.datacenterknowledge.com/archives/2010/08/25/colocation-company-will-submerge-servers	August 25, 2010	
"CarnotJet" Product webpage, February 1, 2011, available at https://web.archive.org/web/20110201123329/http://www.grcooling.com/?page_id=6	February 1, 2011	
"Gallery" webpage, March 23, 2011, available at https://web.archive.org/web/20110323150152/http://www.grcooling.com:80/?page_id=655	March 23, 2011	
Calnan, C., "Austin startup takes green approach to servers," April 15, 2011, available at https://web.archive.org/web/20130806083645/http://www.bizjournals.com/austin/blog/abje_news/2011/04/austin-startup-takes-green-approach-to.html?page=all	April 15, 2011	
DataCenterKnowledge webpage, "Submerged Servers Can Now Heat Your Office," February 6, 2012, available at https://web.archive.org/web/20120206000918/http://www.datacenterknowledge.com/archives/2011/11/14/submerged-servers-can-now-heat-your-office/	November 14, 2011	
"Design" webpage, February 21, 2012, available at https://web.archive.org/web/20120221214135/http://www.grcooling.com:80/product/design/	February 21, 2012	
"Engineering" webpage, April 1, 2012, available at https://web.archive.org/web/20120401194720/http://www.grcooling.com:80/technology/how-works/	April 1, 2012	
"The CarnotJet™ System: Liquid Submersion Server Cooling," Presentation given April 25, 2012	April 25, 2012	
McMillan, R., "Servers Too Hot? Intel Recommends a	August 31, 2012	

Luxurious Oil Bath,” August 31, 2012, available at https://www.wired.com/2012/08/servers-too-hot-intel-recommends-a-luxurious-oil-bath/		
Owano, N., “Intel does math on oil-dunk test for cooler servers,” September 3, 2012, available at https://phys.org/news/2012-09-intel-math-oil-dunk-cooler-servers.html	September 3, 2012	
Witkin, J., “Cooling a Computer Server With Mineral Oil,” September 6, 2012, available at https://archive.nytimes.com/green.blogs.nytimes.com/2012/09/06/cooling-a-computer-server-with-mineral-oil/	September 6, 2012	
“A Top-20 Supercomputing Facility Rethinks its Cooling Efficiency with Fluid-Submersion Cooling,” November 14, 2012, available at https://web.archive.org/web/20121114152326/http://www.grcooling.com/docs/Green-Revolution-Cooling-and-Texas-Advanced-Computing-Center-Research-Poster.pdf	November 14, 2012	
“Cable Management Features of GRC’s Rack-Based Immersion-Cooling Systems,” video posted April 13, 2011, available at https://www.youtube.com/watch?v=V-x4pER5YuU	April 13, 2011	
“See Our ICeraQ™ Micro-Modular, Rack-Based Immersion-Cooling System in Action,” video posted April 17, 2012, available at https://www.youtube.com/watch?v=6IX9U2zaI_I	April 17, 2012	
Japanese Patent No. JPH04116758 U to Yamaguchi	October 20, 1992	March 29, 1991
U.S. Patent No. 8,009,419 to Attlesey et al. (Chad Daniel Attlesey)	August 30, 2011	April 18, 2007 (priority) / May 16, 2006 (prov)
U.S. Patent No. 7,403,392 to Attlesey et al. (Chad Daniel Attlesey)	June 22, 2008	April 18, 2007 (filing) / May 16, 2006 (prov)
U.S. Patent Publication No. 2008/0017355 to Attlesey et al. (Chad Daniel Attlesey)	January 24, 2008	April 18, 2007 (filing) / May 16, 2006 (prov)

Schmidt, R. R. et al. "High-end server low-temperature cooling," IBM J. Res. & Dev. Vol. 46 No. 6, November 2002	November 2002	
Tuma, P. E. "The Merits of Open Bath Immersion Cooling of Datacom Equipment," 26 th IEEE SEMI-THERM Symposium, downloaded on April 23, 2010 from IEEE Xplore	April 23, 2010	
Abu-Khalaf, A. M. "Dynamic and Steady-state Behavior of a CSTR," Chemical Engineering Education, pp. 132-134, Spring 1996	Spring 1996	
Marsh, W. J. et al. "Sensible Heating and Boiling Incipience in Free-Falling Dielectric Liquid Films," Journal of Electronic Packaging, Transaction of the ASME, Vol. 111, pp. 46-53, March 1989	March 1989	
Boucherit, M. N. et al. "Study of the evolution of a semi-open cooling circuit," Anti-Corrosion Methods and Material, Vol. 53, No. 4, pp. 212-217, July 2006	July 2006	
U.S. Patent No. 4,115,877 to Wall (Frederick Wall)	September 26, 1978	March 14, 1977
U.S. Patent No. 4,984,066 to Iversen (Arthur Iverson)	January 8, 1991	December 12, 1989
U.S. Patent Publication No. 2009/0260777 to Attlesey (Chad Daniel Attlesey)	October 22, 2009	April 1, 2009 / April 21, 2008 (prov) / August 4, 2008 (prov)
U.S. Patent Publication No. 2010/0103614 to Campbell et al. (Levi A. Campbell)	April 29, 2010	October 23, 2008

Table 2-A: Prior Art Systems and Inventions for the Asserted Patent

Name of System or Invention	Date of Sale / Offer for Sale / Public Use / Known by Others
GRC's CarnotJet™ System	2011
GRC's ICERaQ cooling system	2012

For each of the prior art devices identified above, GRC has listed and produced documents

as evidence of the relevant features and functionality to the extent that they are presently available and have been located. GRC has obtained or is in the process of attempting to obtain the identified devices and have made or will make them available for inspection to the extent they are obtained. To the extent that one or more documents (e.g., user manual) may be used to describe aspects of a particular device, that device is a single reference for prior art purposes under 35 U.S.C. § 102. Some or all of the corroborating references may also separately qualify as prior art publications under 35 U.S.C. § 102 and may be used as invalidating references under 35 U.S.C. §§ 102 and/or 103. Further, GRC is actively searching for information regarding at least the systems, devices, and/or inventions listed above in Table 2-A.

Many of the inventive, research, design, and development activities concerning these systems and technologies occurred in the United States before the alleged priority date of the Asserted Claims of the Asserted Patent. GRC has obtained, and is in the process of obtaining, additional information regarding the dates by which the cited products and services were publicly disclosed, used, sold, or offered for sale, the circumstances under which the research, design, and development activities were conducted, and the identities of the particular individuals involved in such activities through publicly available patents, publications, and product literature. The actual dates, circumstances, and identities of individuals will be the subject of third-party discovery during this lawsuit, which GRC reserves the right to rely upon to corroborate the prior art status of the prior art identified herein. GRC reserves the right to modify, amend, or supplement these contentions if additional information becomes available during the course of this lawsuit. Furthermore, GRC will make all such devices, software programs, or other products in GRC's possession, custody, or control available for inspection by Plaintiff.

Each prior art patent, publication, or product identified above was either effectively filed

or issued (for patents), published (for publications) or known, used, offered for sale or sold (for products) before either the earliest claimed priority date of the Asserted Patent to which it is applied for invalidity, and none appears to have been abandoned, suppressed, or concealed, so each such reference also constitutes evidence of prior invention pursuant to 35 U.S.C. § 102(g), if it is in the U.S. The persons or entities involved with each such invention include the named inventors on the above-identified patents, the authors listed on the above-identified publications, and the entities and individuals identified in connection with the above-identified products.

Because GRC has not yet started discovery in this case, including taking depositions of the named inventors, and otherwise obtaining discovery from Plaintiff and third parties, GRC reserves the right to supplement these contentions with facts, documents, or other information learned at a later point through discovery or further investigation.

IV. INVALIDITY GROUNDS

Pursuant to the Scheduling Order (Dkt. 23), GRC contends that certain prior art references below anticipate one or more Asserted Claims and that to the extent the identified prior art references do not anticipate the Asserted Claims, those claims are invalid as obvious under 35 U.S.C. §103. Each anticipatory prior art reference, either alone or in combination with other prior art, also renders the Asserted Claims invalid as obvious. In particular, each anticipatory prior art reference may be combined with (1) information generally known to persons skilled in the art at the time of the alleged invention, and/or (2) any of the other identified prior art references. To the extent that Plaintiff contends that any of the anticipatory prior art fails to disclose one or more limitations of the Asserted Claims, GRC contends that any difference between the reference and the corresponding patent claims would have been obvious to one of ordinary skill in the art. Thus, all anticipation charts should be interpreted as both reflecting anticipation by the reference as well

as invalidity due to single reference obviousness, to the extent that Plaintiff contends that any limitation is missing.

A. Anticipation

As stated above, GRC incorporates by reference all other invalidity contentions related to the Asserted Patent served on or otherwise provided to Plaintiff, whether past or future. In accordance with the Scheduling Order (Dkt. 23), prior art references anticipating the Asserted Claims are provided below. The prior art listed below anticipates the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims reflected by Plaintiff's Complaint and Preliminary Infringement Contentions.

The Asserted Claims of the Asserted Patent are anticipated and/or rendered obvious by prior art. Pursuant to the Scheduling Order (Dkt. 23), GRC identifies the prior art references that anticipate or render obvious the Asserted Claims in the claim charts of Exhibits A1 and A2 (collectively "Appendix A") which are hereby incorporated by reference as if fully set forth herein. The claim charts of Appendix A show how these prior art references teach or suggest each and every element of the Asserted Claims. For each reference or combination of references suggested by each chart and/or herein, GRC indicates whether the prior art renders the claim anticipated and/or obvious pursuant to the Scheduling Order (Dkt. 23).

In addition to contending that the Asserted Claims are invalid in view of the prior art references cited in the claim charts of Appendix A, GRC further contends that the Asserted Claims are invalid as anticipated and/or obvious under U.S.C. §§ 102(a), 102(b), and/or 103 in view of public knowledge and uses and/or offers for sale of products and services related to the subject matter of the cited references. As discovery is ongoing, GRC continues to investigate these items and to reserve the right to amend or supplement these contentions to include additional information

or documents regarding such products and/or systems. In addition to contending that the Asserted Claims are invalid in view of the explicit disclosures of the prior art references cited in the claim charts of Appendix A, GRC further contends that the knowledge of skill evidenced by those references render those claims invalid. GRC further contends that, even if a prior art reference does not expressly disclose all limitations as arranged or combined in the same manner as an asserted claim, a skilled artisan reading the reference would at once envisage the claimed arrangement or combination. *See, e.g., Kennametal Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

GRC incorporates by reference, as if set forth fully herein, all prior art cited during the prosecution of the Asserted Patent, all prior art as described in any future inter partes review proceedings of the Asserted Patent, and all prior art disclosed during related litigation proceedings.

Where GRC identifies a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure, as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure, embodiment, or other material, the identification should be understood to include the referenced figure, embodiment, or other material as well. GRC's citations to specific statements, figures, or disclosures in a prior art reference are sufficient to put Plaintiff on notice where each element of each asserted claim is found in the prior art. However, it should be recognized that a person of ordinary skill in the art would generally read a prior art reference as a whole and in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information including other publications and general scientific or engineering knowledge. GRC therefore reserves the right to rely upon other unidentified portions

of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions.

GRC also reserves the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions would have been obvious to a person of ordinary skill in the art, including the basis of modifying or combining certain cited references. To the extent any limitation is deemed not to be exactly met by an item of prior art, then any purported differences are such that the claimed subject matter as a whole would have been obvious to one skilled in the art at the time of the alleged invention, in view of the state of the art and knowledge of those skilled in the art. To the extent that an element of an Asserted Claim is not anticipated, the claim is rendered obvious by combination with one or more other prior art references identified in Appendix A.

B. Obviousness

As stated above, GRC incorporates by reference all other invalidity contentions related to the Asserted Patent served on or otherwise provided to Plaintiff, whether past or in the future. In addition to certain claims being anticipated at least under Plaintiff's apparent claim constructions as indicated above, the Asserted Claims are also invalid as obvious over the same teachings identified for anticipation. Further, the Asserted Claims are obvious over various combinations of the references shown in the claim charts accompanying or incorporated by reference into this disclosure. No Asserted Claim goes beyond combining known elements to achieve predictable results or does more than choose between clear alternatives known to those of skill in the art. Thus, to the extent that an Asserted Claim is not anticipated, it is nevertheless invalid as obvious. Specifically, GRC asserts that any charted or incorporated reference in combination with one or more other charted or incorporated references renders the Asserted Claims obvious.

In *KSR International Co. v. Teleflex, Inc.*, the United States Supreme Court held that, among other things, “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” 550 U.S. 398, 416 (2007); *see also id.* at 417 (“[A] court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.”). In particular, a patent is obvious where “the content of the prior art, the scope of the patent claim, and the level of ordinary skill are not in material dispute, and the obviousness of the claim is apparent in light of these factors.” *Id.* at 427. The Supreme Court found that “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *Id.* at 417.

Moreover, the Supreme Court recognizes that market pressures will motivate a person of ordinary skill to survey known art for solutions to problems. *Id.* at 421 (“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp.”). When a person of ordinary skill uses an identified, predictable solution to solve a problem, “it is likely the product not of innovation but of ordinary skill and common sense.” *Id.* In addition, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *Id.* at 417. If a person of ordinary skill can implement a predictable variation, U.S.C. § 103 bars its patentability. *Id.*

“‘[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.’”

Intel Corp. v. PACT XPP Schweiz AG, 61 F.4th 1373, 1379 (Fed. Cir. 2023) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007)). “Additionally, ‘universal’ motivations known in a particular field to improve technology provide ‘a motivation to combine prior art references ***even absent any hint of suggestion*** in the references themselves.’” *Id.* (quoting *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 797-99 (Fed. Cir. 2021)) (original emphasis). Thus, motivations to combine, as well as the general state of the art, may be found in a variety of places including, but not limited to, in the references defined above, and the specification of the Asserted Patent. For example, each piece of prior art relates to systems and methods for decoding and/or encoding video data. A person of ordinary skill in the art at the time of the alleged invention would have been motivated to combine any one piece of identified prior art with any other identified piece of prior art. For at least this reason, it would have been obvious to a person of skill in the art at the time of the alleged invention of the Asserted Claims to combine the various references cited herein so as to practice the Asserted Claims and there is a motivation in the art to make such a combination. Further reasons to combine the references identified in these charts include the nature of the problem being solved, the express, implied, and/or inherent teachings of the prior art, the knowledge of persons of ordinary skill in the art, the fact that the prior art is generally directed towards methods and systems for decoding and/or encoding video data, that such combinations would have yielded predictable results, and that such combinations would have represented known alternatives to a person of ordinary skill in the art.

The law does not require evidence of a specific motivation to combine prior art where the combination would yield expected results and at most simply represents a known alternative or design choice to one of skill in the art. *See Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344

(Fed. Cir. 2017); *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1739-40 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, and instead applying an "expansive and flexible" approach). Indeed, the Supreme Court held that a POSITA is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420-21.

Nevertheless, in addition to the information contained immediately above and elsewhere in these contentions, GRC identifies additional motivations and reasons to combine. For example, in addition to the specific motivations identified herein, motivation to modify a particular reference or to combine any two or more of the identified references comes from (a) the nature of the problem being solved, (b) the teachings of the prior art, (c) the knowledge of persons of ordinary skill in the art, (d) the fact that all of the references teach systems, apparatuses, and methods related to the subject matter and address the same technical issues described in the Asserted Patent, and (e) one would be motivated by considerations of efficiency, effectiveness, convenience, cost-savings, and accessibility, to combine the various teachings of the references. Additionally, one would be motivated to address the alleged problems or achieve the purported objectives identified in the Background sections of the Asserted Patent, of the references cited on the face of the Asserted Patent, and of the other references cited herein.

In sum, motivations to modify or combine the identified references including the references listed above can be found via, for example, discussions in the cited references, the state of the art discussed in the references, and the knowledge of one of ordinary skill in the art. One of ordinary skill in the art would have been motivated to combine these references, because these references relate to common objectives and subject matter. The references share commonalities in terms of

their general subject matter as well as the types of equipment, products, systems, and/or methods used. Further, certain prior art references explicitly or implicitly reference other prior art references, share common authors or inventors, were published in the same journals, were compiled by a common author of a compilation or reference book, were presented at the same conferences, and/or were developed at common companies, schools, or organizations, which would motivate one of ordinary skill in the art to combine them. These references are within the field of the Asserted Patent and are directed to similar subject matter within the field. Additionally, the references, and any products, devices, or processes described in the references, existed and/or were invented in the same time period providing further motivation for combination. These disclosures were provided without prejudice to any arguments or objections concerning the relevance of motivation to combine in connection with any invalidity contentions.

GRC reserves the right to further specify the motivations to combine the prior art in response to positions that Plaintiff may take later in this case and as discovery, including third party discovery, proceeds. GRC may rely on any and all portions of the prior art, other documents, and expert testimony to establish that a person of ordinary skill in the art would have been motivated to modify or combine the prior art so as to render the claims invalid as obvious. Moreover, GRC reserves the right to rely on later identified sources of information, including but not limited to witness testimony and other discovery, to establish the state of the art in the relevant time frame pertaining to the Asserted Patent.

Additionally, GRC notes that Plaintiff has neither provided any contention that secondary considerations of non-obviousness exist for the Asserted Patent nor provided any evidence of such secondary considerations. GRC is not aware of any evidence supporting the existence of any such secondary considerations. This lack of evidence further renders the Asserted Claims obvious.

Proving any such secondary considerations is Plaintiff's burden. *See, e.g., ZUP, LLC v. Nach Mfg., Inc.*, 896 F.3d 1365, 1373 (Fed. Cir. 2018) (“[A] patentee bears the burden of production with respect to evidence of secondary considerations of nonobviousness.”). To the extent Plaintiff is permitted to introduce contentions and/or evidence concerning secondary considerations in the future, GRC reserves all rights to rebut those contentions if and when Plaintiff identifies them. In the meantime, GRC notes the complete lack of any such evidence in the record. Moreover, GRC further contends that, in any event, the evidence of obviousness for each asserted claim is so overwhelming that secondary considerations are necessarily insufficient to rebut GRC's showing. *See, e.g., Ohio Willow Wood Co. v. Alps South, LLC*, 735 F.3d 1333, 1344 (Fed. Cir. 2013) (“[W]here a claimed invention represents no more than the predictable use of prior art elements according to established functions, as here, evidence of secondary indicia are frequently deemed inadequate to establish non-obviousness.”).

While GRC reserves the right to rely on any combination of the references reflected in their charts or incorporated herein by reference, GRC provides the following exemplary and non-exhaustive references and/or combinations evidencing invalidity of the claims of the Asserted Patent. The combinations of prior art listed below render obvious the Asserted Claims under the proper construction of the claims and/or under Plaintiff's apparent interpretation of the claims as set forth by Plaintiff in its Complaint and Preliminary Infringement Contentions.

Pursuant to the Scheduling Order (Dkt. 23), GRC identifies in Appendix A the prior art references that render obvious the Asserted Claims and include below and in Appendix A exemplary rationales and combinations showing the obviousness of the Asserted Claims in view of the prior art. To the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix A, the limitation would have been obvious in light

of the disclosures within the reference and the knowledge of one of ordinary skill in the art at the time of the Asserted Patent. Moreover, to the extent Plaintiff contends that an element is not disclosed in any one of the anticipatory references described in Appendix A, such reference may be combined with any other references listed in Appendix A for such element, thereby rendering the claims invalid for obviousness. To the extent a finder of fact determines that a limitation of any of the Asserted Claims is not disclosed by one of the references identified above, the claim is nevertheless unpatentable as obvious because they contain nothing that constitutes a patentable innovation. To the extent a finder of fact determines that a limitation of the Asserted Claims is not anticipated, it does not go beyond combining familiar elements according to known methods to achieve predictable results or does more than choose between clear alternatives known to those of ordinary skill in the art.

1. Obviousness Rationale and Motivations to Combine

Obviousness: For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those prior art references identified in Appendix A along with the knowledge of one of ordinary skill in the art to meet the limitations of the Asserted Claims. As a result, the references identified herein render one or more Asserted Claims obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Plaintiff's Asserted Claims. GRC may rely upon a subset of the identified references or all of the references identified herein, including all references in Appendix A, for purposes of obviousness depending on the

Court's claim construction, positions taken by Plaintiff during this litigation, and further investigation and discovery.

Reservation of Rights: Moreover, as mentioned above, GRC has not yet completed their search or discovery concerning additional prior art. As such, GRC's inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and GRC reserves the right to identify additional specific combinations as well as to detail and explain such combinations.

No More Than Ordinary Variations of Prior Art; No Unexpected Results: To the extent not anticipated, the Asserted Claims represent no more than the result of ordinary variations of the prior art. GRC further believes that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the attached charts, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415-16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420-21. Nevertheless, in addition to the information contained elsewhere in these contentions, GRC identifies motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art

references identified in Appendix A would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in Appendix A would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references disclosed in Appendix A is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to

improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in Appendix A because all of these references relate to the same area of technology and/or are from analogous art. The Asserted Claims are directed to an “appliance immersion tank system.” Asserted Patent at Abstract. The Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on his/her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the Asserted Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to immersion cooling.

Demand and Market Forces: For example, market forces suggested a demand for

increased efficiency in immersion cooling, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to solutions of that time.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicants in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the Asserted Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the Asserted Patent, there are a finite number of approaches for increasing the efficiency of heat dissipation via immersion cooling. For example, as of the priority date of the Asserted Patent, a POSITA would have been very familiar with the elements of the Asserted Patent's claims, including based on the public disclosure, sale, and use of such elements by GRC. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the Asserted Patent's claims does not render them novel or non-obvious.

2. Combinations

There are significant similarities in subject matter and objectives for each of many references used in these contentions for the Asserted Patent, as shown in Appendix A. Indeed, the claims of the Asserted Patent are directed to subject matter that was disclosed by GRC to Midas before the priority date. To the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals relative to immersion cooling.

In addition to the specific examples provided above, GRC reserves the right to rely on the disclosures of the references listed in Appendix A for additional motivation to combine. These examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. GRC reserves the right to contend that the motivations to combine provided herein apply to other combinations at the appropriate time, e.g., in expert reports regarding invalidity. To the extent one or more of identified combinations is posed as a combination of only two references, it does not indicate that the two references that are being combined for one purpose could not be joined by a third reference (or more additional references) whose combination serves the same or a different purpose. Indeed, many of the features recited in the Asserted Claims are componentized features/functions whereby the feature could be implemented using teachings from another source while not interfering with additional features. For that reason, a POSITA may have reasonably looked to and been motivated to combine three or more references in order to achieve a specific outcome.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in Appendix A with any other reference or references listed in Appendix A along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '457 Patent. This is detailed further in Exhibits A1 and A2.

As mentioned above, GRC has not yet completed its search or discovery concerning additional prior art. Moreover, the exemplary combinations are provided based on GRC's current understanding of the Asserted Claims and Plaintiff's apparent view of the scope of those claims as shown, for example, in Plaintiff's Infringement Contentions. Further, a Markman Order has not yet been issued in this case. As such, GRC's inclusion of exemplary combinations does not

preclude them from identifying other invalidating combinations as appropriate, and GRC reserves the right to identify additional specific combinations as well as to detail and explain such combinations.

V. CLAIM CHARTS

Pursuant to the Scheduling Order (Dkt. 23), GRC provides a claim chart identifying disclosures in the references identified in Sections III-IV above as to the Asserted Claims are provided in the attached Appendix A.

GRC has identified relevant portions and/or features of the prior art. However, the identified prior art may contain additional descriptions of or alternative support for the claim limitations. GRC may rely on uncited portions or features of the identified prior art, other documents, and expert testimony, to provide context or to aid in understanding the identified prior art and the state of the art. Citations to a particular figure in a reference include the caption and description of the figure and any text relating to the figure. Similarly, citations to particular text referring to a figure include the figure and caption as well. Portions relevant to dependent claims incorporate by reference the citations to the chain of claims from which that dependent claim derives. Likewise, portions related to subsequent limitations that refer to claim elements identified, described, and/or cited to in earlier limitations may rely on the citations related to those portions of the claim chart that identify and/or describe these elements.

Throughout the invalidity claim charts in Appendix A, GRC provides exemplary citations showing where references disclose subject matter recited in preambles of the Asserted Claims, regardless of whether the preambles limit the claims. GRC reserves the right to argue that the preambles are or are not limitations. Further, where an entry in a claim chart corresponding to a given limitation refers back to the discussion of another claim, the entry incorporates all evidence

cited for the other claim.

As noted above, the asserted claims have not yet been construed. Additional portions of the references may become relevant after claim construction. Further, to the extent that any claim term is governed by 35 U.S.C. § 112 ¶ 6, the claim charts identify, by the citations provided, the structure(s), act(s), or material(s) in each reference performing the claimed function for each limitation of the asserted claims. Plaintiff's claim construction positions, expert analysis and testimony, and additional discovery could all inform which portions of the references disclose a limitation, including under 35 U.S.C. § 112 ¶ 6, and whether any particular limitation is governed by 35 U.S.C. § 112 ¶ 6. GRC's contentions are based on the information presently available, and GRC reserves all rights to provide their claim construction positions in accordance with the Scheduling Order (Dkt. 23) in this case.

VI. OTHER GROUNDS FOR INVALIDITY

Pursuant to the Scheduling Order (Dkt. 23), GRC hereby identifies grounds of invalidity for the Asserted Patent based on lack of written description under 35 U.S.C. § 112, first paragraph; lack of enablement under 35 U.S.C. § 112, first paragraph; indefiniteness under 35 U.S.C. § 112, second paragraph; and indefiniteness under 35 U.S.C. § 112, sixth paragraph. These contentions shall not be construed as an admission that any claim construction advanced by GRC in this case is in any way inconsistent, flawed, or erroneous. Nor should these contentions prevent GRC from advancing claim construction and/or non-infringement positions in lieu of, or in addition to, invalidity positions. Further, these contentions shall not be construed as an admission of or acquiescence to Plaintiff's purported construction of the claim language or of other positions advanced by Plaintiff during the course of this litigation. GRC's invalidity contentions under 35 U.S.C. § 112 may depend, in part, on the Court's claim construction, as well as Plaintiff's alleged

scope of the Asserted Claims. Consequently, GRC only identifies the issues under 35 U.S.C. § 112 of which they are presently aware.

A. Lack of Written Description and/or Enablement Under 35 U.S.C. § 112, ¶ 1

The Asserted Patent does not provide sufficient written description to establish that the inventors were in possession of the alleged inventions recited in the Asserted Claims at the time the Asserted Patent was filed, at least as Plaintiff appears to be asserting those limitations. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010). In other words, the applicants did not describe their purported inventions in a manner that “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* One of ordinary skill in the art would not have understood that the inventors were in possession of the full scope of the claimed apparatus and methods, at least as plaintiff appears to be asserting the claims. For example, the claims of the Asserted Patent does not provide sufficient written description of the limitations listed below. One of ordinary skill in the art would not understand the specification to provide a written description of a system “wherein the tank and primary circulation facility comprise a highly-integrated module.”

The specification of the Asserted Patent also does not enable one of ordinary skill in the art to make and/or use certain recited elements of the Asserted Claims without undue experimentation, at least as plaintiff appears to be asserting those limitations. For example, the claims of the Asserted Patent fail to sufficiently enable the limitations listed below. One of ordinary skill in the art would not understand the specification to enable a system “wherein the tank and primary circulation facility comprise a highly-integrated module.” To the extent the following limitations are definite (under 35 U.S.C. § 112, ¶ 2), the application that became the Asserted Patent fails to sufficiently describe or enable them as required by 35 U.S.C. § 112, ¶ 1:

Term	Relevant Claim(s)
“integrated horizontally into the long wall of the tank adjacent all appliance slots”	1, 6
“adapted to receive the dielectric fluid as it flows over the weir”	1, 6
“wherein the tank and primary circulation facility comprise a highly-integrated module”	2

B. Invalidity Under 35 U.S.C. § 112, ¶ 2

“[T]he second paragraph of § 112 contains two requirements: first, the claim must set forth what the applicant regards as his invention, and second, it must do so with sufficient particularity and distinctness, i.e., the claim must be sufficiently definite.” *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002) (internal quotation marks and alteration omitted). “Where it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention,” the claim is “invalid under § 112, paragraph 2.” *Id.* at 1349. Several of the Asserted Claims are invalid because it would be apparent to one of skill in the art, based on the specification, that the invention set forth in these claims are not what the patentee regarded as his invention, at least as the claims are being asserted by the Plaintiff. *Id.* These claims are invalid under the “applicant regards” prong of § 112 at least because they contain elements that differ from and/or conflict with the Asserted Patent’s written description of the invention, at least as the claim elements are being asserted by Plaintiff, or because they omit elements that one of skill in the art would understand as part of the Asserted Patent’s invention based on the specification: claims 1-3 and 6.

Independently, under § 112, ¶ 2, “a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Several of the Asserted Claims are also invalid

as indefinite under § 112, ¶ 2 because they fail to inform those skilled in the art about the scope of the invention with reasonable certainty and are indefinite.

The following limitations recited in the Asserted Claims are indefinite in whole, in part or in combination:

Term	Relevant Claim(s)
“integrated horizontally into the long wall of the tank adjacent all appliance slots”	1, 6
“adapted to receive the dielectric fluid as it flows over the weired”	1, 6
“wherein the tank and primary circulation facility comprise a highly-integrated module”	2
“integrated horizontally into the long wall of the tank adjacent all appliance slots”	1, 6

C. Inventorship and Inequitable Conduct

Every claim in the '457 Patent is invalid and/or unenforceable for two additional reasons: (1) the patent fails to name the actual inventor of the subject matter claimed and (2) Plaintiff engaged in related inequitable conduct to procure the '457 Patent.

First, as stated in GRC's Answer and Counterclaims and fully incorporated by reference herein, the sole inventor of the claims in the '457 Patent is Christiaan Best. *See* Dkt. 16 at ¶¶ 80-99.

Second, Plaintiff engaged in inequitable conduct by withholding material prior art documents and procuring false inventorship affidavits to identify individuals other than Christiaan Best as inventors of the '457 patent. *See id.* at ¶¶ 80-108. Regarding the documents, Plaintiff withheld patents, publications, presentations, and products from the PTO. Documentation showing that Plaintiff and its named inventors knew that GRC created the technology that was ultimately described and claimed in the '457 patent are being produced concurrently. If the examiner had been made aware of this material prior art, the '457 would not have issued.

Relatedly, Plaintiff affirmatively engaged in acts of egregious misconduct by filing false

affidavits declaring Christopher L. Boyd, James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou inventors of the '457 patent. During other proceedings before the Office, Plaintiff also touted the views of these named inventors:

- “It is significant here that the seven named inventors and the Examiner all found Krajewski and Cray to not be invalidating, either alone or in combination with the other references of record (including each other).” (*Immersion Systems LLC v. Midas Green Techs., LLC*, IPR2021-01176, Paper 10 (POPR) at 11);
- “Given the amount of structural detail recited in claim 11, and further given the express differentiation of Best set forth in the '457 patent itself, it is no wonder that the seven named inventors and the Examiner all found claim 11 to be patentable over Best.” (*Id.* at 33-34);
- “Thus, the seven named inventors all clearly considered Best to at least lack a ‘weir’ that is ‘adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot’ (as recited in all challenged claims).” (*Id.* at 41.)

However, as noted above, Christiaan Best is the sole inventor of the subject matter described and claimed in the '457 patent, and even Plaintiff now admits that six of the seven named inventors were improperly named. (*See* '457 Patent File History, March 21, 2023, Requests under Rule 48 Correcting Inventorship). Plaintiff also affirmatively knew this was the case when the application that led to the '457 patent was filed. Concurrently produced documents show that Plaintiff knew the subject matter described and claimed in the '457 patent belonged to GRC and was invented by Christiaan Best, but Plaintiff procured and filed erroneous inventorship affidavits anyway. This constitutes inequitable conduct that renders the patent unenforceable.

VII. PRIORITY DATE

In its Preliminary Infringement Contentions, Plaintiff argues that the Asserted Claims are entitled to a priority date of at least as early as March 14, 2012, and that all asserted claims are entitled to an effective filing date of December 14, 2012.

GRC does not agree, and therefore disputes, that the Asserted Claims are entitled to the priority date asserted by Plaintiff. For example, GRC disputes that Chris Boyd conceived of the invention on March 14, 2012 and/or that Midas was diligent in filing its U.S. provisional application No. 61/832,211. The Asserted Patent is therefore not entitled to the claimed priority date of March 14, 2012. The correct and legally-applicable priority date of the Asserted Patent is instead no earlier—and possibly later—than the PCT filing date of December 13, 2013.

VIII. PRODUCTIONS

Pursuant to the Scheduling Order (Dkt. 23), GRC has produced and/or made available for inspection documents and other materials sufficient to show the operation of any aspects or elements of the Accused Products identified by Plaintiff in its Preliminary Infringement Contention charts.

Additionally, and pursuant to the Scheduling Order (Dkt. 23), GRC is concurrently producing a copy of each item of prior art identified herein. These prior art references and corroborating evidence are cited in attached invalidity claim charts in Appendix A. GRC will also make available for inspection any prior art systems or devices upon request to the extent GRC acquires such systems or devices. GRC's search for prior art references, additional documentation, and/or corroborating evidence concerning prior art systems and devices is ongoing. Accordingly, GRC reserves the right to supplement its production as GRC obtains additional prior art references, documentation, and/or corroborating evidence concerning invalidity during the course of discovery.

Dated: October 7, 2024

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that counsel of record who have appeared electronically in this case are being served with this document on October 7, 2024 by way of the primary email address that said counsel supplied to the Court's CM/ECF system.

By: /s/ Ashley N. Moore
Ashley N. Moore

EXHIBIT A1

Invalidity of U.S. Patent No. 10,405,457

The references cited in this exhibit are identified in the table below. Each reference is prior art under at least 35 U.S.C. §§ 102 and/or 103 for the asserted claims of U.S. Patent No. 10,405,457 (“the ’457 patent”), as discussed in detail in the claim chart below:

Short Name	Patent/Publication (Primary Inventor/Author)	Publication / Effective Filing Date
Best-2008	U.S. Patent Application Publication No. 2011/0132579 to Best et al. (Christiaan Best)	June 9, 2011 / August 11, 2008 (Prov filing) / August 10, 2009 (PCT filing)
Osada	Japanese Patent No. 2001-181898 to Osada et al. (Osada Osamu)	July 3, 2001 / December 27, 1999
Best-2012	U.S. Patent Applivation Publication No: 2014/0211412 to Best (Christiaan Best)	July 31, 2014 / August 5, 2011 (Prov filing) / August 4, 2012 (PCT filing)
Oktay	U.S. Patent No. 3,406,244 to Oktay (Sevgin Oktay)	October 15, 1968 / June 7, 1966
Kobayashi	U.S. Patent No. 5,341,825 to Kobayashi (Satoshi Kobayashi)	August 30, 1994 / October 16, 1991
Berman	U.S. Patent No. 5,054,519 to Berman (Allan Berman)	October 8, 1991 / December 26, 1990
Suzuki	U.S. Patent No. 5,651,836 to Suzuki (Kuniyoshi Suzuki)	July 29, 1997 / February 27, 1995
Rolfson	U.S. Patent No. 6,001,189 to Rolfson (J. Brett Rolfson)	December 14, 1999 / September 30, 1996
Jang	U.S. Patent No. 6,752,897 to Jang et al. (Ruei-Hung Jang)	June 22, 2004 / October 22, 2002
Kashkoush	U.S. Patent No. 6,840,250 to Kashkoush et al. (Ismail Kashkoush)	January 11, 2005 / April 6, 2001 (Prov filing) / April 5, 2002 (Filing)

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Short Name	Patent/Publication (Primary Inventor/Author)	Publication / Effective Filing Date
Chong	U.S. Patent No. 6,872,262 to Chong et al. (Kam Beng Chong)	March 29, 2005 / September 27, 2000
Meseth	U.S. Patent No. 7,532,699 to Meseth (Johann Meseth)	May 12, 2009 / April 16, 2004 (PCT filing)
Osada-296	Japanese Patent Publication No. 2001207296 to Osada et al. (Osada Osamu)	July 31, 2001 / January 26, 2000
Sato	Japanese Patent Publication No. 2008086900 to Sato et al. (Sato Fumiatsu)	April 17, 2008 / September 30, 2006
Miyamoto	Japanese Patent Publication No. 2007301529 to Miyamoto (Miyamoto Makoto)	November 22, 2007 / May 15, 2006
Kimura	Japanese Patent Publication No. 2007201330 to Kimura (Kimura Masahiro)	August 9, 2007 / January 30, 2006
Boyd	Presentation Slides, titled “Data Center Immersion Cooling” by Chris Boyd of Midas Green Technologies, LLC, dated November 2011, slides available at https://www.slideserve.com/gita/data-center-immersion-cooling#google_vignette	November 2011
Tsukamoto	Japanese Patent Publication No. 2012204546 to Tsukamoto et al. (Tsukamoto Kazumi)	October 22, 2012 / March 24, 2011
Ishida	Japanese Patent Publication No. 2010022885 to Ishida (Ishida Motohiro)	February 4, 2010 / July 15, 2008
Koyoma	Japanese Patent Publication No. 2010212363 to Koyoma et al. (Koyoma Norihiko)	September 24, 2010 / March 9, 2009
Urano	Japanese Patent Publication No. 2009202156 to Urano (Urano Koichi)	September 10, 2009 / June 5, 2009
Takahashi	Japanese Patent Publication No. 2008251779 to Takahashi et al. (Takahashi Hisato)	October 16, 2008 / March 30, 2007
Tsutsui	Japanese Patent Publication No. 2008043938 to Tsutsui et al. (Tsutsui Norihisa)	February 28, 2008 / March 14, 2007
Sato-231	Japanese Patent Publication No. 2007152231 to Sato et al. (Sato Shiro)	June 21, 2007 / December 5, 2005

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Short Name	Patent/Publication (Primary Inventor/Author)	Publication / Effective Filing Date
Shinchi	Japanese Patent Publication No. 2006013015 to Shinchi et al. (Shinchi Hiroyuki)	January 12, 2006 / June 24, 2004
Tsuboi	Japanese Patent Publication No. 2004211111 to Tsuboi et al. (Tsuboi Takashi)	July 29, 2004 / December 26, 2002
Ogasawara	Japanese Patent Publication No. 2002184747 to Ogasawara et al. (Ogasawara Kazuhisa)	June 28, 2002 / December 12, 2000
Muraoka	Japanese Patent Publication No. 2002093769 to Muraoka (Muraoka Yusuke)	March 29, 2002 / September 12, 2000
Mokuo	Japanese Patent Publication No. 2001304937 to Mokuo (Mokuo Katsutoshi)	October 31, 2001 / April 27, 2000
Shindo	Japanese Patent Publication No. 2001118820 to Shindo (Shindo Akinori)	April 27, 2001 / October 20, 1999
Nishizaki	Japanese Patent Publication No. 2000183024 to Nishizaki (Nishizaki Mitsuhiro)	June 30, 2000 / December 17, 1998
Shindo-894	Japanese Patent Publication No. 10289894 to Shindo (Shindo Naoki)	October 27, 1998 / April 15, 1997
Tanabe	Japanese Patent Publication No. 10135173 to Tanabe (Tanabe Madoka)	May 22, 1998 / November 1, 1996
Yamazawa	Japanese Patent Publication No. 10085683 to Yamazawa et al. (Yamazawa Toshiharu)	April 7, 1998 / September 18, 1996
Yamaguchi	Japanese Patent No. JPH04116758 U to Yamaguchi	October 20, 1992 / March 29, 1991
Attlesey-419	U.S. Patent No. 8,009,419 to Attlesey et al. (Chad Daniel Attlesey)	August 30, 2011 / April 18, 2007 (priority) / May 16, 2006 (prov)
Attlesey-392	U.S. Patent No. 7,403,392 to Attlesey et al. (Chad Daniel Attlesey)	June 22, 2008 / April 18, 2007 (filing) / May 16, 2006 (prov)

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Short Name	Patent/Publication (Primary Inventor/Author)	Publication / Effective Filing Date
Attlesey-355	U.S. Patent Publication No. 2008/0017355 to Attlesey et al. (Chad Daniel Attlesey)	January 24, 2008 / April 18, 2007 (filing) / May 16, 2006 (prov)

The asserted claims and alleged priority date of the '457 patent are identified below:

'457 Patent Asserted Claims	Alleged Priority Date
1-3, 6	"December 14, 2012" (Preliminary Infringement Contentions, ¶4)

The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified herein may be responsive at least in part to Plaintiff's infringement contentions, with which Defendant disagrees. As such, nothing in Defendant's claim charts should be construed as an admission regarding infringement, either literally or under the doctrine of equivalents, or as an admission regarding Defendant's understanding of the proper scope of the asserted claims. Defendant reserves the right to rely on additional citations or sources of evidence that also may be applicable, or that may become applicable in light of claim construction, changes in Plaintiff's infringement contentions, and/or information obtained during discovery as the case progresses.

The chart below provides non-exhaustive citations to the prior art references identified above with respect to each limitation of each asserted claim. As illustrated below, nearly every limitation of each asserted claim was disclosed and known to a POSITA based on at least Best-2008. Thus, the claims were obvious in view of Best-2008 on its own, as well as in view of the additional prior art charted herein.

To the extent Plaintiff argues that any limitation in the chart below is not disclosed, expressly or inherently, by Best-2008 and/or Best-2008 combined with the knowledge of a POSITA, the limitation is disclosed and rendered obvious by each of the other references cited for that limitation, whether considered individually or in combination. For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of the references cited in the chart below, along with the knowledge of one of ordinary skill in the art to meet the limitations of the '457

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Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the '457 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Plaintiff's Asserted Claims. Defendant may rely upon a subset of the identified references or all of the references identified herein, including all references in the chart below, for purposes of obviousness depending on the Court's claim construction, positions taken by Plaintiff during this litigation, and further investigation and discovery. Moreover, as mentioned above, Defendant has not yet completed their search or discovery concerning additional prior art. As such, Defendant's inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendant reserves the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '457 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendant further believes that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the chart below, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415–16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420–21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendant identifies motivation and reason to combine the cited art.

Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in the chart below would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in chart below would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

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Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '457 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references cited in the chart below is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in the chart below because all of these references relate to the same area of technology and/or are from analogous art. The '457 Patent Asserted Claims are directed to “electrical appliance cooling systems, and, in particular, to an improved appliance immersion cooling system and method of operation.” '457 Patent at 1:21-24. The '457 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '457 Patent Asserted Claims.

Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the '457 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to immersion cooling, fluid flow and recovery in processing tanks, etc.

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Demand and Market Forces: For example, market forces—including as set forth in Best-2008—demanded improvements in immersion cooling including fluid handling therein, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to immersion cooling systems.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicants in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the '457 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the '457 Patent, there are a finite number of approaches for immersion cooling systems. For example, as of the priority date of the '457 Patent, a POSITA would have been very familiar with basic elements of the '457 Patent's claims—indeed, the cooling systems of Best-2008 and/or Osada disclose each element of the asserted claims with at most minor variations that were known and obvious when the '457 Patent was filed. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the '457 Patent's claims does not render them novel or non-obvious.

As the '457 Patent acknowledges, immersion cooling systems: utilized “an electrically non-conductive or dielectric fluid to extract heat from electronic circuit assemblies” (1:40-53); could be used for cooling appliances oriented horizontally (e.g., in a vertical stack) (1:62-65) or vertically (2:2-10); and included “support apparatus[es] for extracting waste heat from the tank cooling fluid and dissipating to the environment the heat so extracted” (2:23-29).

There are significant similarities in subject matter and objectives for each of the many references used in these contentions for the '457 Patent. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of facilitating immersion cooling and associated fluid handling.

In addition to the specific examples provided above, Defendant reserves the right to rely on the disclosures of the references listed in the chart below for additional motivation to combine. These examples of combinations are given merely to illustrate various motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendant reserves the right to contend that the motivations to combine provided herein apply to other combinations at the appropriate time, e.g., in expert reports regarding invalidity. To the extent one or more of identified combinations is posed as a combination of only two references, it does not indicate that the two references that are being combined for one purpose could not be joined by a third reference (or more additional references) whose combination serves the same or a different purpose. Indeed, many of the features recited in the asserted claims are componentized features/functions whereby the feature could be implemented using

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teachings from another source while not interfering with additional features. For that reason, a POSITA may have reasonably looked to and been motivated to combine three or more references in order to achieve a specific outcome.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in the chart below with any other reference or references listed in the chart below along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '457 Patent.

Where Defendant cites a particular figure, such citation should be understood to encompass the caption and description of the figure and any text relating to the figure, in addition to the figure itself. Conversely, where a cited portion of text refers to a figure, the citation should be understood to include the figure as well.

Defendant reserves the right to amend or supplement this claim chart at a later date as more fully set forth in the Cover Pleading, based on, for example and without limitation, subsequent discovery, any amendments to the pleadings, or rulings from the Court.

'457 Patent	Prior-Art References
[1.0] An appliance immersion cooling system comprising:	Best-2008 and other references disclose the preamble. Best-2008, for example, discloses: • <i>Abstract</i> (“Apparatus, systems, and methods for efficiently cooling computing devices having heat-generating electronic components, such as, for example, independently operable servers, immersed in a dielectric liquid coolant in a tank.”); see also [0025], [0053]. • <i>FIGS. 3-6</i> (showing “an exemplary immersion-cooled rack having a plurality of independently operable servers mounted therein,” [0036], [0037].) • <i>FIG. 11</i> (showing “side-by-side immersion-cooled racks having a plurality of independently operable servers mounted therein,” [0044]) • [0066] (“The system 100 includes a tub or tank 110 containing a dielectric liquid coolant into which a plurality of servers 120 may be immersed.”) • <i>The claims</i> (See, e.g., claim 1: “A system for cooling a plurality of independently operable servers containing heat generating electronic

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	<i>components, the system comprising: at least one tank defining an interior volume... wherein the at least one tank is configured for containing the dielectric liquid coolant within the interior volume such that, when the plurality of servers are mountably received therein, at least a portion of each server is submerged within the dielectric liquid coolant for sufficiently cooling each respective server when the tank is sufficiently full of the liquid coolant....”).</i> Osada discloses: • <i>[0001], [0002], [0051]</i> • <i>FIGS. 3, 4, 16A, 16B and corresponding description</i> Best-2012 discloses: • <i>FIGS. 6, 7A, 7B, 7C and corresponding description</i> • <i>[0017]</i> • <i>[0069]</i> Oktay discloses: • <i>Abstract, 1:25-29, 1:51-55, 1:65-2:15, FIG. 1 and corresponding description, claim 1</i> • <i>Kobayashi: FIGS. 8, 9 and corresponding description</i> • <i>Boyd: Slides 5, 6, 8, 9</i>
[1.1] a tank adapted to immerse in a dielectric fluid a plurality of electrical appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, a long wall of the tank, the tank comprising:	<i>See 1.0.</i> Best-2008 discloses this limitation. For example, Best-2008’s cooling system includes a tank adapted to immerse electrical appliances (e.g., servers) in a dielectric

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fluid by mounting the servers in appliance slots as recited. This feature is shown below.

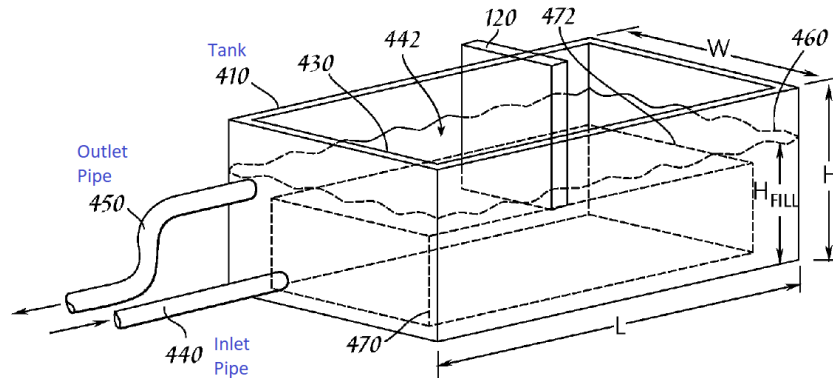


Fig. 3

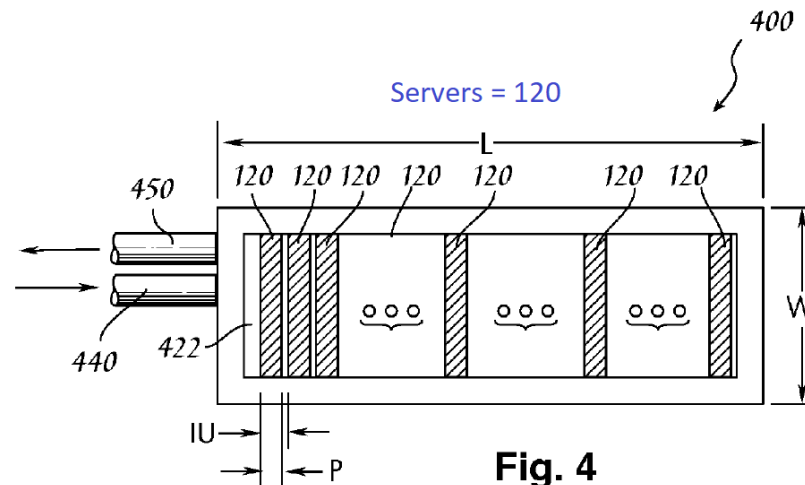


Fig. 4

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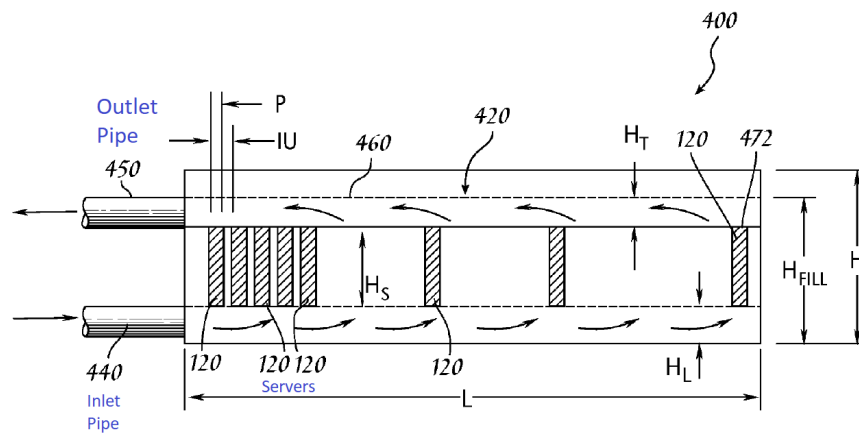
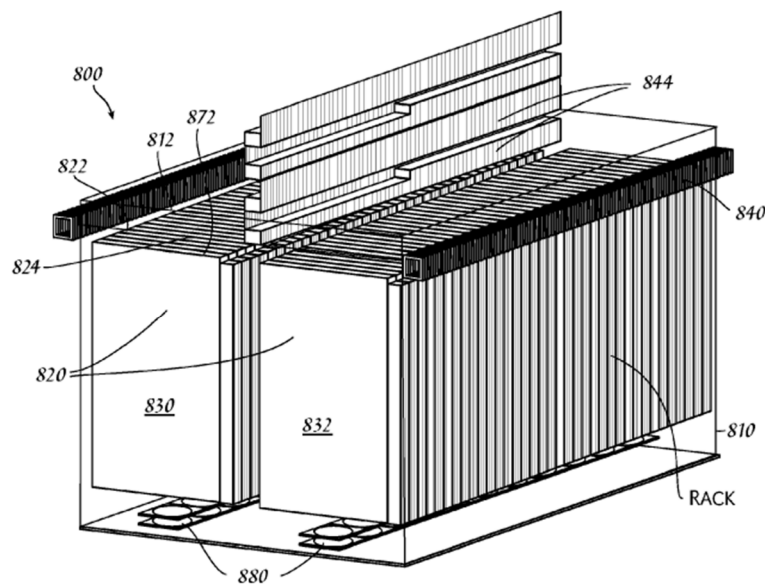


Fig. 6

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See also:

- [0083]
 - “The tank 410 may be fabricated of [material] that is compatible with the dielectric liquid coolant used as a cooling medium.”
 - “The tank 410 may face upward with an open top 430 to form an open interior volume and may be shaped to have a length L , width W , and height H with the minimum footprint to insert multiple servers 120.”
 - “Suitable mounting members may be used to mount the servers in the tank to form the server rack 470 within the tank.”

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- Additional prior art references also disclose this limitation. Portions of figures disclosing a tank as claimed are highlighted yellow below. For example:

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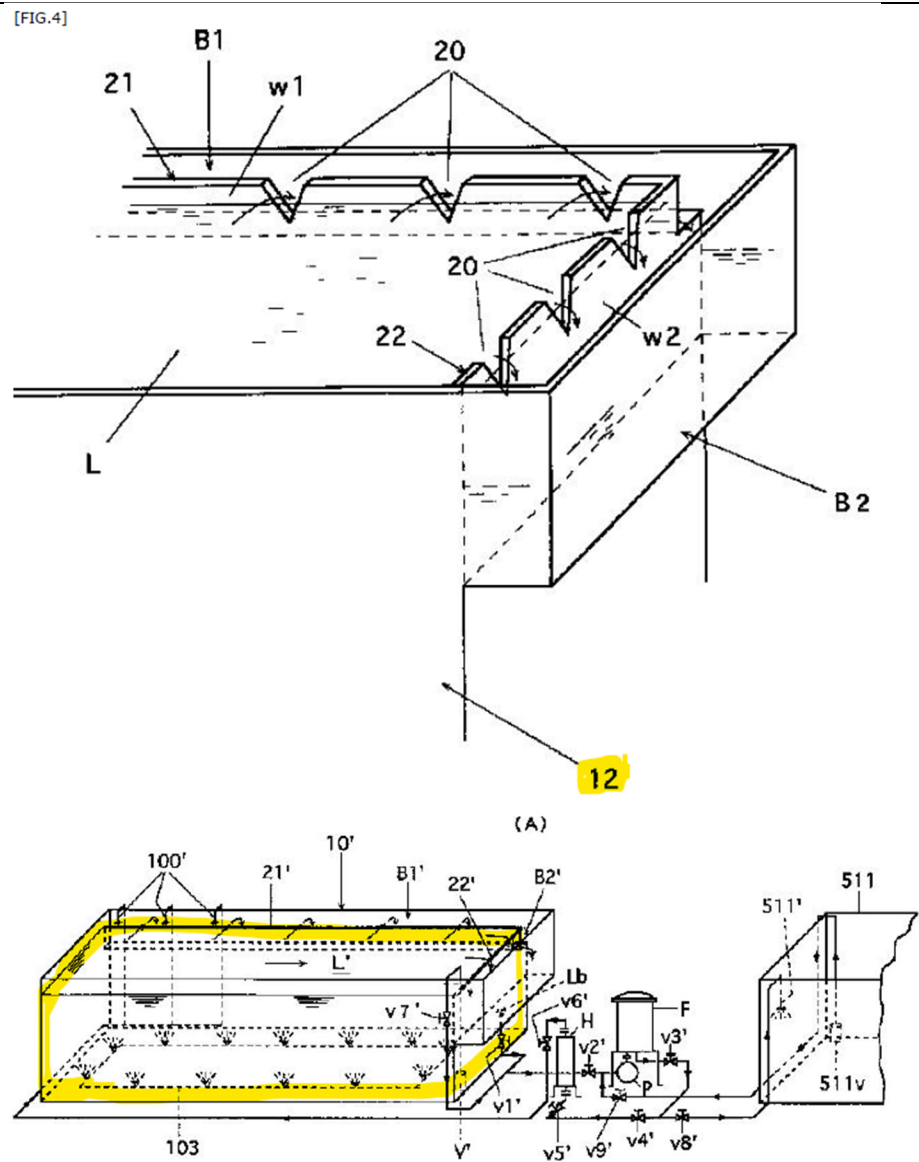


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	• Best-2012 discloses: • [0017] • [0069] • FIGS. 6, 7A, 7B, 7C and corresponding description • Oktay: FIGS. 1, 2 and corresponding description (e.g., “container 11” and “container 73”), claim 1 • Kobayashi: FIGS. 8, 9 and corresponding description • Berman: FIGS. 1, 2, 3, 4 and corresponding description • Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and corresponding description (e.g., “tank 1”) • Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description • Sato: FIG. 1 and corresponding description (e.g., “cleaning tank 37”) • Miyamoto: FIG. 1 and corresponding description (e.g., “cleaning tank 21”) • Kimura: FIG. 1 and corresponding description (e.g., “inner tank 11”) • Boyd: Slides 5, 6, 8, 9
[1.2] a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, having an overflow lip adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot; and	<i>See 1.1.</i> In a prior litigation and IPR, Patent Owner previously construed “weir” as “an overflow structure or barrier that determines the level of a liquid.” The Examiner contended a “weir” is nothing more than a hole in the side of a tank as per the ’457 patent, which the Patent Owner did not refute.

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Best-2008 includes a weir, as shown and described below in relation to outlet pipe 450:

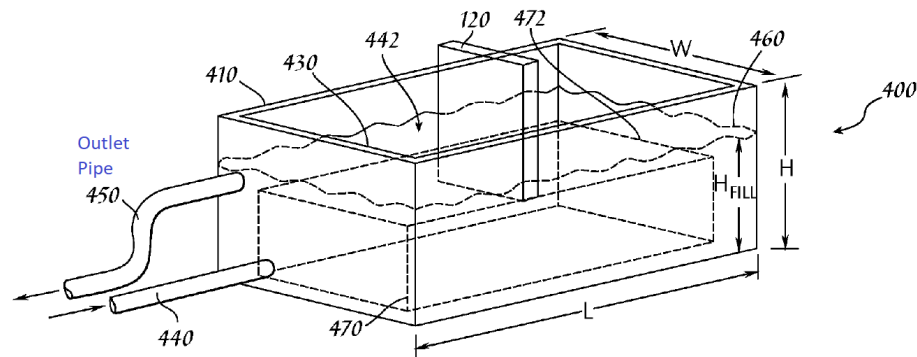


Fig. 3

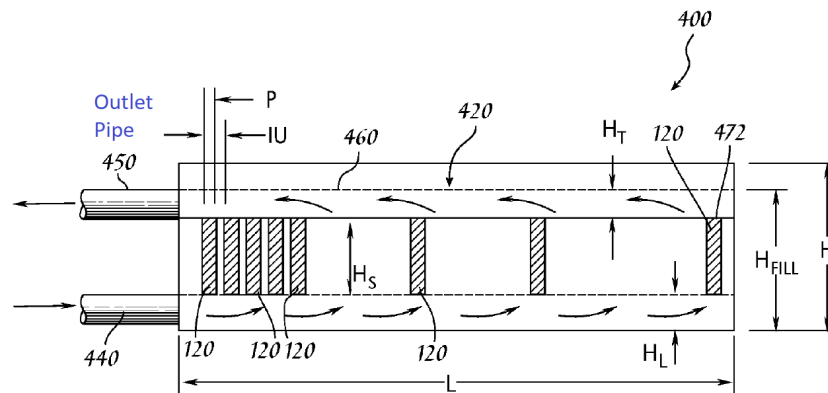


Fig. 6

See also:

- [0092] (explaining that the outlet pipe can also be along the long wall of the tank): "FIG. 9 depicts an end elevation view of yet another illustrative

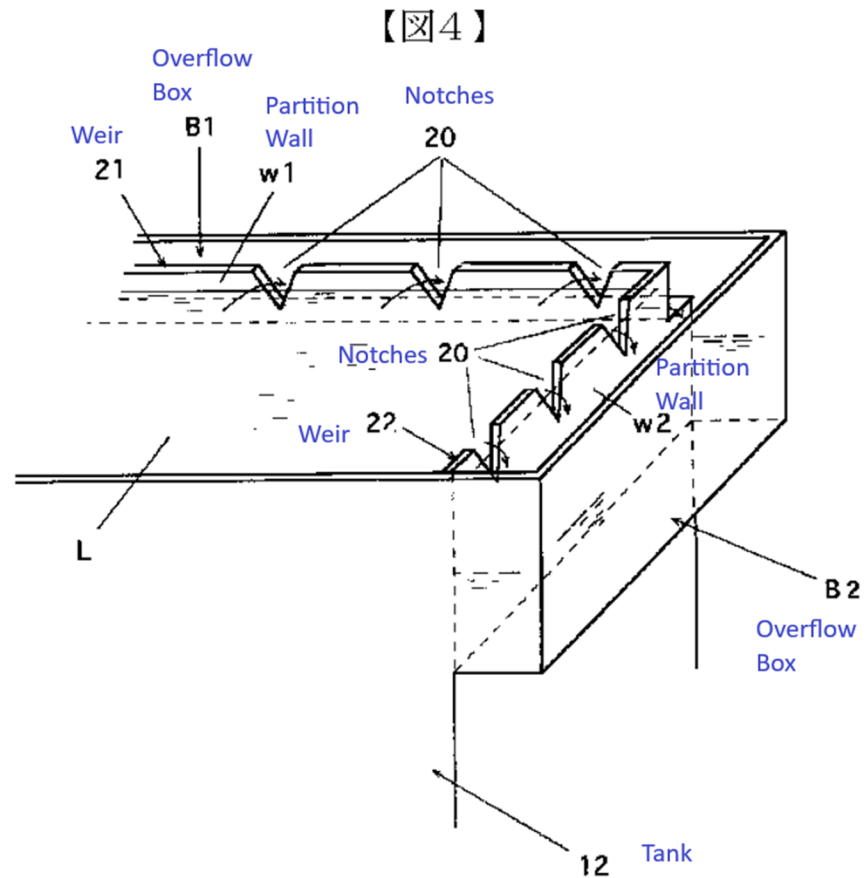
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	<i>embodiment of a suitable fixture or server rack apparatus 600 for use in connection with a combination of system 100 of FIG. 1A and system 200 of FIG. 1B. ... The inlet piping 640 is located nearer one end of one of the longer sides of the rectangular tank than the middle and is located nearer the bottom of the tank than the middle. The output piping 650 is located nearer the opposite end of the same longer side of the rectangular tank nearer the top of the tank."</i> Additional prior art references also disclose this limitation. For example: • <i>Osada, including:</i> • <i>FIG. 4 (showing weirs 21, 22 for overflow liquid L to flow into overflow boxes B1, B2 to maintain liquid level height):</i>
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- FIG. 16(A) (showing weirs 21', 22' for overflow liquid L to flow into overflow boxes B1', B2' to maintain liquid level height):

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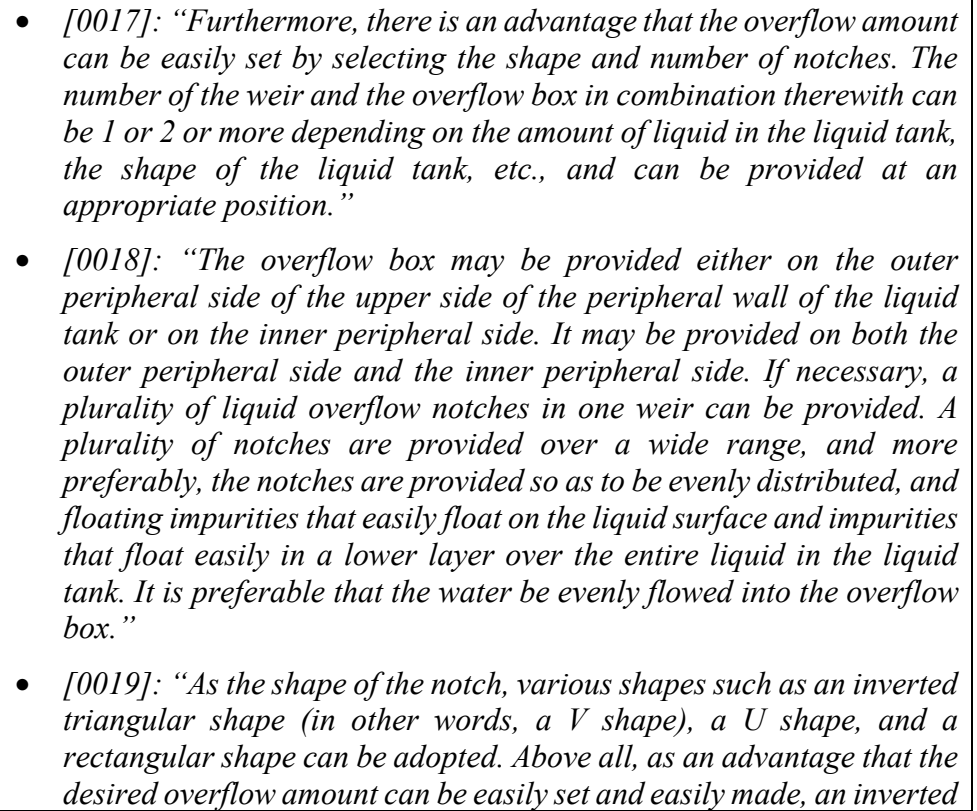


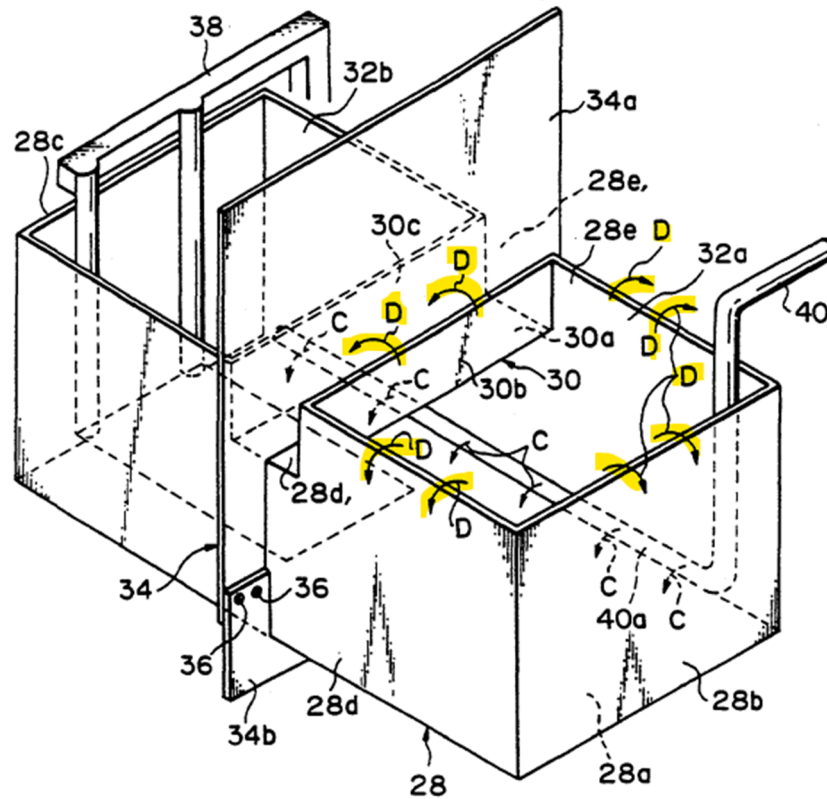
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	<i>triangular notch formed such that the opening width gradually narrows from the upper end of the notch to the lower side, and the opening width A narrow rectangular notch can be mentioned, and it is preferable to provide a plurality of these.”</i> • <i>See also FIG. 13(B), [0126]-[0159]</i> • <i>Best-2012, including:</i> • <i>[0070] and FIGS. 7A-7C: “The area A_2 of the velocity augmentation devices along the length of the pressure manifold 710 is much smaller than the area A_1 of the pressure manifold 710. This allows for the pressure lost through the velocity augmentation devices to be much greater than the pressure lost through the pressure manifold 710. Consequently, the pressure across the velocity augmentation devices is approximately equal over the entire length of the tank 600. Likewise, suction across the suction manifold 720 is approximately equal along the entire length of the tank 600. Hence, coolant flow is approximately equal along the length of the entire tank 600.”</i> • <i>Oktay: FIG. 2, 3:50-55 (e.g., “overflow orifices 91”)</i> • <i>Kobayashi: FIGS. 8, 9 and corresponding description (e.g., “pure water overflows from the opening sections 32a and 32b, as indicated by arrows D in FIGS. 8 and 9,” with arrows D shown in yellow highlights below)</i>
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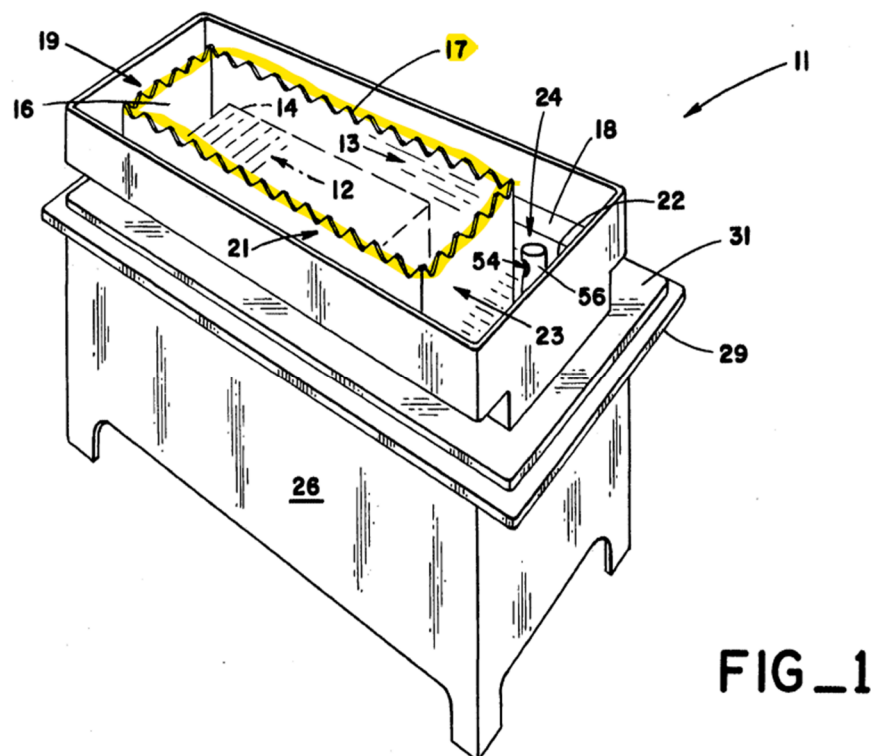
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- *Berman: FIGS. 1, 2, 3, 4 and corresponding description (e.g., upper edge 17 of processing vessel 16 is highlighted in yellow below)*

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- *Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and corresponding description (e.g., wall between tank 1 and “overflow discharge part 2”)*
- *Rolfson: FIG. 1 and corresponding description (e.g., wall of process tank 20)*
- *Jang: FIGS. 1, 2, 3, 4 and corresponding description (e.g., “bath chamber wall 14” and “bevel 13a”)*
- *Kashkoush: FIGS. 3, 4 and corresponding description (e.g., “re-circulation weir 13” and side-walls 11a, 11b of process tank 10)*

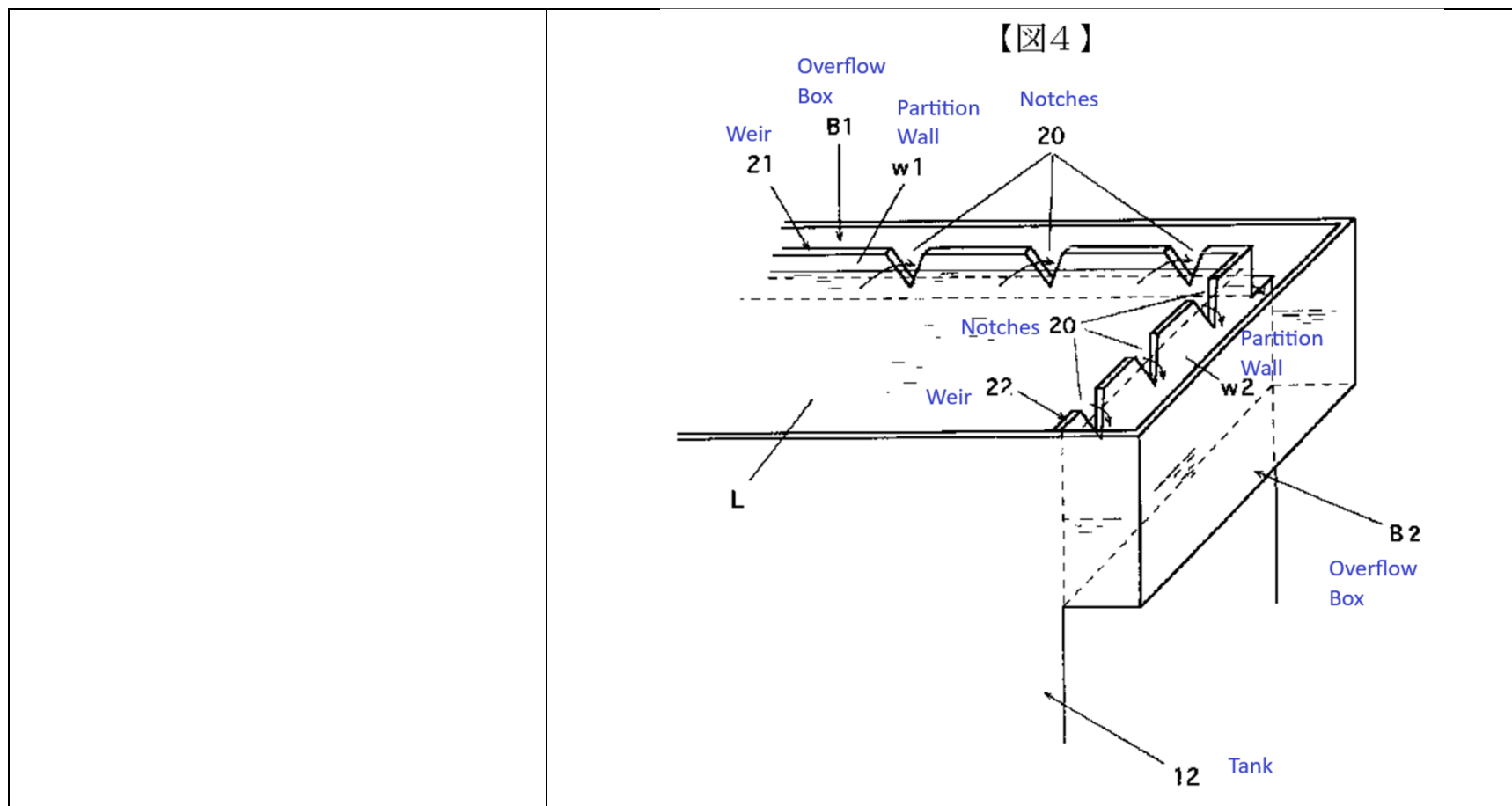
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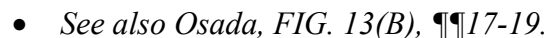
	• <i>Chong: FIG. 1 and corresponding description (e.g., “overflow lip 32”)</i> • <i>Meseth: The FIGURE and corresponding description (e.g., “dividing wall 12” and “overflow edge 18”)</i> • <i>Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description</i> • <i>Sato: FIG. 1 and corresponding description (e.g., wall between cleaning tank 37 and overflow tank 38)</i> • <i>Miyamoto: FIG. 1 and corresponding description (e.g., wall between cleaning tank 21 and overflow tank 27)</i> • <i>Kimura: FIG. 1 and corresponding description (e.g., wall between inner tank 11 and outer bath 12)</i>
[1.3] a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir; and	<i>See Limitations 1.1, 1.2.</i> A dielectric fluid recovery reservoir as recited was known and rendered obvious by at least Best-2008 in view of Osada. For example, Osada’s overflow boxes (fluid recovery reservoirs) are positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir:

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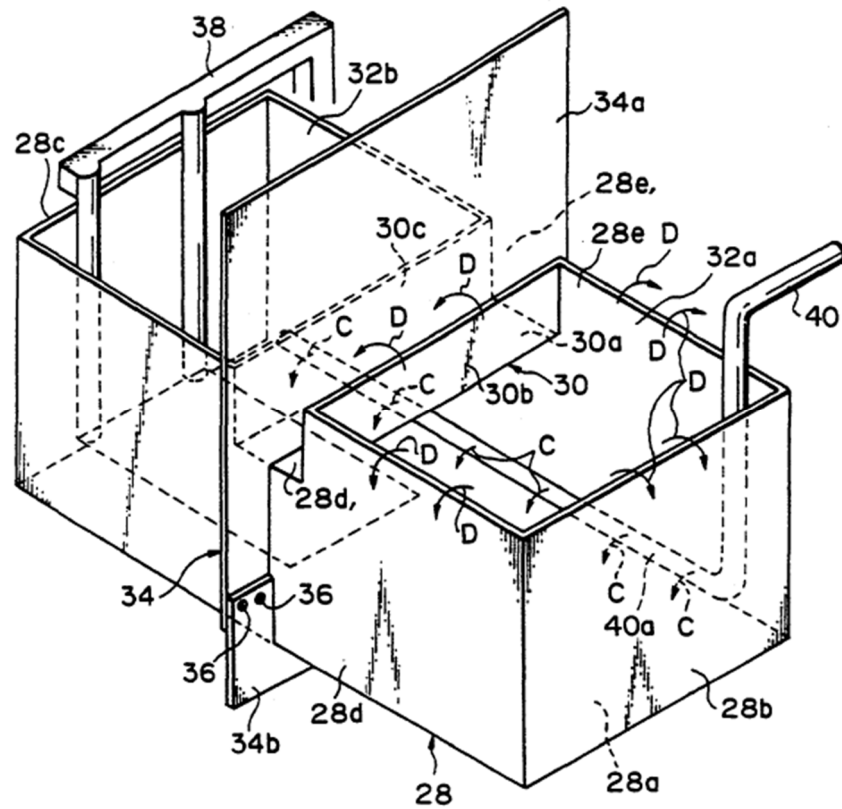
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- *Best-2012: FIGS. 6, 7A, 7B, 7C, [0069]-[0072]*
- *Oktay: FIG. 2, 3:50-58 (e.g., “pool of liquid 93 collects, above the bottom wall of enclosure 85”)*
- *Kobayashi: FIGS. 8, 9 and corresponding description, for example:*
 - *5:51-6:37: “The overflow tank further comprises a groove formation member 30 provided between the opposed side walls 28d and 28e at a middle location thereof.... The groove formation member 30 includes a bottom wall 30a bridging the opposed side walls 28d and 28e and disposed at a level lower than that of the upper edges of the side walls 28b, 28c, 28d, and 28e, and opposed side walls 30b and 30c extending upward from the side edges of the bottom wall 30a between the opposed side walls 28d and 28e and having upper edges that are flush with the upper edges of the side walls 28b, 28c, 28d, and 28e.”*

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- *Berman: FIGS. 1, 2, 3, 4 and corresponding description (e.g., trough 18 for receiving overflow liquid below upper edge 17 is highlighted in yellow below)*

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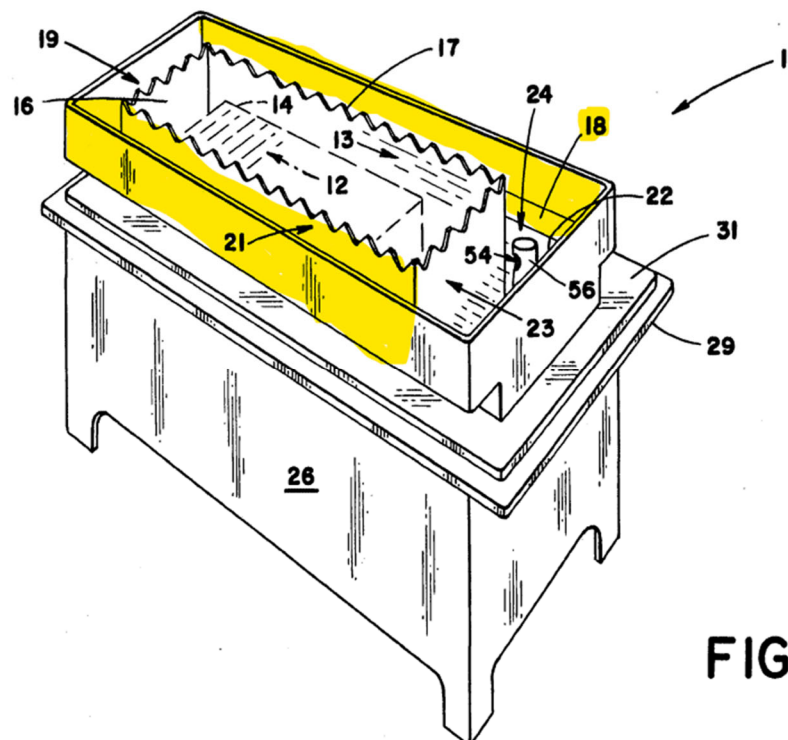


FIG_1

- Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and corresponding description (e.g., “overflow discharge part 2”)
- Rolfsen: FIG. 1 and corresponding description (e.g., overflow tank 22)
- Jang: FIGS. 1, 2, 3, 4 and corresponding description (e.g., “overflow chamber 15”)
- Kashkoush: FIGS. 3, 4 and corresponding description (e.g., “re-circulation weir 13,” “basin floor 22,” and “basin wall 23”)
- Chong: FIG. 1 and corresponding description (e.g., “overflow basin 16”)

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	• <i>Meseth: The FIGURE and corresponding description (e.g., “separation chamber 22”)</i> • <i>Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description</i> • <i>Sato: FIG. 1 and corresponding description (e.g., “overflow tank 38”)</i> • <i>Miyamoto: FIG. 1 and corresponding description (e.g., “overflow tank 27”)</i> • <i>Kimura: FIG. 1 and corresponding description (e.g., “outer bath 12”)</i>
[1.4] a primary circulation facility adapted to circulate the dielectric fluid through the tank, comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot;	<i>See Limitations 1.1, 1.2, 1.3.</i> A primary circulation facility as recited was known and rendered obvious by at least Best-2008. For example, FIGS. 1A, 1B, and 2 of Best-2008 show various pumps, heat exchangers, and piping arrangements that may be used to recirculate the dielectric fluid through the tanks via a first liquid circuit. According to Patent Owner, a plenum is “a structure for dispensing liquid.” FIG. 6 of Best-2008 also discloses such a plenum, in the form of an inlet pipe that distributes the cooled dielectric fluid through a plenum adjacent the bottom of the tank:

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- [0067]: “The liquid coolant heated by the servers 120 in the server rack is then fluidly coupled through suitable piping or lines to a pump 130, which pumps the heated liquid coolant through suitable piping or lines to a remotely or distally located heat exchanger 140 associated with a heat-rejection or cooling apparatus 150. The distally heat exchanger 140 rejects the heat from the incoming heated liquid coolant and fluidly couples the cooled liquid coolant through a return fluid line or piping 170 back into the tank 110. Thus, at least a portion of the liquid coolant completes a fluid circuit through the servers 120 in the tank 110, pump 130, heat exchanger 140, and back into the tank 110.”
- [0086]: “The mounting members may also be configured to mount the servers in the server rack 470 above the bottom of the tank to create a volume of liquid coolant between each respective server and the bottom of the tank such that the flow of the dielectric liquid coolant through the servers is improved. Preferably, the mounting members are configured to mount the servers closely adjacent to one another in the server rack to restrict the flow of the dielectric

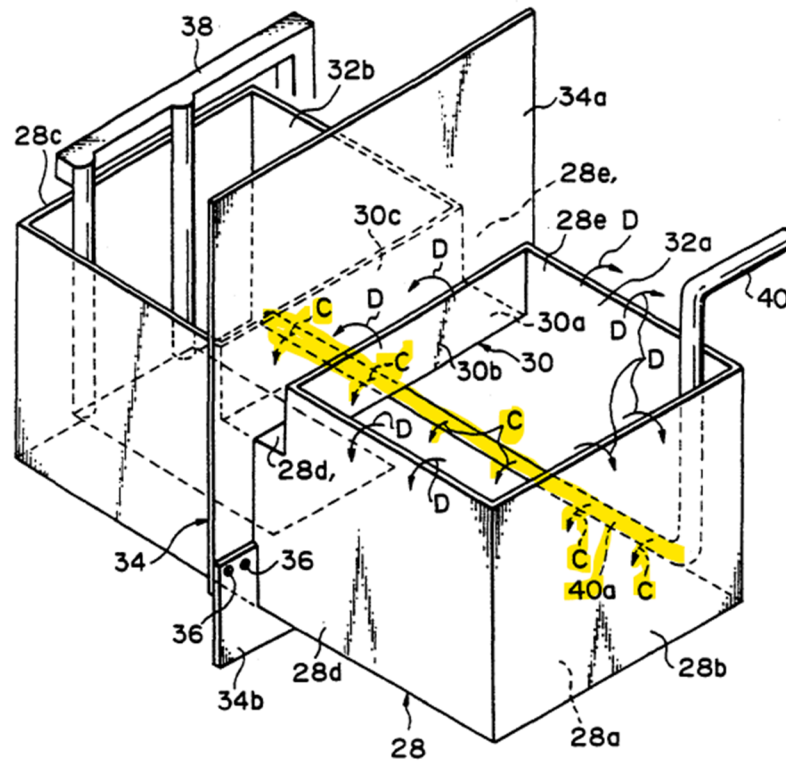
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	<i>liquid coolant between the vertically-oriented servers, such that the flow of the dielectric liquid coolant through the servers is enhanced.”</i> A primary circulation facility as recited in the claim was also known and rendered obvious by at least the following prior art references: • <i>Best-2012, including:</i> • <i>FIGS. 2A, 2B and corresponding description</i> • <i>[0070] and FIGS. 7A-7C: “The area A_2 of the velocity augmentation devices along the length of the pressure manifold 710 is much smaller than the area A_1 of the pressure manifold 710. This allows for the pressure lost through the velocity augmentation devices to be much greater than the pressure lost through the pressure manifold 710. Consequently, the pressure across the velocity augmentation devices is approximately equal over the entire length of the tank 600. Likewise, suction across the suction manifold 720 is approximately equal along the entire length of the tank 600. Hence, coolant flow is approximately equal along the length of the entire tank 600.”</i> • <i>Osada, including:</i> • <i>[0041], [0051]</i> • <i>FIGS. 1, 3, 4, 16(A), 16(B) and corresponding description</i> • <i>Kobayashi: FIG. 8, 6:29-35 (e.g., duct section 40a with liquid discharging from a bottom of the tank as indicated by arrows C is shown below in yellow highlights)</i>
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- Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 15, 16, 17 and corresponding description (e.g., “spouting nozzles 4,” “spouting nozzles 23” and “spouting nozzles 43”)
- Osada-296: FIGS. 3, 16 and corresponding description
- Miyamoto: FIG. 1 and corresponding description (e.g., “cleaning nozzle part 22”)

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[1.5] a secondary fluid circulation facility adapted to extract heat from the dielectric fluid circulating in the primary circulation facility, and to dissipate to the environment the heat so extracted; and

See Limitation 1.4

Best-2008 discloses this limitation. For example, as shown in FIGS. 1A, 1B, and 2 of Best-2008, a secondary fluid circulation facility may be used to extract heat from the dielectric fluid circulating in the primary circulation facility, and to dissipate to the environment the heat so extracted. In FIG. 1A, a cooling apparatus (150) employs a cooling liquid in a second fluid circuit in communication with a heat exchanger (140):

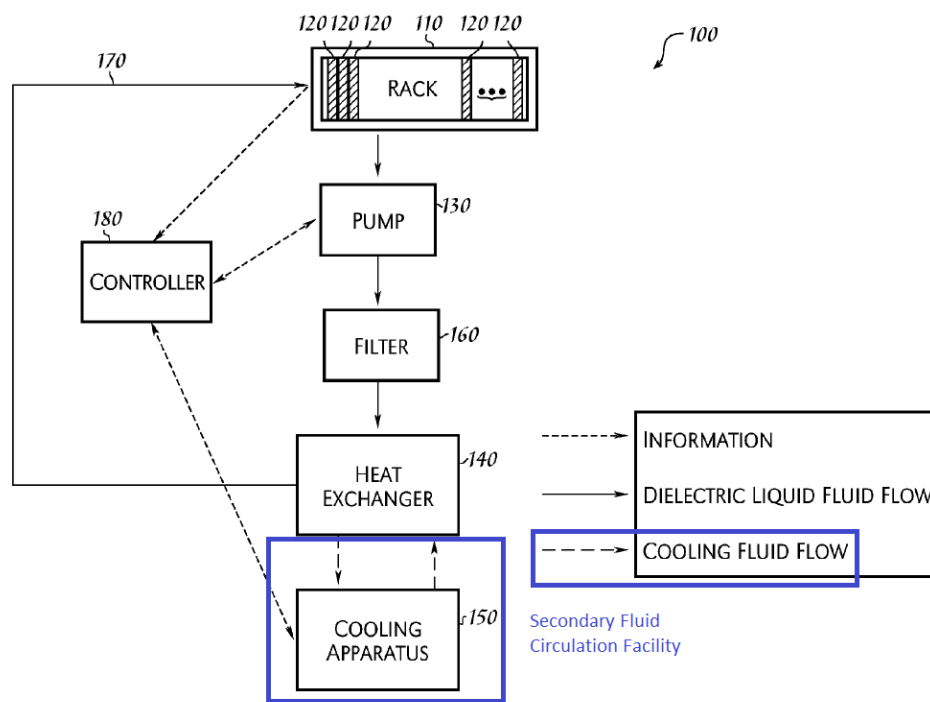


Fig. 1A

See also:

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	• [0067]: “The heat rejected from the heated liquid coolant through the heat exchanger 140 may then be selectively used by alternative heat rejection or cooling apparatus 150...to dissipate, recover, or beneficially use the rejected heat depending on the different environmental conditions and/or server operating conditions to which the system is subject.” Additional prior art references also disclose this limitation. For example: • Osada, including: • [0051], [0071], [0080], [0087], [0100] • FIGS. 1, 3, 4, 16A, 16B and corresponding description • Best-2012, including: • FIGS. 2A, 2B and corresponding description • Oktay: FIG. 2, 3:55-62 • Meseth: The FIGURE and corresponding description, 5:6-40 • Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description (e.g., [0012], [0096], [0111], [0121], [0122]) • Sato: FIG. 1 and corresponding description (e.g., “cooling device 40”) • Kimura: FIG. 1 and corresponding description (e.g., [0033], “cooling mechanism 25”) • Boyd: Slide 6 (e.g., “Redundant evaporative cooling towers”)
[1.6] a control facility adapted to coordinate the operation of the primary and secondary	See Limitation 1.4, 1.5.

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fluid circulation facilities as a function of the temperature of the dielectric fluid in the tank.

Best-2008 discloses this limitation. As shown in, for instance, FIGS. 1A, 1B and 2 of Best-2008, a control facility may be used to “coordinate the operation of the primary and secondary fluid circulation facilities as a function of the temperature of the dielectric fluid in the tank.” One example is shown in FIG. 1A, below, where a controller (180) coordinates the operation of the pump (130) and cooling apparatus (150):

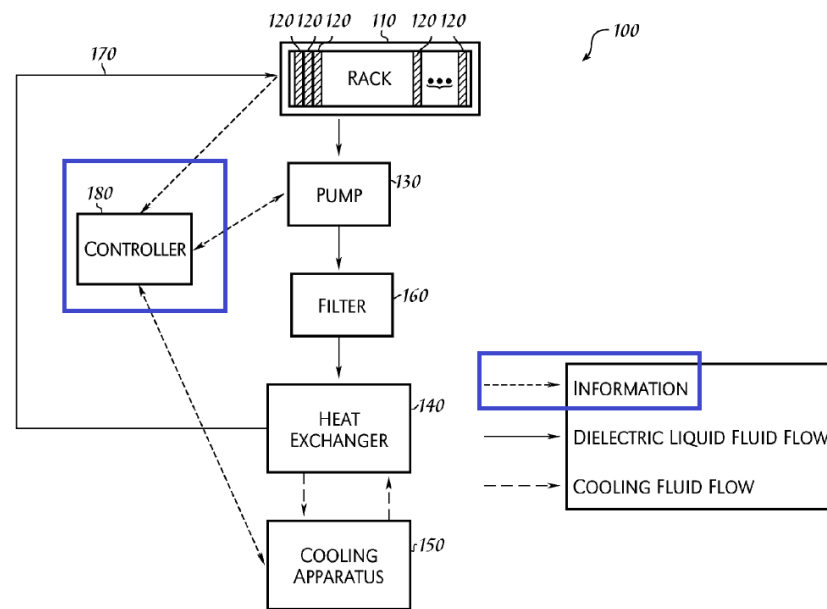


Fig. 1A

See also:

- [0068]: “The system 100 includes a computer controller 180 of conventional design ... The controller 180 may receive monitor signals of various operational parameters from various components of the cooling system 100 and the environment and may generate control signals to control various components of the cooling system to maintain the heated liquid coolant exiting

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	<i>the servers in the tank at a specific elevated temperature in order to sufficiently cool each of the servers while reducing the total amount of energy needed to cool the servers....Based upon such information, the controller 180 may output signals to the pump 130 and heat rejection or cooling apparatus 150 to adjust the flow of the liquid coolant through the fluid circuit and the amount of the heat being rejected by the heat rejection or cooling apparatus 150 for sufficiently cooling each respective server while maintaining the heated liquid coolant exiting the servers at the elevated temperature to reduce the amount of energy consumed to sufficiently cool each of the servers in the server rack.”</i> Additional prior art references also disclose this limitation. For example: • <i>Osada, including:</i> • [0064], [0066], [0071], [0072], [0074], [0075], [0080], [0083], [0085], [0087], [0091]-[0105], [0108]-[0110] • <i>FIGS. 1, 3 and corresponding description</i> • <i>Best-2012, including:</i> • <i>FIGS. 2A, 2B and corresponding description</i> • <i>Oktay: FIG. 1, 2:64-3:16</i> • <i>Osada-296: e.g., [0083]-[0087], [0092], [0096]-[0101], [0111], [0119], [0120]-[0122]</i> • <i>Sato: FIG. 1 and corresponding description (e.g., “controller 101,” [0044])</i>
[Claim 2] The system of claim 1 wherein the tank and primary circulation facility comprise a highly-integrated module.	<i>See Limitations 1.1, 1.4.</i> To the extent this limitation can be understood, it is disclosed by Best-2008. For example, Best-2008 discloses that its heat exchanger (280) (primary circulation

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facility) may be located inside the tank (210), making the tank and primary circulation facility “a highly-integrated module”) as shown by, for instance FIG. 1B:

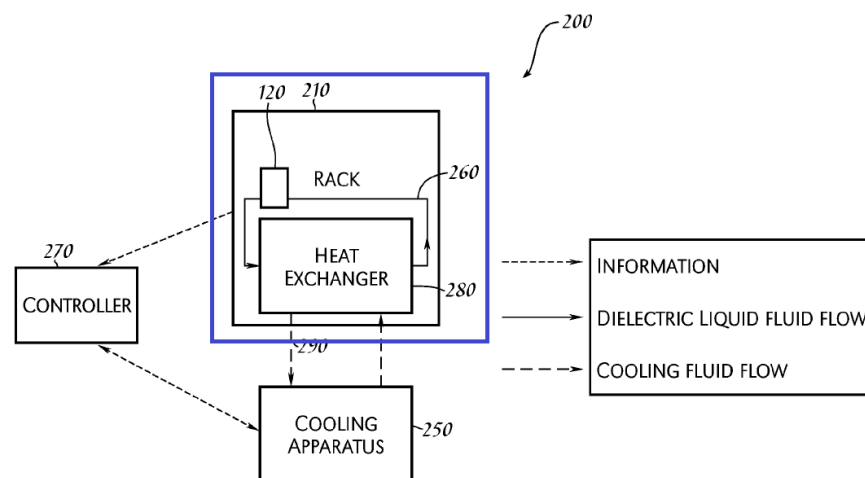


Fig. 1B

Additional prior art references also disclose this limitation. For example:

- *Osada, including:*
 - [0051], [0071], [0080], [0087], [0100]
 - FIGS. 1, 3, 16(A) and corresponding description
- *Best-2012, including:*
 - FIGS. 2A, 2B, 6, 7C, and corresponding description
- *Oktay: FIGS. 1, 2 and corresponding description*
- *Berman: FIGS. 1, 2, 3, 4 and corresponding description*

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	• <i>Osada-296: FIGS. 1, 3, 4, 16 and corresponding description</i>
[Claim 3] The system of claim 1 wherein the tank further comprises: an interconnect panel facility adapted to mount appliance support equipment.	<i>See Limitation 1.1.</i> Best-2008 teaches this limitation. • [0100]: “As shown in FIG. 13, the apparatus 800 also may have cable trays 840 mounted along two sides of the tank 810 paralleling the sides of the server racks 830 and 832 to organize the signal and control network cabling 842 from the servers to the controller and other computers in the data center and beyond. The apparatus 800 may further have power distribution units (‘PDUs’) 844 mounted above the space between the server racks in order to distribute needed electrical power through suitable power cables 846 to the multiple servers.” Additional prior art references also disclose this limitation. For example: • <i>Best-2012, including:</i> • [0041], [0057], [0068] • <i>FIGS. 2A, 2B, 6 and corresponding description</i> • <i>Oktay: FIG. 1, 2:35-43</i>

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[6.0] A tank module adapted for use in an appliance immersion cooling system, the tank module, comprising:	<i>See Limitations 1.0 and 1.1.</i> Best-2008 discloses the preamble. For example: • <i>Abstract (“Apparatus, systems, and methods for efficiently cooling computing devices having heat-generating electronic components, such as, for example, independently operable servers, immersed in a dielectric liquid coolant in a tank.”); see also [0025], [0053].</i> • <i>FIGS. 3-6 (showing “an exemplary immersion-cooled rack having a plurality of independently operable servers mounted therein,” [0036], [0037].)</i> • <i>FIG. 11 (showing “side-by-side immersion-cooled racks having a plurality of independently operable servers mounted therein,” [0044])</i> • <i>[0066] (“The system 100 includes a tub or tank 110 containing a dielectric liquid coolant into which a plurality of servers 120 may be immersed.”)</i> • <i>The claims (See, e.g., claim 1: “A system for cooling a plurality of independently operable servers containing heat generating electronic components, the system comprising: at least one tank defining an interior volume... wherein the at least one tank is configured for containing the dielectric liquid coolant within the interior volume such that, when the plurality of servers are mountably received therein, at least a portion of each server is submerged within the dielectric liquid coolant for sufficiently cooling each respective server when the tank is sufficiently full of the liquid coolant....”)</i> Additional prior art also discloses this preamble. For example: • <i>Osada, including:</i> • <i>[0001], [0002], [0051]</i> • <i>FIGS. 3, 4, 16A, 16B and corresponding description</i> • <i>Best-2012, including:</i>
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	• FIGS. 6, 7A, 7B, 7C and corresponding description • [0017] • [0069] • Oktay: Abstract, 1:25-29, 1:51-55, 1:65-2:15, FIG. 1 and corresponding description, claim 1 • Kobayashi: FIGS. 8, 9 and corresponding description • Boyd: Slides 5, 6, 8, 9
[6.1] a tank adapted to immerse in a dielectric fluid a plurality of electrical appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, a long wall of the tank, the tank comprising:	See Limitation 1.1. Best-2008 discloses this limitation. For example, Best-2008 discloses a cooling system including a tank adapted to immerse electrical appliances (e.g., servers) in a dielectric fluid by mounting the servers in appliance slots as recited. This feature is shown below. Fig. 3

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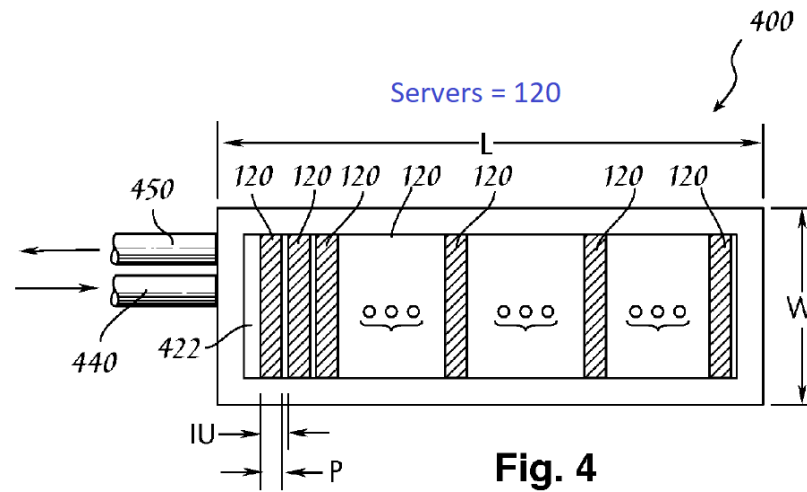


Fig. 4

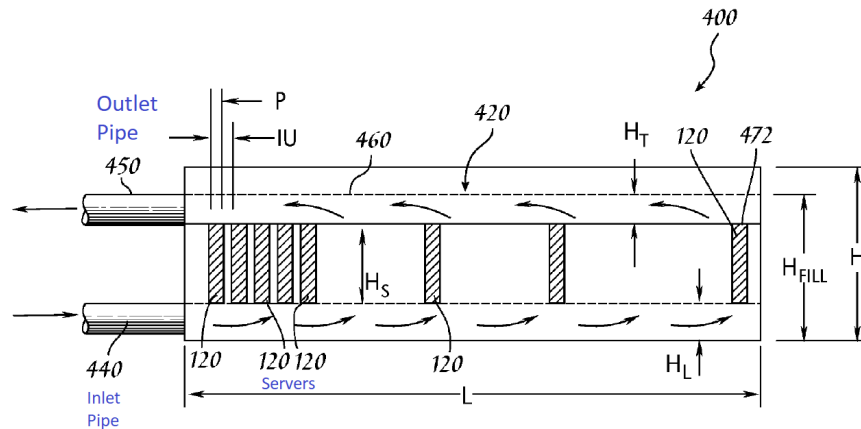


Fig. 6

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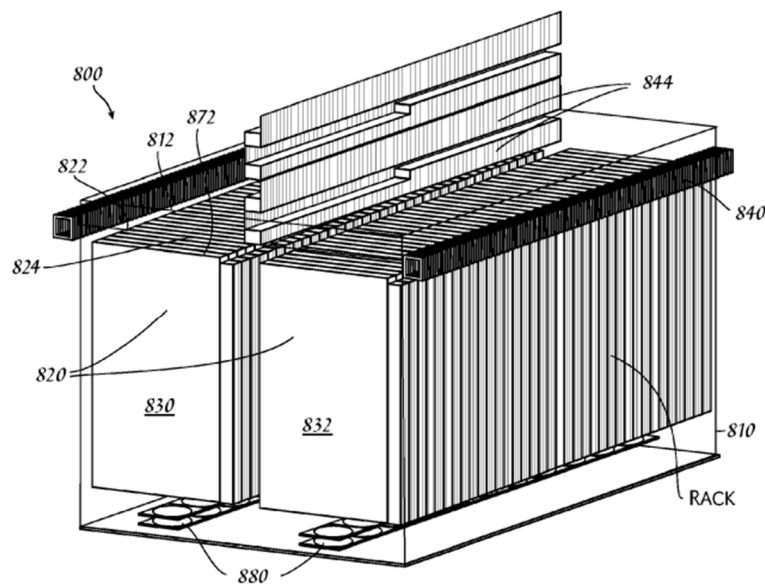


Fig. 11

See also:

- [0083]
 - “The tank 410 may be fabricated of [material] that is compatible with the dielectric liquid coolant used as a cooling medium.”
 - “The tank 410 may face upward with an open top 430 to form an open interior volume and may be shaped to have a length L , width W , and height H with the minimum footprint to insert multiple servers 120.”
 - “Suitable mounting members may be used to mount the servers in the tank to form the server rack 470 within the tank.”

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- [0085] (“[T]he mounting members are configured to mountably receive the plurality of servers in a vertical orientation, thereby minimizing the footprint of the servers relative to the ground, and with the ‘front’ panel facing upward for easy installation and removal of a server without the need to remove or disturb any other server within the tank 410.”)
- [0090] (“In another alternative rack design (not shown in the drawings), the tank 410 is divided into a plurality of bins with each bin being sized to receive one corresponding server with the ‘front panel’ facing upward.”)
- FIG. 11 and [0097]-[0107] (showing and describing plurality of servers in vertical orientation in slots of a tank and immersed in dielectric fluid.)

Additional prior art references also disclose this limitation. Portions of figures disclosing a tank as claimed are highlighted yellow below. For example:

- Osada, including:
 - [0001], [0002], [0051]
 - FIGS. 3, 4, 16A, 16B and corresponding description

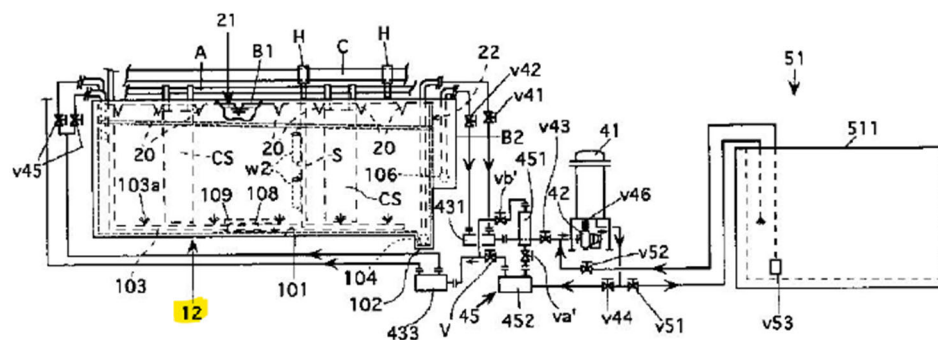


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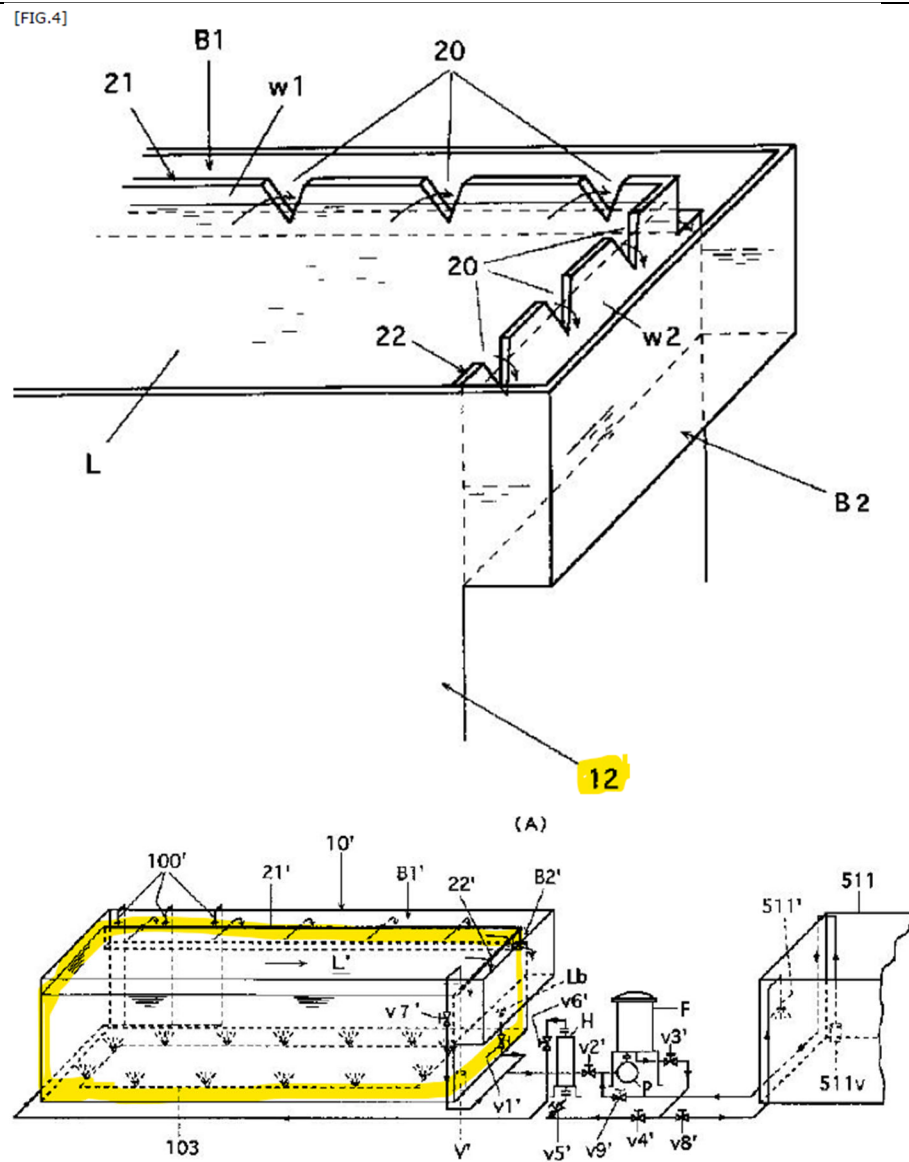


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	• <i>Best-2012, including:</i> • [0017] • [0069] • <i>FIGS. 6, 7A, 7B, 7C and corresponding description</i> • <i>Oktay: FIGS. 1, 2 and corresponding description (e.g., “container 11” and “container 73”), claim 1</i> • <i>Kobayashi: FIGS. 8, 9 and corresponding description</i> • <i>Berman: FIGS. 1, 2, 3, 4 and corresponding description</i> • <i>Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and corresponding description (e.g., “tank 1”)</i> • <i>Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description</i> • <i>Sato: FIG. 1 and corresponding description (e.g., “cleaning tank 37”)</i> • <i>Miyamoto: FIG. 1 and corresponding description (e.g., “cleaning tank 21”)</i> • <i>Kimura: FIG. 1 and corresponding description (e.g., “inner tank 11”)</i> • <i>Boyd: Slides 5, 6, 8, 9</i>
[6.2] a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, having an overflow lip adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot; and;	<i>See Limitation 1.2.</i> Best-2008 discloses this limitation. In a prior litigation and IPR, Patent Owner previously construed “weir” as “an overflow structure or barrier that determines the level of a liquid.” The Examiner contended a “weir” is nothing more than a hole in the side of a tank as per the ’457 patent, which the Patent Owner did not refute.

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Best-2008 includes a weir, as shown and described below in relation to outlet pipe 450:

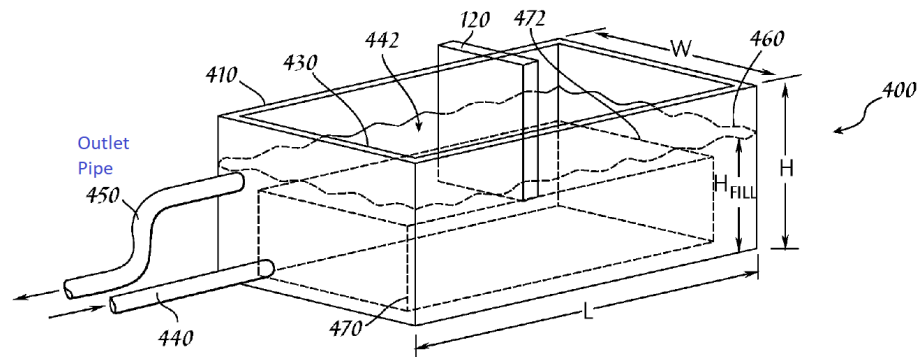


Fig. 3

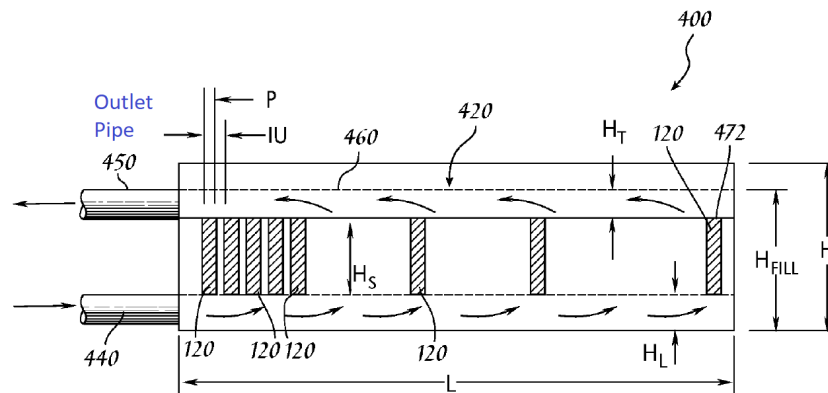


Fig. 6

See also:

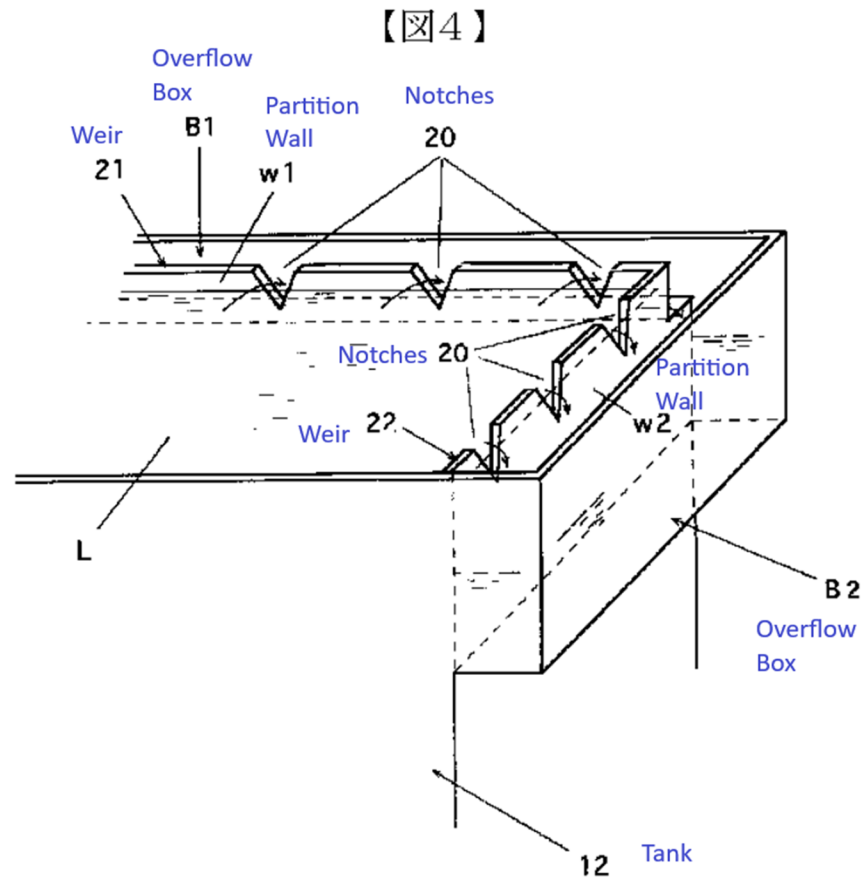
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	• <i>[0092] (explaining that the outlet pipe can also be along the long wall of the tank): “FIG. 9 depicts an end elevation view of yet another illustrative embodiment of a suitable fixture or server rack apparatus 600 for use in connection with a combination of system 100 of FIG. 1A and system 200 of FIG. 1B. ... The inlet piping 640 is located nearer one end of one of the longer sides of the rectangular tank than the middle and is located nearer the bottom of the tank than the middle. The output piping 650 is located nearer the opposite end of the same longer side of the rectangular tank nearer the top of the tank.”</i> Additional prior art references also disclose this limitation. For example: • <i>Osada, including:</i> • <i>FIG. 4 (showing weirs 21, 22 for overflow liquid L to flow into overflow boxes B1, B2 to maintain liquid level height):</i>
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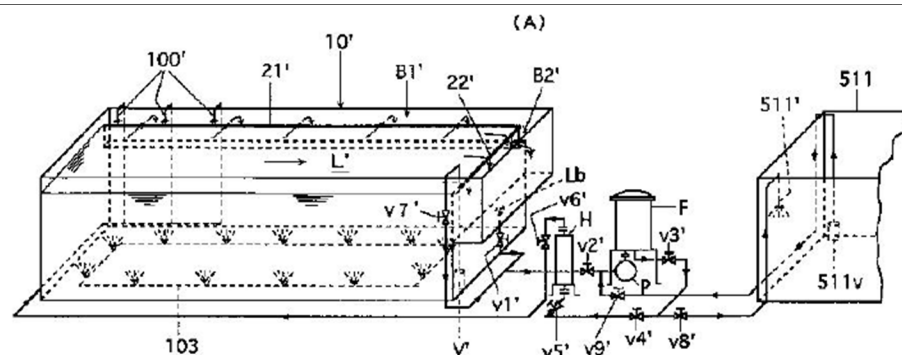
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- FIG. 16(A) (showing weirs 21', 22' for overflow liquid L to flow into overflow boxes B1', B2' to maintain liquid level height):

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- [0017]: “Furthermore, there is an advantage that the overflow amount can be easily set by selecting the shape and number of notches. The number of the weir and the overflow box in combination therewith can be 1 or 2 or more depending on the amount of liquid in the liquid tank, the shape of the liquid tank, etc., and can be provided at an appropriate position.”
- [0018]: “The overflow box may be provided either on the outer peripheral side of the upper side of the peripheral wall of the liquid tank or on the inner peripheral side. It may be provided on both the outer peripheral side and the inner peripheral side. If necessary, a plurality of liquid overflow notches in one weir can be provided. A plurality of notches are provided over a wide range, and more preferably, the notches are provided so as to be evenly distributed, and floating impurities that easily float on the liquid surface and impurities that float easily in a lower layer over the entire liquid in the liquid tank. It is preferable that the water be evenly flowed into the overflow box.”
- [0019]: “As the shape of the notch, various shapes such as an inverted triangular shape (in other words, a V shape), a U shape, and a rectangular shape can be adopted. Above all, as an advantage that the desired overflow amount can be easily set and easily made, an inverted

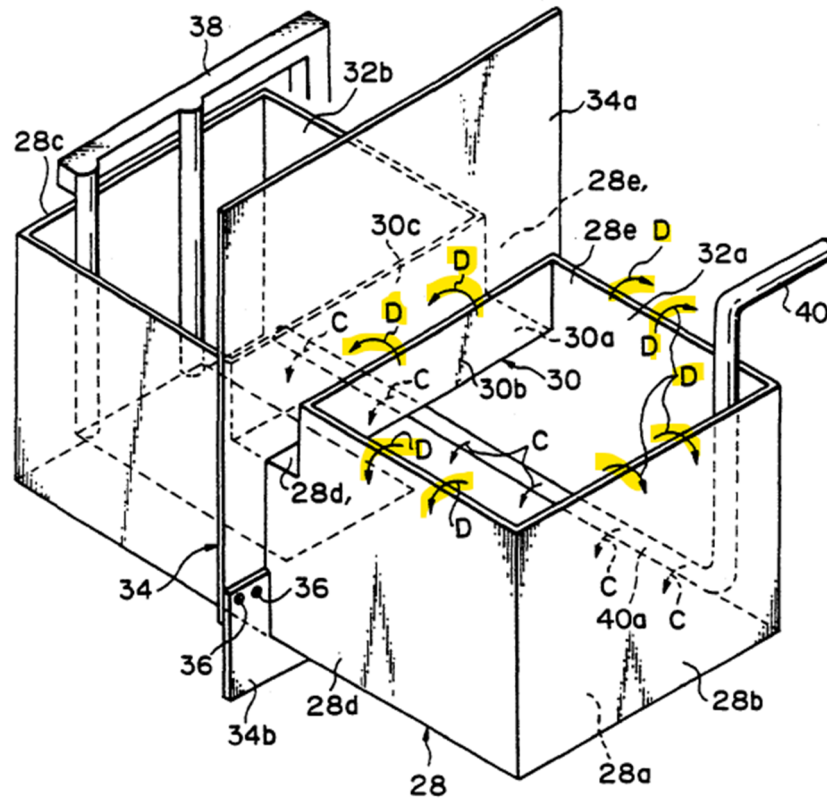
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	<i>triangular notch formed such that the opening width gradually narrows from the upper end of the notch to the lower side, and the opening width A narrow rectangular notch can be mentioned, and it is preferable to provide a plurality of these.”</i> • <i>See also FIG. 13(B), [0126]-[0159]</i> • <i>Best-2012, including:</i> • <i>[0070] and FIGS. 7A-7C: “The area A_2 of the velocity augmentation devices along the length of the pressure manifold 710 is much smaller than the area A_1 of the pressure manifold 710. This allows for the pressure lost through the velocity augmentation devices to be much greater than the pressure lost through the pressure manifold 710. Consequently, the pressure across the velocity augmentation devices is approximately equal over the entire length of the tank 600. Likewise, suction across the suction manifold 720 is approximately equal along the entire length of the tank 600. Hence, coolant flow is approximately equal along the length of the entire tank 600.”</i> • <i>Oktay: FIG. 2, 3:50-55 (e.g., “overflow orifices 91”)</i> • <i>Kobayashi: FIGS. 8, 9 and corresponding description (e.g., “pure water overflows from the opening sections 32a and 32b, as indicated by arrows D in FIGS. 8 and 9,” with arrows D shown in yellow highlights below)</i>
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- *Berman: FIGS. 1, 2, 3, 4 and corresponding description (e.g., upper edge 17 of processing vessel 16 is highlighted in yellow below)*

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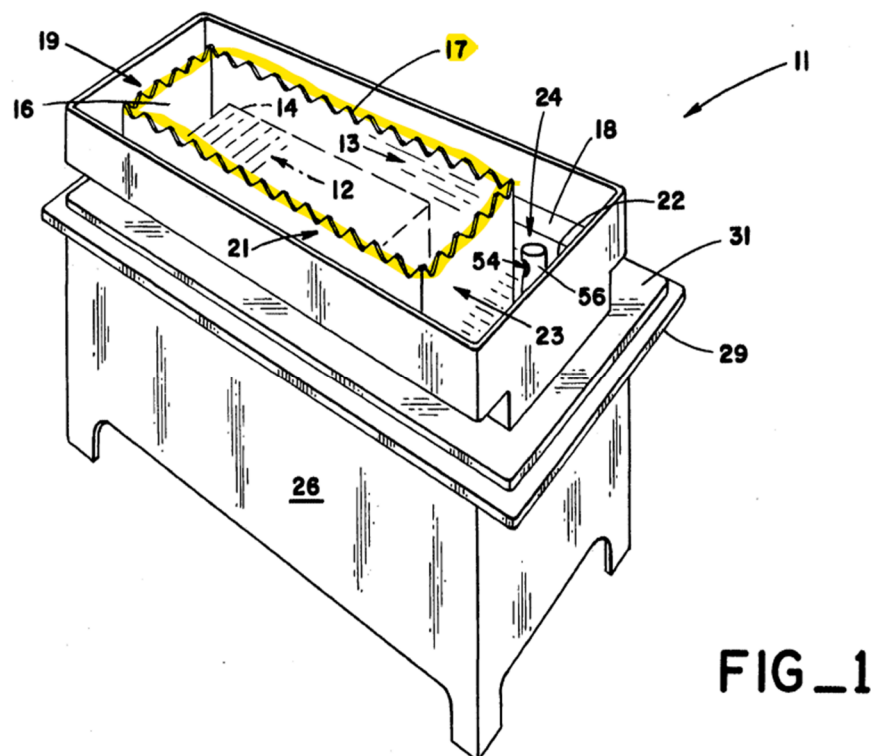


FIG_1

- Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and corresponding description (e.g., wall between tank 1 and “overflow discharge part 2”)
- Rolfsen: FIG. 1 and corresponding description (e.g., wall of process tank 20)
- Jang: FIGS. 1, 2, 3, 4 and corresponding description (e.g., “bath chamber wall 14” and “bevel 13a”)
- Kashkoush: FIGS. 3, 4 and corresponding description (e.g., “re-circulation weir 13” and side-walls 11a, 11b of process tank 10)

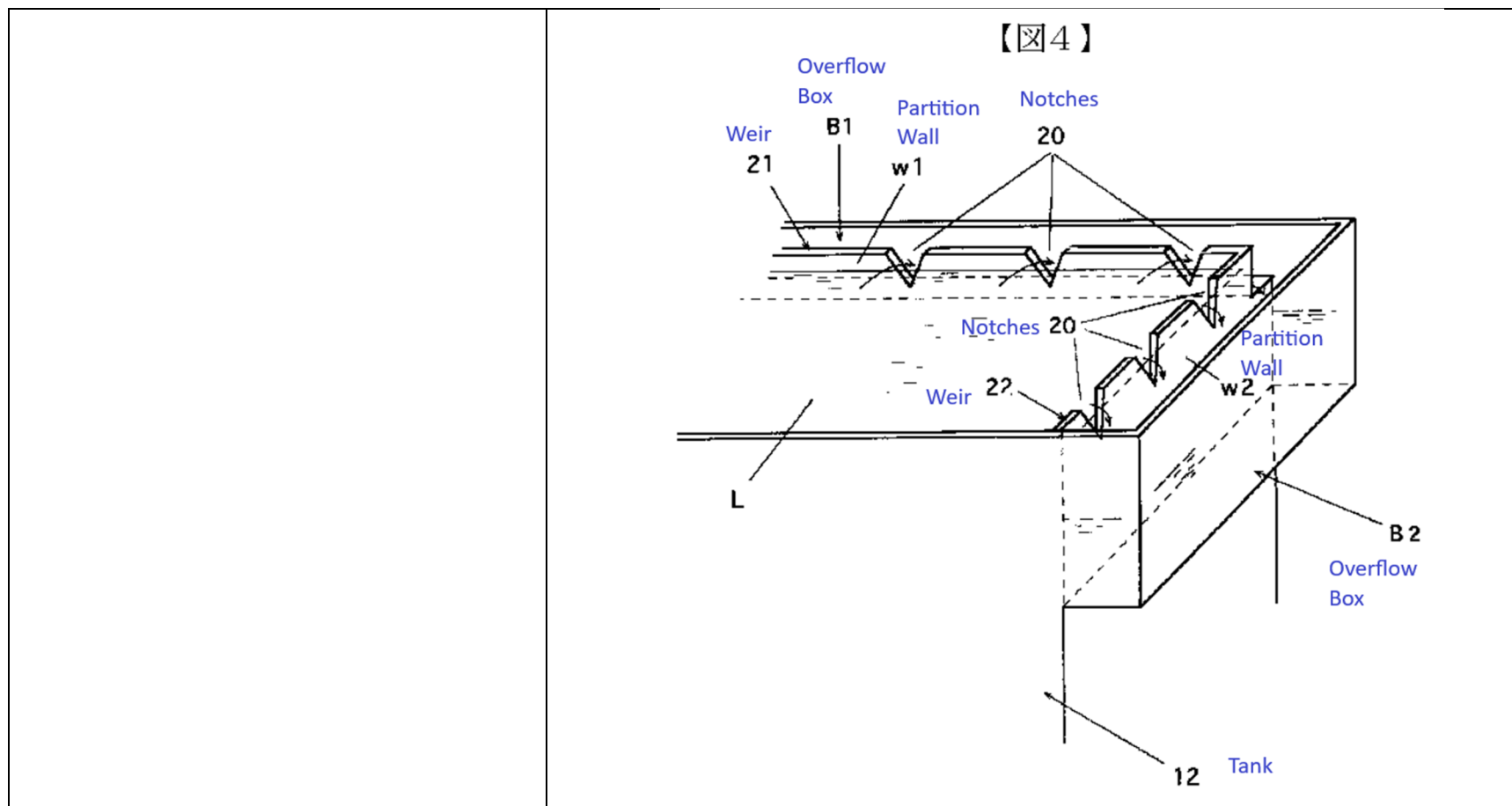
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	• <i>Chong: FIG. 1 and corresponding description (e.g., “overflow lip 32”)</i> • <i>Meseth: The FIGURE and corresponding description (e.g., “dividing wall 12” and “overflow edge 18”)</i> • <i>Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description</i> • <i>Sato: FIG. 1 and corresponding description (e.g., wall between cleaning tank 37 and overflow tank 38)</i> • <i>Miyamoto: FIG. 1 and corresponding description (e.g., wall between cleaning tank 21 and overflow tank 27)</i> • <i>Kimura: FIG. 1 and corresponding description (e.g., wall between inner tank 11 and outer bath 12)</i>
[6.3] a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir;	<i>See Limitation 1.3.</i> A dielectric fluid recovery reservoir as recited was known and rendered obvious by at least Best-2008 in view of Osada. For example, Osada’s overflow boxes (fluid recovery reservoirs) are positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir:

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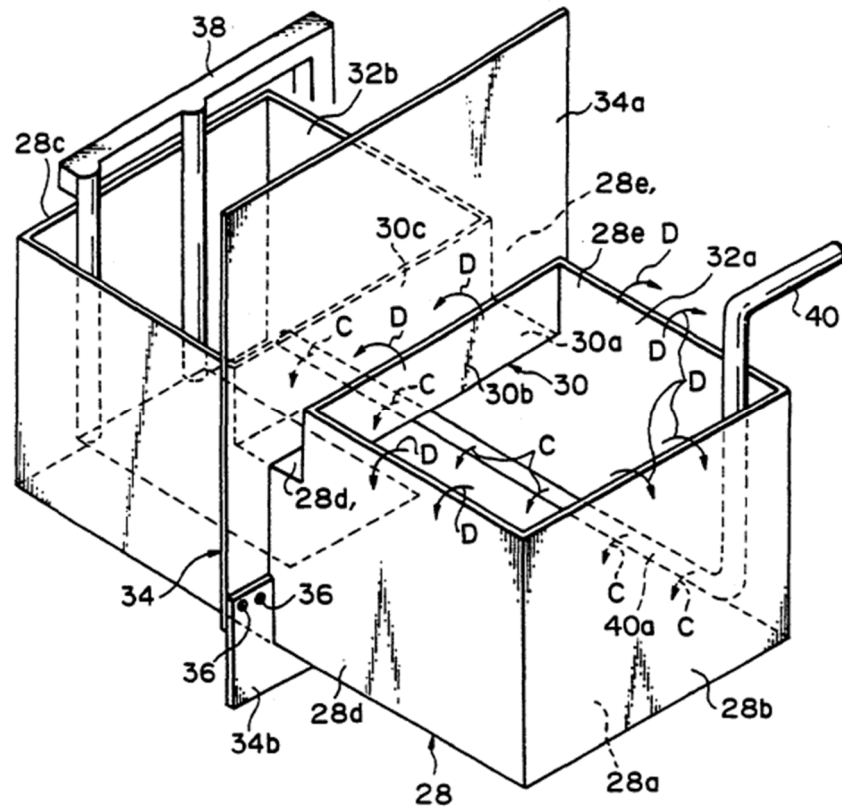
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- *Best-2012: FIGS. 6, 7A, 7B, 7C, [0069]-[0072]*
- *Oktay: FIG. 2, 3:50-58 (e.g., “pool of liquid 93 collects, above the bottom wall of enclosure 85”)*
- *Kobayashi: FIGS. 8, 9 and corresponding description, for example:*
 - *5:51-6:37: “The overflow tank further comprises a groove formation member 30 provided between the opposed side walls 28d and 28e at a middle location thereof.... The groove formation member 30 includes a bottom wall 30a bridging the opposed side walls 28d and 28e and disposed at a level lower than that of the upper edges of the side walls 28b, 28c, 28d, and 28e, and opposed side walls 30b and 30c extending upward from the side edges of the bottom wall 30a between the opposed side walls 28d and 28e and having upper edges that are flush with the upper edges of the side walls 28b, 28c, 28d, and 28e.”*

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- *Berman: FIGS. 1, 2, 3, 4 and corresponding description (e.g., trough 18 for receiving overflow liquid below upper edge 17 is highlighted in yellow below)*

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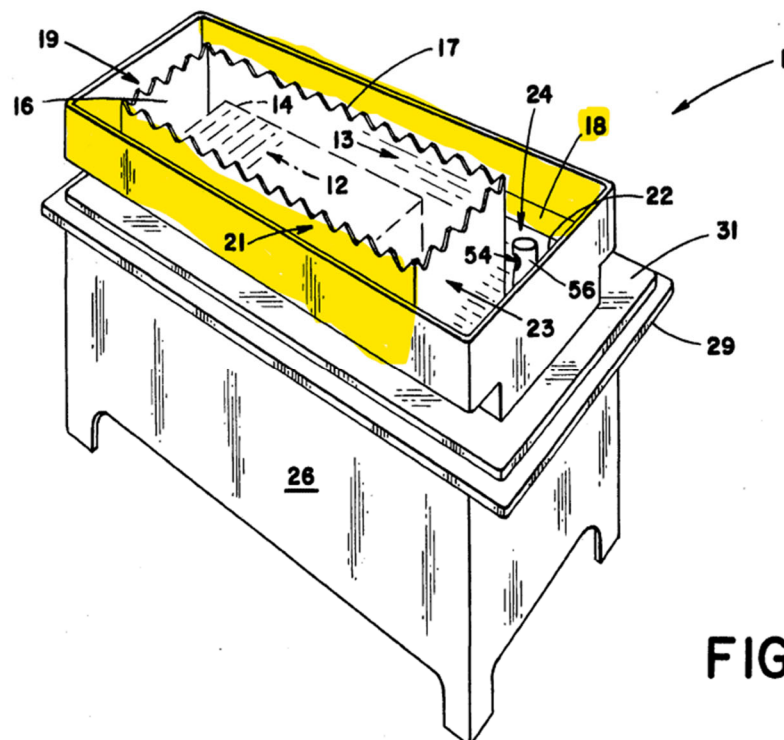


FIG_1

- Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and corresponding description (e.g., “overflow discharge part 2”)
- Rolfsen: FIG. 1 and corresponding description (e.g., overflow tank 22)
- Jang: FIGS. 1, 2, 3, 4 and corresponding description (e.g., “overflow chamber 15”)
- Kashkoush: FIGS. 3, 4 and corresponding description (e.g., “re-circulation weir 13,” “basin floor 22,” and “basin wall 23”)
- Chong: FIG. 1 and corresponding description (e.g., “overflow basin 16”)

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	• <i>Meseth: The FIGURE and corresponding description (e.g., “separation chamber 22”)</i> • <i>Osada-296: FIGS. 3, 4, 13(B), 14(B), 16 and corresponding description</i> • <i>Sato: FIG. 1 and corresponding description (e.g., “overflow tank 38”)</i> • <i>Miyamoto: FIG. 1 and corresponding description (e.g., “overflow tank 27”)</i> • <i>Kimura: FIG. 1 and corresponding description (e.g., “outer bath 12”)</i>
[6.4] a primary circulation facility adapted to circulate the dielectric fluid through the tank, comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot; and	<i>See Limitation 1.4.</i> A primary circulation facility as recited was known and rendered obvious by at least Best-2008. For example, FIGS. 1A, 1B, and 2 show various pumps, heat exchangers, and piping arrangements that may be used to recirculate the dielectric fluid through the tanks via a first liquid circuit. According to Patent Owner, a plenum is “a structure for dispensing liquid.” FIG.6 of Best-2008 also discloses such a plenum, in the form of an inlet pipe that distributes the cooled dielectric fluid through a plenum adjacent the bottom of the tank:

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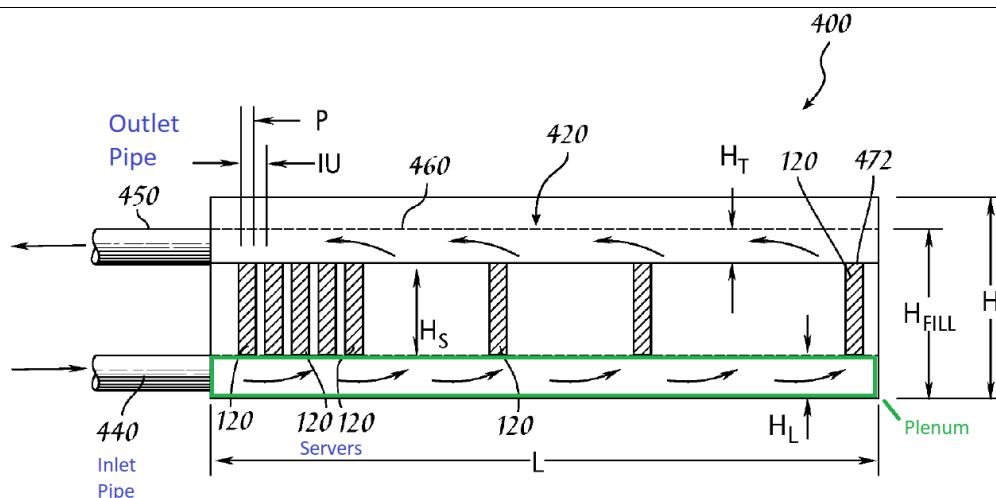


Fig. 6

- [0067]: “The liquid coolant heated by the servers 120 in the server rack is then fluidly coupled through suitable piping or lines to a pump 130, which pumps the heated liquid coolant through suitable piping or lines to a remotely or distally located heat exchanger 140 associated with a heat-rejection or cooling apparatus 150. The distally heat exchanger 140 rejects the heat from the incoming heated liquid coolant and fluidly couples the cooled liquid coolant through a return fluid line or piping 170 back into the tank 110. Thus, at least a portion of the liquid coolant completes a fluid circuit through the servers 120 in the tank 110, pump 130, heat exchanger 140, and back into the tank 110.”
- [0086]: “The mounting members may also be configured to mount the servers in the server rack 470 above the bottom of the tank to create a volume of liquid coolant between each respective server and the bottom of the tank such that the flow of the dielectric liquid coolant through the servers is improved. Preferably, the mounting members are configured to mount the servers closely adjacent to one another in the server rack to restrict the flow of the dielectric

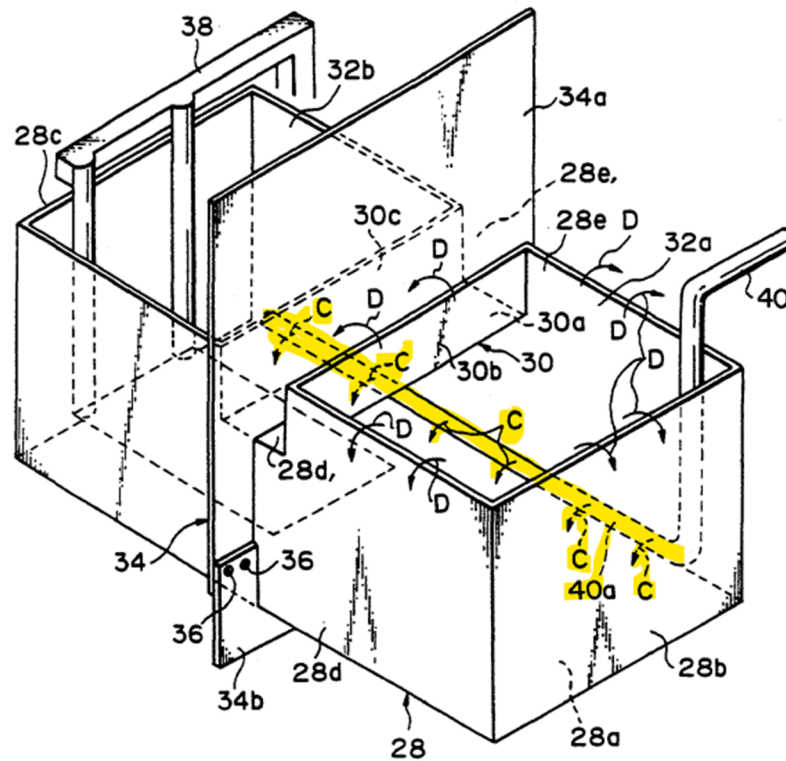
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	<i>liquid coolant between the vertically-oriented servers, such that the flow of the dielectric liquid coolant through the servers is enhanced.”</i> A primary circulation facility was also known and rendered obvious by at least the following prior art references: • <i>Best-2012, including:</i> • <i>FIGS. 2A, 2B and corresponding description</i> • <i>[0070] and FIGS. 7A-7C: “The area A_2 of the velocity augmentation devices along the length of the pressure manifold 710 is much smaller than the area A_1 of the pressure manifold 710. This allows for the pressure lost through the velocity augmentation devices to be much greater than the pressure lost through the pressure manifold 710. Consequently, the pressure across the velocity augmentation devices is approximately equal over the entire length of the tank 600. Likewise, suction across the suction manifold 720 is approximately equal along the entire length of the tank 600. Hence, coolant flow is approximately equal along the length of the entire tank 600.”</i> • <i>Osada, including:</i> • <i>[0041], [0051]</i> • <i>FIGS. 1, 3, 4, 16(A), 16(B) and corresponding description</i> • <i>Kobayashi: FIG. 8, 6:29-35 (e.g., duct section 40a with liquid discharging from a bottom of the tank as indicated by arrows C is shown below in yellow highlights)</i>
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- Suzuki: FIGS. 1, 2, 3, 6, 7, 8, 9, 10, 11, 15, 16, 17 and corresponding description (e.g., “spouting nozzles 4,” “spouting nozzles 23” and “spouting nozzles 43”)
- Osada-296: FIGS. 3, 16 and corresponding description
- Miyamoto: FIG. 1 and corresponding description (e.g., “cleaning nozzle part 22”)

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[6.5] a control facility adapted to control the operation of the primary fluid circulation facility as a function of the temperature of the dielectric fluid in the tank.

See Limitation 1.6.

Best-2008 discloses this limitation. As shown in, for instance, FIGS. 1A, 1B and 2 of Best-2008, a control facility may be used to “coordinate the operation of the primary and secondary fluid circulation facilities as a function of the temperature of the dielectric fluid in the tank.” One example is shown in FIG. 1A, below, where a controller (180) coordinates the operation of the pump (130) and cooling apparatus (150):

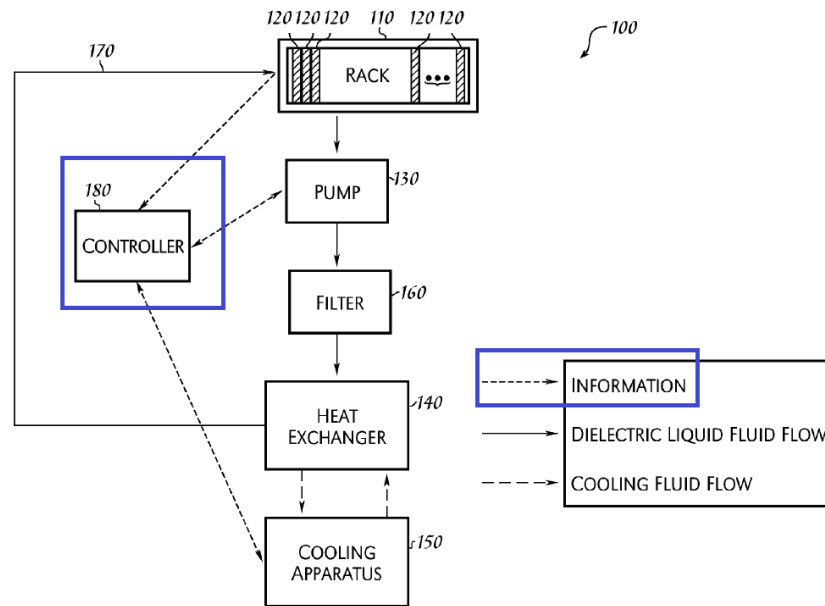


Fig. 1A

See also:

- [0068]: “The system 100 includes a computer controller 180 of conventional design ... The controller 180 may receive monitor signals of various

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operational parameters from various components of the cooling system 100 and the environment and may generate control signals to control various components of the cooling system to maintain the heated liquid coolant exiting the servers in the tank at a specific elevated temperature in order to sufficiently cool each of the servers while reducing the total amount of energy needed to cool the servers....Based upon such information, the controller 180 may output signals to the pump 130 and heat rejection or cooling apparatus 150 to adjust the flow of the liquid coolant through the fluid circuit and the amount of the heat being rejected by the heat rejection or cooling apparatus 150 for sufficiently cooling each respective server while maintaining the heated liquid coolant exiting the servers at the elevated temperature to reduce the amount of energy consumed to sufficiently cool each of the servers in the server rack."

Additional prior art references also disclose this limitation. For example:

- *Osada, including:*
 - *[0064], [0066], [0071], [0072], [0074], [0075], [0080], [0083], [0085], [0087], [0091]-[0105], [0108]-[0110]*
 - *FIGS. 1, 3 and corresponding description*
- *Best-2012, including:*
 - *FIGS. 2A, 2B and corresponding description*
- *Oktay: FIG. 1, 2:64-3:16*
- *Osada-296: e.g., [0083]-[0087], [0092], [0096]-[0101], [0111], [0119], [0120]-[0122]*
- *Sato: FIG. 1 and corresponding description (e.g., "controller 101," [0044])*

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The references cited in this exhibit are identified in the table below. Each reference is prior art under at least 35 U.S.C. §§ 102 and/or 103 for the asserted claims of U.S. Patent No. 10,405,457 (“the ’457 patent”), as discussed in detail in the claim chart below:

Short Name	Publication	Publication Date
CarnotJet-2011	GRC “CarnotJet” Product webpage, February 1, 2011, available at https://web.archive.org/web/20110201123329/http://www.grcooling.com/?page_id=6	February 1, 2011
Miller	Miller, R., “Colocation Company Will Submerge Servers,” August 25, 2010, available at https://www.datacenterknowledge.com/archives/2010/08/25/colocation-company-will-submerge-servers	August 25, 2010
GRC Gallery-2011	GRC “Gallery” webpage, March 23, 2011, available at https://web.archive.org/web/20110323150152/http://www.grcooling.com:80/?page_id=655	March 23, 2011
DataCenter	DataCenterKnowledge webpage, “Submerged Servers Can Now Heat Your Office,” February 6, 2012, available at https://web.archive.org/web/20120206000918/http://www.datacenterknowledge.com/archives/2011/11/14/submerged-servers-can-now-heat-your-office/	February 6, 2012
GRC Design-2012	GRC “Design” webpage, February 21, 2012, available at https://web.archive.org/web/20120221214135/http://www.grcooling.com:80/product/design/	February 21, 2012
CarnotJet-2012	“The CarnotJet™ System: Liquid Submersion Server Cooling,” Presentation given April 25, 2012, at SC11 Conference in Seattle, WA	April 25, 2012
Boyd	Presentation Slides, titled “Data Center Immersion Cooling” by Chris Boyd of Midas Green Technologies, LLC, dated November 2011, slides available at https://www.slideserve.com/gita/data-center-immersion-cooling#google_vignette	November 2011
Calnan	Calnan, C., “Austin startup takes green approach to servers,” April 15, 2011, available at https://web.archive.org/web/20130806083645/http://www.bizjournals.com/austin/blog/abje_news/2011/04/austin-startup-takes-green-approach-to.html?page=all	April 15, 2011
GRC Engineering-2012	GRC “Engineering” webpage, April 1, 2012, available at https://web.archive.org/web/20120401194720/http://www.grcooling.com:80/technology/how-works/	April 1, 2012

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Short Name	Publication	Publication Date
McMillan	McMillan, R., “Servers Too Hot? Intel Recommends a Luxurious Oil Bath,” August 31, 2012, available at https://www.wired.com/2012/08/servers-too-hot-intel-recommends-a-luxurious-oil-bath/	August 31, 2012
Owano	Owano, N., “Intel does math on oil-dunk test for cooler servers,” September 3, 2012, available at https://phys.org/news/2012-09-intel-math-oil-dunk-cooler-servers.html	September 3, 2012
Witkin	Witkin, J., “Cooling a Computer Server With Mineral Oil,” September 6, 2012, available at https://archive.nytimes.com/green.blogs.nytimes.com/2012/09/06/cooling-a-computer-server-with-mineral-oil/	September 6, 2012
GRC-TACC	“A Top-20 Supercomputing Facility Rethinks its Cooling Efficiency with Fluid-Submersion Cooling,” November 14, 2012, available at https://web.archive.org/web/20121114152326/http://www.grcooling.com/docs/Green-Revolution-Cooling-and-Texas-Advanced-Computing-Center-Research-Poster.pdf	November 14, 2012
YouTube-CableMgmt	“Cable Management Features of GRC’s Rack-Based Immersion-Cooling Systems,” video posted April 13, 2011, available at https://www.youtube.com/watch?v=V-x4pER5YuU	April 13, 2011
YouTube - ICeraQ	“See Our ICeraQ™ Micro-Modular, Rack-Based Immersion-Cooling System in Action,” video posed April 17, 2012, available at https://www.youtube.com/watch?v=6IX9U2zaI_I	April 17, 2012

The asserted claims and alleged priority date of the ’457 patent are identified below:

’457 Patent Asserted Claims	Alleged Priority Date
1-3, 6	“December 14, 2012” (Preliminary Infringement Contentions, ¶4)

The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified herein may be responsive at least in part to Plaintiff’s infringement contentions, with which Defendant disagrees. As such, nothing in Defendant’s claim charts should be construed as an admission regarding infringement, either literally or under the doctrine of equivalents, or as an admission regarding Defendant’s understanding of the proper scope of the asserted claims. Defendant reserves the right to rely on additional citations or sources of evidence that also may be applicable, or that may become applicable in light of claim construction, changes in Plaintiff’s infringement contentions, and/or information obtained during discovery as the case progresses.

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The chart below provides non-exhaustive citations to the prior art references identified above with respect to each limitation of each asserted claim. As illustrated below, nearly every limitation of each asserted claim was disclosed and known to a POSITA based on at least GRC's CarnotJet™ and/or ICeraQ™ systems, which were systems that were in public use prior to the alleged priority date. The references cited herein provide prior art evidence of the existence and features of these systems. Thus, the claims were disclosed or obvious in view of the CarnotJet™ and/or ICeraQ™ systems on their own, as well as in view of the additional prior art charted herein.

To the extent Plaintiff argues that any limitation in the chart below is not disclosed, expressly or inherently, by the CarnotJet™ and/or ICeraQ™ systems combined with the knowledge of a POSITA, the limitation is disclosed and rendered obvious by each of the other references cited for that limitation, whether considered individually or in combination. For at least the reasons described in these contentions, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of the references cited in the chart below, along with the knowledge of one of ordinary skill in the art to meet the limitations of the '457 Patent Asserted Claims. As a result, the references identified herein render one or more Asserted Claims of the '457 Patent obvious when the references are read in combination with each other, and/or when read in view of the state of the art and knowledge of those skilled in the art. Each and every reference identified is also relevant to the state of the art at the time of the alleged invention. Any of the references disclosed above may be combined with one another to render obvious (and therefore invalid) each of Plaintiff's Asserted Claims. Defendant may rely upon a subset of the identified references or all of the references identified herein, including all references in the chart below, for purposes of obviousness depending on the Court's claim construction, positions taken by Plaintiff during this litigation, and further investigation and discovery. Moreover, as mentioned above, Defendant has not yet completed their search or discovery concerning additional prior art. As such, Defendant's inclusion of exemplary combinations does not preclude them from identifying other invalidating combinations as appropriate, and Defendant reserves the right to identify additional specific combinations as well as to detail and explain such combinations.

To the extent not anticipated, the '457 Patent Asserted Claims represent no more than the result of ordinary variations of the prior art. Defendant further believes that no showing of a specific motivation to combine prior art is required to combine the references disclosed above and in the chart below, as each combination of art would have no unexpected results, and at most would simply represent a known alternative to one of ordinary skill in the art. *See KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 415–16 (2007) (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, instead espousing an "expansive and flexible" approach); *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1058 (Fed. Cir. 2016); *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1344 (Fed. Cir. 2017). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *Id.* at 420–21. Nevertheless, in addition to the information contained elsewhere in these contentions, Defendant identifies motivation and reason to combine the cited art.

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Predictable Results; Obvious to Try: One or more combinations of the prior art references identified in the chart below would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. Further, the combinations of the prior art references identified in chart below would have been obvious because the combinations represent known potential options with a reasonable expectation of success.

Interrelated Teachings: Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; common authorship; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the '457 Patent Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the alleged invention(s); and the background knowledge that would have been possessed by a person having ordinary skill in the art.

Summary of Motivations to Combine: Thus, the motivation to combine the teachings of the prior art references cited in the chart below is found in the references themselves and also in: (1) the nature of the problem being solved; (2) the express, implied and inherent teachings of the prior art; (3) the knowledge of persons of ordinary skill in the art; (4) the predictable results obtained in combining the different elements of the prior art; (5) the predictable results obtained in simple substitution of one known element for another; (6) the use of a known technique to improve similar devices, methods, or products in the same way; (7) the predictable results obtained in applying a known technique to a known device, method, or product ready for improvement; (8) the finite number of identified predictable solutions that had a reasonable expectation of success; and (9) known work in various technological fields that could be applied to the same or different technological fields based on design incentives or other market forces.

Same Area of Technology: Additionally, it would be obvious to one of ordinary skill in the art to consult and/or combine any of the prior art listed in the chart below because all of these references relate to the same area of technology and/or are from analogous art. The '457 Patent Asserted Claims are directed to “electrical appliance cooling systems, and, in particular, to an improved appliance immersion cooling system and method of operation.” '457 Patent at 1:21-24. The '457 Patent Asserted Claims merely unite old elements, well known in the field, with no change in their respective function or result. Given the interrelated teachings of the prior art, the effects of demands known to the design community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art, it would have been obvious for one of ordinary skill in the art to combine these familiar elements, disclosed and/or embodied in the prior art listed above to practice the '457 Patent Asserted Claims.

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Same Technical Issues: A person of ordinary skill would have been motivated to combine the above prior art based on her knowledge, the nature of the problem to be solved, and the teachings of the prior art. The identified prior art addresses the same or similar technical issues and suggests the same or similar solutions to those issues. Moreover, some of the prior art refer to or discuss other prior art, illustrating the close technical relationship among the prior art. For the '457 Patent, one of ordinary skill in the art would have been motivated to combine known prior art solutions described in these references relating to immersion cooling, fluid flow and recovery in processing tanks, etc.

Demand and Market Forces: For example, market forces demanded improvements in immersion cooling including fluid handling therein, and thus one of skill in the art would have thought to combine or modify references that described known methods that one of skill in the art would have recognized as offering improvements to immersion cooling systems.

Known Elements; Obvious to Try: Moreover, many of the claim elements were already known as admitted by the applicants in the patent specification. These elements represented design choices available to a person of ordinary skill. When there is a design need or market pressure to solve a problem such as identified previously and/or described in the '457 Patent, and there are a finite number of identified, predictable solutions, a person of ordinary skill would be motivated to combine the known options that are within his or her technical grasp. For the '457 Patent, there are a finite number of approaches for immersion cooling systems. For example, as of the priority date of the '457 Patent, a POSITA would have been very familiar with basic elements of the '457 Patent's claims—indeed, the cooling systems of CarnotJet™ and/or ICeraQ™ disclose each element of the asserted claims with at most minor variations that were known and obvious when the '457 Patent was filed. Such elements were within the knowledge of a POSITA, whether or not disclosed in any particular reference, and the inclusion of such elements in the '457 Patent's claims does not render them novel or non-obvious.

As the '457 Patent acknowledges, immersion cooling systems: utilized “an electrically non-conductive or dielectric fluid to extract heat from electronic circuit assemblies” (1:40-53); could be used for cooling appliances oriented horizontally (e.g., in a vertical stack) (1:62-65) or vertically (2:2-10); and included “support apparatus[es] for extracting waste heat from the tank cooling fluid and dissipating to the environment the heat so extracted” (2:23-29).

There are significant similarities in subject matter and objectives for each of the many references used in these contentions for the '457 Patent. Moreover, to the extent that any of these references includes a feature not expressly disclosed in one or more other references, a POSITA would have naturally looked to, and been motivated to combine, any one of these references with one or more of the other references in order to better achieve their common goals of facilitating immersion cooling and associated fluid handling.

In addition to the specific examples provided above, Defendant reserves the right to rely on the disclosures of the references listed in the chart below for additional motivation to combine. These examples of combinations are given merely to illustrate various

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motivations to combine and are not intended to provide an exhaustive list of every possible combination to which the motivation may apply. Defendant reserves the right to contend that the motivations to combine provided herein apply to other combinations at the appropriate time, *e.g.*, in expert reports regarding invalidity. To the extent one or more of identified combinations is posed as a combination of only two references, it does not indicate that the two references that are being combined for one purpose could not be joined by a third reference (or more additional references) whose combination serves the same or a different purpose. Indeed, many of the features recited in the asserted claims are componentized features/functions whereby the feature could be implemented using teachings from another source while not interfering with additional features. For that reason, a POSITA may have reasonably looked to and been motivated to combine three or more references in order to achieve a specific outcome.

For at least the reasons described above, it would have been obvious to one of ordinary skill in the art to combine each prior art reference listed in the chart below with any other reference or references listed in the chart below along with the knowledge of one of ordinary skill in the art to arrive at the inventions claims in the '457 Patent.

Where Defendant cites a particular figure, such citation should be understood to encompass the caption and description of the figure and any text relating to the figure, in addition to the figure itself. Conversely, where a cited portion of text refers to a figure, the citation should be understood to include the figure as well.

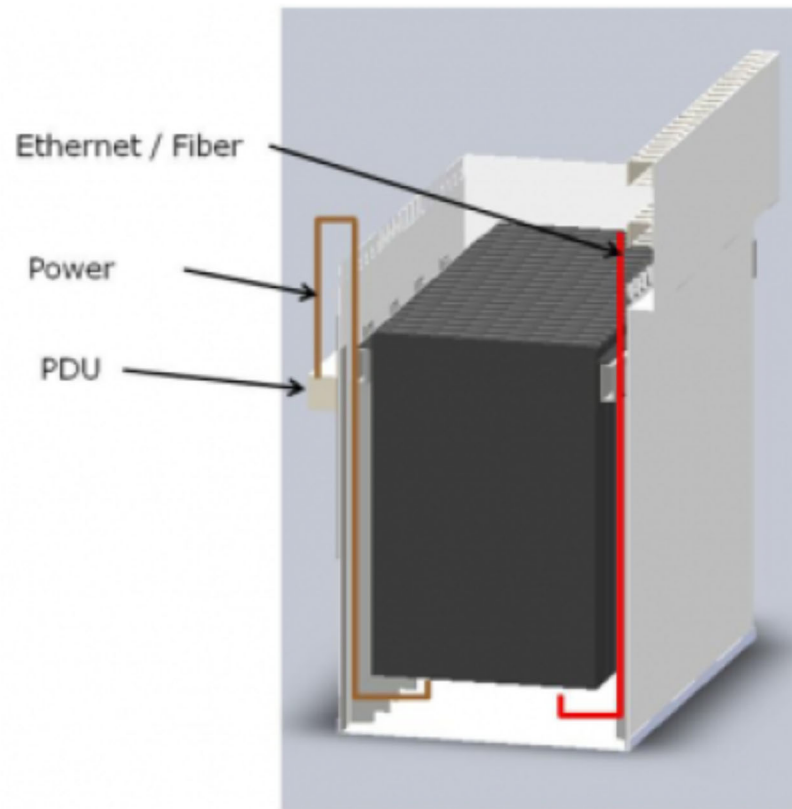
Defendant reserves the right to amend or supplement this claim chart at a later date as more fully set forth in the Cover Pleading, based on, for example and without limitation, subsequent discovery, any amendments to the pleadings, or rulings from the Court.

'457 Patent	Prior-Art References
[1.0] An appliance immersion cooling system comprising:	To the extent the preamble is limiting, the CarnotJet™ system from Green Revolution Cooling (“GRC”) is a prior art system that is an appliance immersion cooling system as recited in the preamble. For example, as evidenced by CarnotJet-2011: • <i>P. 2: “The pumping module contains pumps, filters, and either a coolant-to-water heat exchanger or an optional coolant-to-air radiator. Pumping modules can be located in the data center periphery, or under an existing raised floor, if floor space is at a premium.”</i>

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- *P. 2: "By eliminating the need for a hot aisle and putting racks back to back and side to side, rack density can either stay the same or increase, even though racks are situated horizontally instead of vertically."*
- *The Figure on p. 3:*



[Click to enlarge](#)

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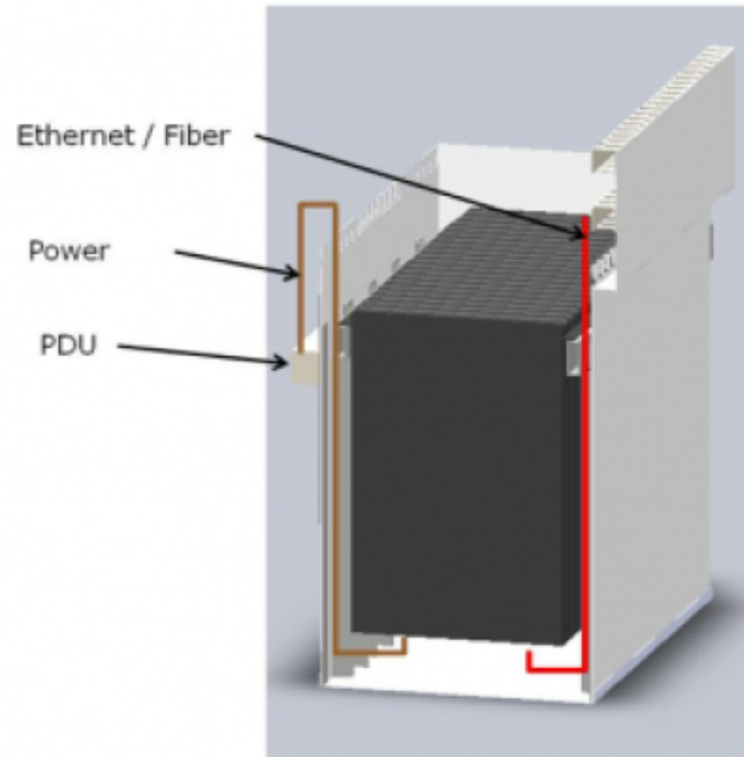
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	• <i>P. 4: “Our coolant at 40° C will keep the hard drives below 45° C and the CPUs below 62° C, a full 13° cooler than normal.”</i> Additional references also demonstrate that CarnotJet™ met this preamble. For example: • <i>Miller, p. 2: “Midas Networks has purchased four of Green Revolutions 42U CarnotJet racks, which submerge servers in a dielectric fluid. The CarnotJet system resembles a rack tipped over on its back, with servers inserted vertically into slots in the enclosure, which is filled with a coolant similar to mineral oil.”</i> • <i>GRC Gallery-2011 (showing photographs of CarnotJet™).</i> • <i>DataCenter, p.1.</i> • <i>GRC Design-2012.</i> • <i>CarnotJet-2012:</i> ○ <i>P. 1 (“Liquid Submersion Server Cooling,” photo showing appliance immersion cooling system)</i> ○ <i>P. 2 (“Liquid Submersion Cooling”)</i> ○ <i>P. 5 (illustrating the CarnotJet™ system with tank)</i>
[1.1] a tank adapted to immerse in a dielectric fluid a plurality of electrical appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, a long wall of the tank, the tank comprising:	<i>See 1.0.</i> The CarnotJet™ included a tank adapted as recited in this limitation. For example, as evidence by CarnotJet-2011: • <i>P. 2: “By eliminating the need for a hot aisle and putting racks back to back and side to side, rack density can either stay the same or increase, even though racks are situated horizontally instead of vertically.”</i>

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- *P. 3: "As shown on the home page, a 24 rack install will take 24-36 square feet per rack."*
- *The Figure on p. 3:*



[Click to enlarge](#)

See also:

- *Miller, p. 2.*

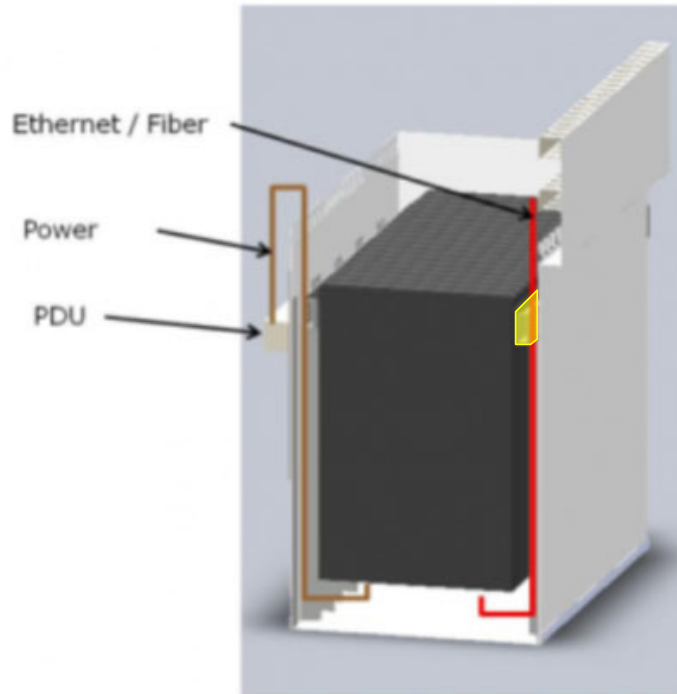
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	• <i>GRC Gallery-2011 (showing photos of CarnotJet™ with a tank as recited).</i> • <i>DataCenter, p. 1 (“Green Revolution’s CarnotJet Submersion Cooling System resembles a rack tipped over on its back, filled with 250 gallons of dielectric fluid, with servers inserted vertically into slots in the enclosure.”)</i> • <i>GRC Design-2012, p. 3 (The Pump Module “also controls fluid mixing within the tank to promote a stable and uniform cooling environment for the servers....”).</i> • <i>CarnotJet-2012:</i> ○ <i>Pp. 5, 9, 10, 11 (illustrating and showing photos of the CarnotJet™ system with tank).</i>
[1.2] a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, having an overflow lip adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot; and	<i>See I.I.</i> In a prior litigation and IPR, Patent Owner previously construed “weir” as “an overflow structure or barrier that determines the level of a liquid.” The Examiner contended a “weir” is nothing more than a hole in the side of a tank as per the ’457 patent, which the Patent Owner did not refute. The CarnotJet™ included a weir as recited in this limitation, along a top of the portion highlighted in yellow below in the Figure from p. 3 of CarnoJet-2011:

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This feature is also shown in the CarnotJet™ system in the following references, for example:

- *YouTube-CableMgmt at 0:14, weir highlighted in red below:*

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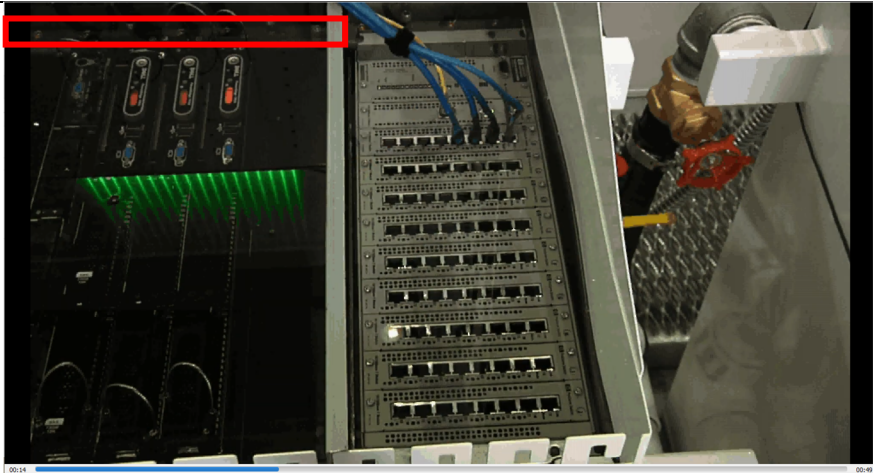
	
[1.3] a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir; and	<i>See Limitations 1.1, 1.2.</i> The CarnotJet™ included a dielectric fluid recovery reservoir as recited in this limitation, as highlighted in yellow below in the Figure from p. 3 of CarnoJet-2011, beneath the weir:

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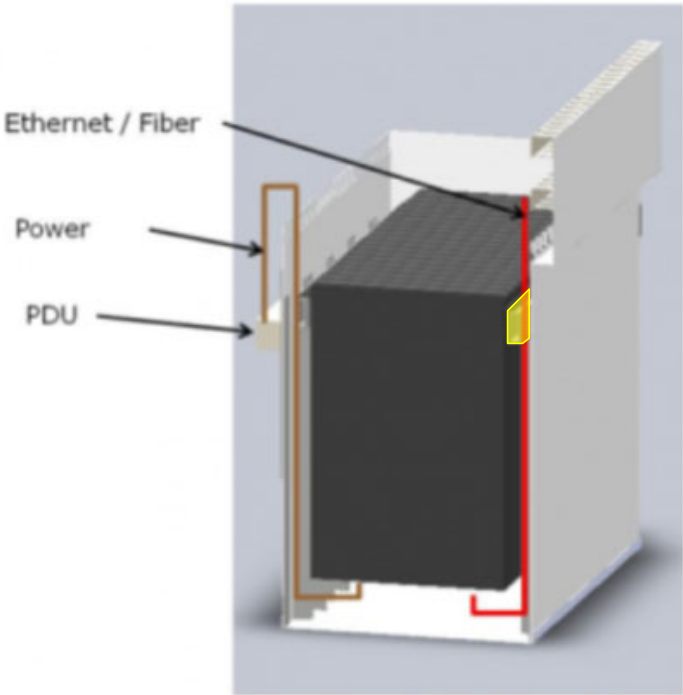
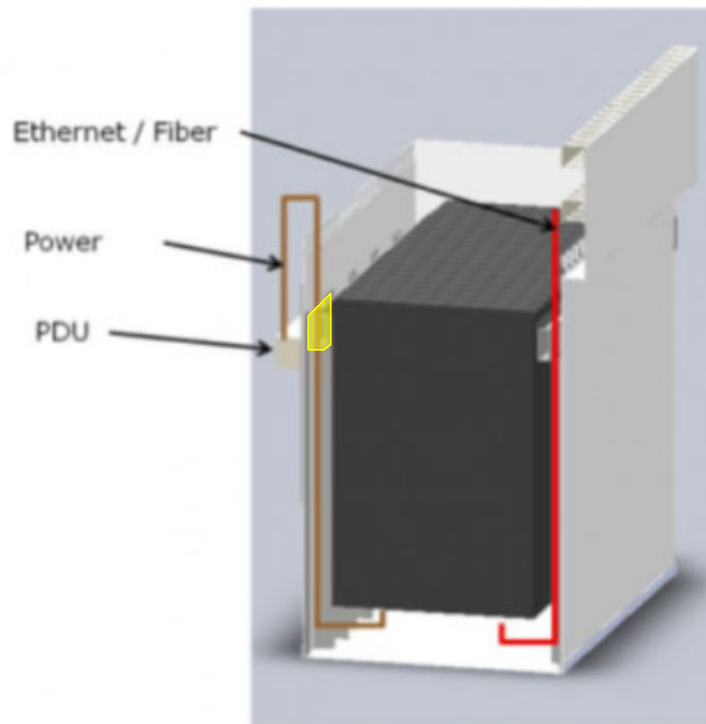
	 Click to enlarge
[1.4] a primary circulation facility adapted to circulate the dielectric fluid through the tank, comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot;	<i>See Limitations 1.1, 1.2, 1.3.</i> A primary circulation facility as recited was known or rendered obvious by the CarnotJet™ system. According to Patent Owner, a plenum is “a structure for dispensing liquid.” The CarnotJet™ included a plenum for dispensing liquid through

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downward holes along the plenum's body, in the location shown in yellow highlights below:

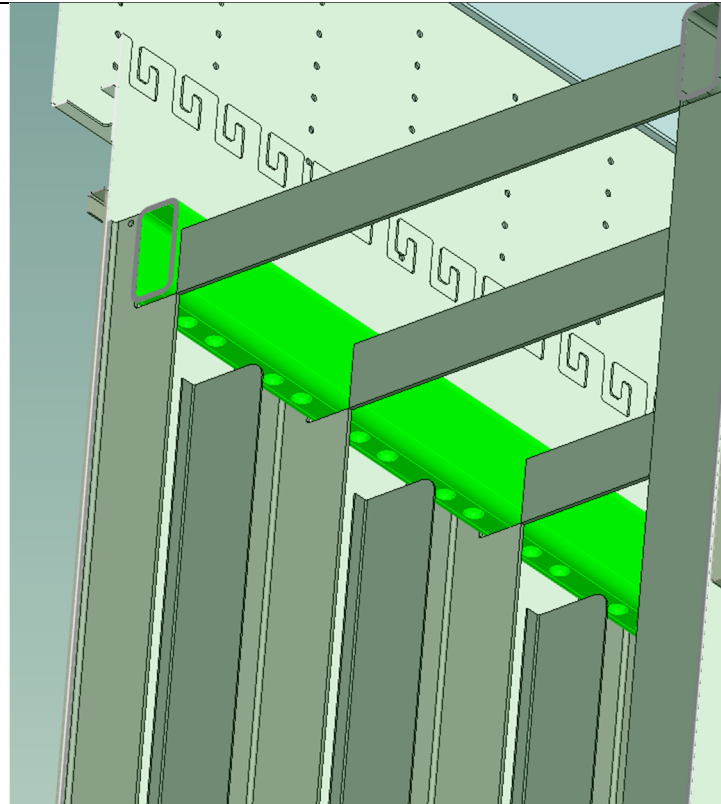


[Click to enlarge](#)

This plenum is also shown in green in the illustration below, with outlet holes along a bottom of the plenum.

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While this plenum of the CarnotJet™ is not positioned adjacent the bottom of the tank, the fluidic effect is the same—as fluid flows out of the holes in the bottom of the plenum, it flows downward along a side of the servers to the bottom of the tank and then upward through the servers from a bottom of the tank.

Additionally or alternatively, it would have been obvious to move the plenum from the upper location shown above to a location adjacent the bottom of the tank to achieve the same flow upward through the servers.

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[1.5] a secondary fluid circulation facility adapted to extract heat from the dielectric fluid circulating in the primary circulation facility, and to dissipate to the environment the heat so extracted; and	<i>See Limitation 1.4</i> The CarnotJet™ system included features that meet this limitation. For example, as CarnotJet-2011 describes at p. 2: “The pumping module contains pumps, filters, and either a coolant-to-water heat exchanger or an optional coolant-to-air radiator.” CarnotJet-2011 at p. 3 also discloses: “The product [CarnotJet™] also includes: . . . Computer controlled primary cooling loop, with sensor monitoring, logging, real-time diagnostics and email and SNMP alerts.” Additional references also provide evidence that the CarnotJet™ included this limitation. For example: • <i>DataCenter at p. 2 (“Fluid temperature is maintained by a pump with a heat exchanger using a standard water loop. The water loop is usually run to an evaporative cooling tower to reject the heat to atmosphere, but it is also possible to reuse the heat from the water, as shown in the tests in Stockholm.”)</i> • <i>GRC Design-2012:</i> ○ <i>P. 3 (“At its most basic level, the Pump Module draws heated coolant from the Rack, filters it, expels the excess heat through the specified heat-exchange method, and returns the coolant to the Rack.”).</i> ○ <i>P. 4 (“Multiple options exist to reject heat to the outside air. We can use an evaporative cooling tower, the waste/return line of the chiller (reducing compressor lift and improving efficiency), or, depending on the climate and the size of the installation, we can use a coolant-to-air radiator.”).</i> • <i>CarnotJet-2012, p. 5 (“Heat expelled outside”).</i>
[1.6] a control facility adapted to coordinate the operation of the primary and secondary	<i>See Limitation 1.4, 1.5.</i>

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fluid circulation facilities as a function of the temperature of the dielectric fluid in the tank.	The CarnotJet™ system included a control facility that meet this limitation. For example, CarnotJet-2011 at p. 3 discloses: “The product [CarnotJet™] also includes: . . . Computer controlled primary cooling loop, with sensor monitoring, logging, real-time diagnostics and email and SNMP alerts.” Additional references also provide evidence that the CarnotJet™ included a control facility as claimed. For example: • <i>GRC Design-2012:</i> ○ <i>P. 1 (“The CarnotJet™ includes three main components: Rack, Pump Module, and Control Module.”)</i> ○ <i>Pp. 3-4 (“The Control Module manages coolant flow and heat-exchanger fan speed (or pump speed) using a closed-loop temperature control algorithm to ensure that the process is always operating as efficiently as possible for a given heat load. Advanced features such as temperature analysis, pressure and coolant level verification, power consumption, smart monitoring and diagnostics, and intelligent optimization allow for lights-out management. Control Module outputs include log files of the above parameters, e-mail and SMNP diagnostic alerts, and hourly status condition updates.”).</i>
[Claim 2] The system of claim 1 wherein the tank and primary circulation facility comprise a highly-integrated module.	<i>See Limitations 1.1, 1.4.</i> To the extent this limitation can be understood, the CarnotJet™ system’s tank and primary circulation facility comprised “a highly-integrated module” as recited. For example, CarnotJet-2011 at p. 2 explains: “The pumping module contains pumps, filters, and either a coolant-to-water heat exchanger or an optional coolant-to-air radiator. Pumping modules can be located in the data center periphery, or under an existing raised floor, if floor space is at a premium.” And at p. 3, CarnotJet-2011 describes: “The product includes: . . . Rack and Pumping Module with redundant

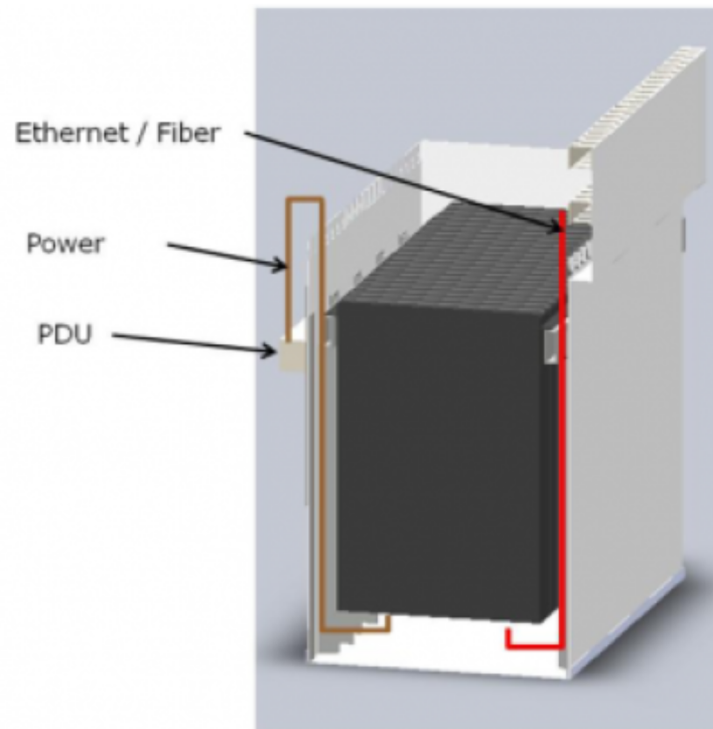
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	pumps[;] Integrated server racks[; and] Computer controlled primary cooling loop, with sensor monitoring, logging, real-time diagnostics and email and SNMP alerts.” Additional references also provide evidence that CarnotJet™ included a tank and primary circulation facility that was a “highly-integrated module.” For example: • <i>GRC Design-2012 at p. 2 (“Pump Modules can be located in the data center periphery or under an existing raised floor (if floor space is at a premium).”).</i> • <i>CarnotJet-2012 at pp. 1, 9, 10, 11 (showing CarnotJet™ system and integrated features).</i>
[Claim 3] The system of claim 1 wherein the tank further comprises: an interconnect panel facility adapted to mount appliance support equipment.	<i>See Limitation 1.1.</i> The CarnotJet™ system included an interconnect panel facility that meets this limitation. For example, CarnotJet-2011 at p. 2 details Cable Management in the CarnotJet™ as follows: “Power and Ethernet cables are organized in a thoughtful fashion as shown to the right. Wiring connected to back plane before server dropped in[;] Integrated guides align and segregate wires as server is lowered[;] Some new blades have Ethernet, PCT and Infiniband connections on front plane[; and] Coolant actually enhances electrical connections.” CarnotJet-2011 illustrates some of these features:

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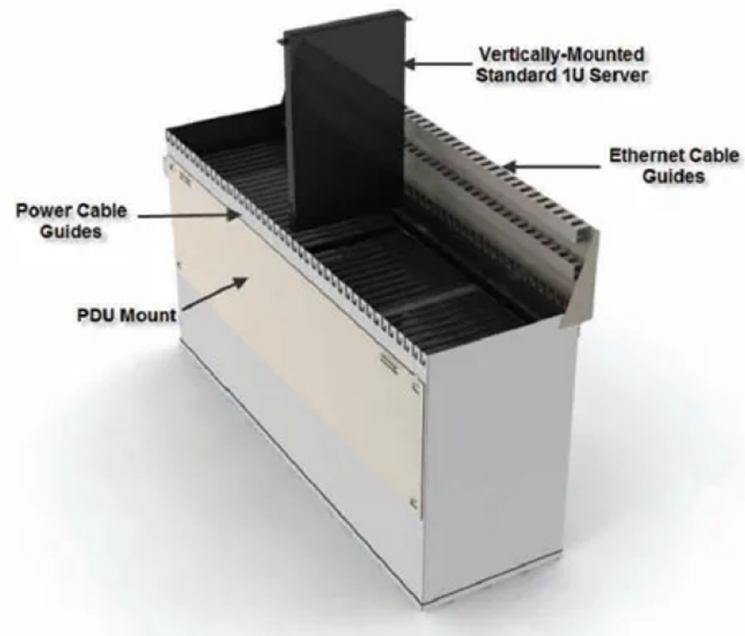
[Click to enlarge](#)

Additional references also show that CarnotJet™ included features that meet this limitation. For example:

- *Miller, p. 2, includes an illustration showing that CarnotJet™ included a “PDU Mount” for a Power Distribution Unit, Power Cable Guides, and Ethernet Cable Guides:*

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greenrevolutioncabinet

- *GRC Design-2012, p. 2 (“Our Racks also feature integrated server rack rails to allow for easy installation and removal of servers.”).*
- *CarnotJet-2012, p. 5 (showing CarnotJet™ 42U Rack with PDU Mount, power cable guides, and ethernet cable guides):*

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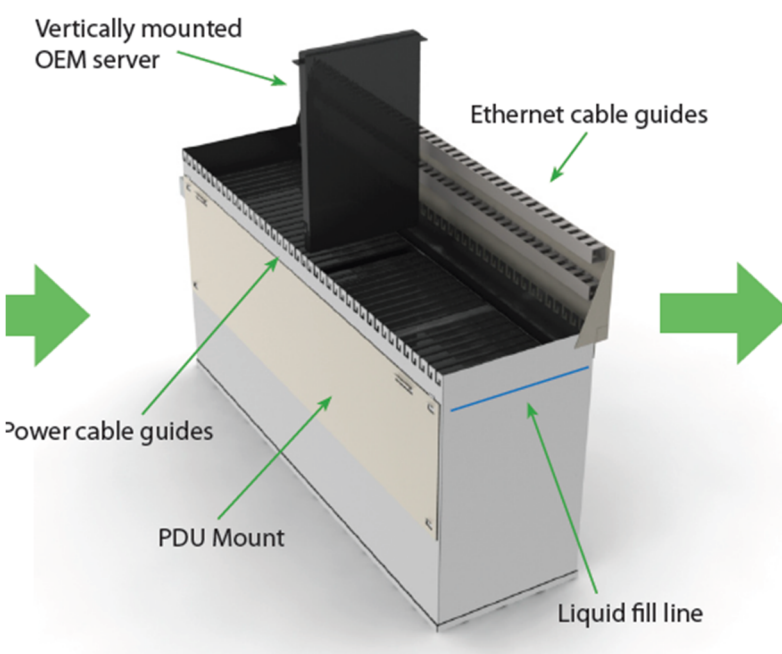
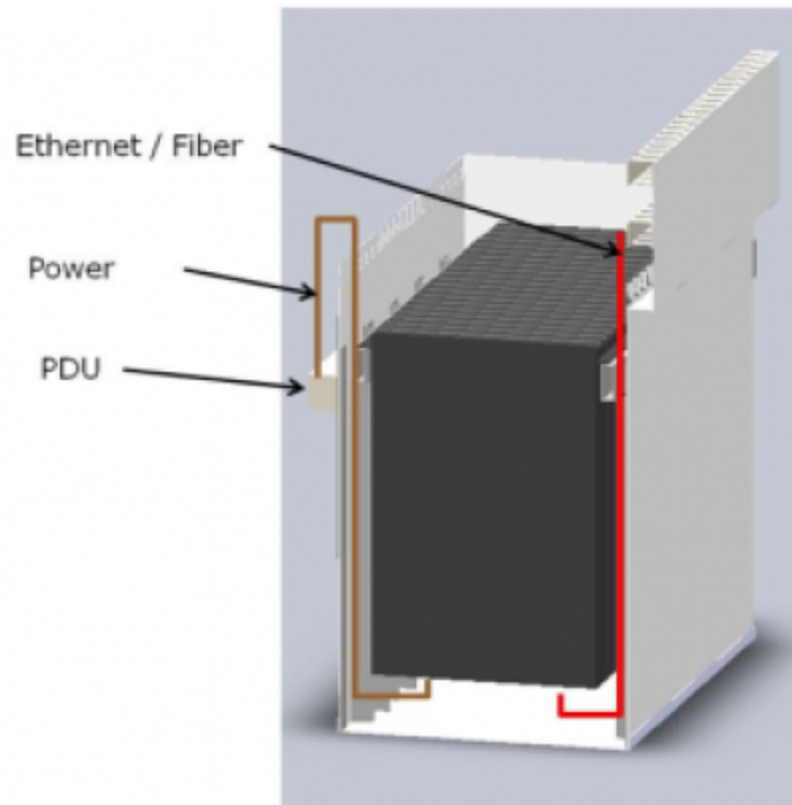
	CarnotJet™ 42U Rack 
[6.0] A tank module adapted for use in an appliance immersion cooling system, the tank module, comprising:	<i>See Limitations 1.0 and 1.1.</i> To the extent the preamble is limiting, the CarnotJet™ system from GRC is a prior art system that includes a tank module adapted for use in an appliance immersion cooling system as recited in the preamble. For example, as evidenced by CarnotJet-2011: • <i>P. 2: “The pumping module contains pumps, filters, and either a coolant-to-water heat exchanger or an optional coolant-to-air radiator. Pumping</i>

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modules can be located in the data center periphery, or under an existing raised floor, if floor space is at a premium.”

- *P. 2: “By eliminating the need for a hot aisle and putting racks back to back and side to side, rack density can either stay the same or increase, even though racks are situated horizontally instead of vertically.”*
- *The Figure on p. 3:*



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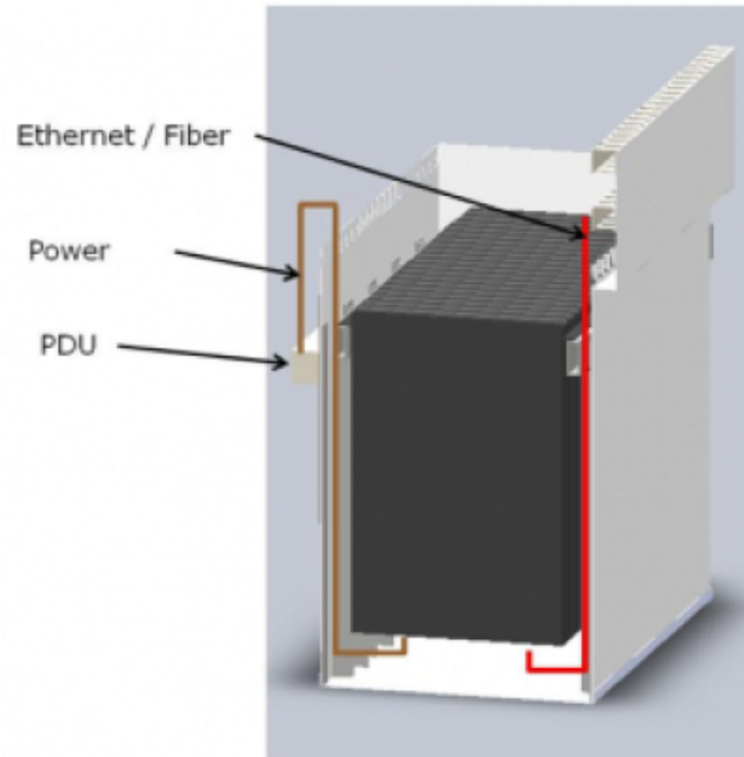
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	• <i>P. 4: “Our coolant at 40° C will keep the hard drives below 45° C and the CPUs below 62° C, a full 13° cooler than normal.”</i> Additional references also demonstrate that CarnotJet™ met this preamble. For example: • <i>Miller, p. 2: “Midas Networks has purchased four of Green Revolutions 42U CarnotJet racks, which submerge servers in a dielectric fluid. The CarnotJet system resembles a rack tipped over on its back, with servers inserted vertically into slots in the enclosure, which is filled with a coolant similar to mineral oil.”</i> • <i>GRC Gallery-2011 (showing photographs of CarnotJet™ including its tank).</i> • <i>DataCenter, p.1.</i> • <i>GRC Design-2012.</i> • <i>CarnotJet-2012:</i> ○ <i>P. 1 (“Liquid Submersion Server Cooling,” photo showing appliance immersion cooling system with tank)</i> ○ <i>P. 2 (“Liquid Submersion Cooling”)</i> ○ <i>P. 5 (illustrating the CarnotJet™ system with tank)</i>
[6.1] a tank adapted to immerse in a dielectric fluid a plurality of electrical appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, a long wall of the tank, the tank comprising:	<i>See Limitation 1.1.</i> The CarnotJet™ included a tank adapted as recited in this limitation. For example, as evidence by CarnotJet-2011: • <i>P. 2: “By eliminating the need for a hot aisle and putting racks back to back and side to side, rack density can either stay the same or increase, even though racks are situated horizontally instead of vertically.”</i>

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- *P. 3: "As shown on the home page, a 24 rack install will take 24-36 square feet per rack."*
- *The Figure on p. 3:*



[Click to enlarge](#)

See also:

- *Miller, p. 2.*

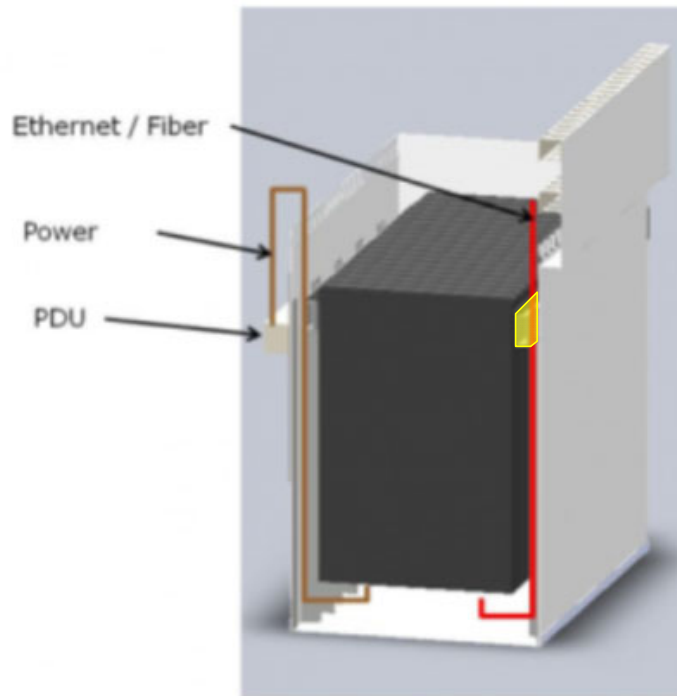
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[6.2] a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, having an overflow lip adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot; and;	<i>See Limitation 1.2.</i> In a prior litigation and IPR, Patent Owner previously construed “weir” as “an overflow structure or barrier that determines the level of a liquid.” The Examiner contended a “weir” is nothing more than a hole in the side of a tank as per the ’457 patent, which the Patent Owner did not refute. The CarnotJet™ included a weir as recited in this limitation, along a top of the portion highlighted in yellow below in the Figure from p. 3 of CarnoJet-2011:

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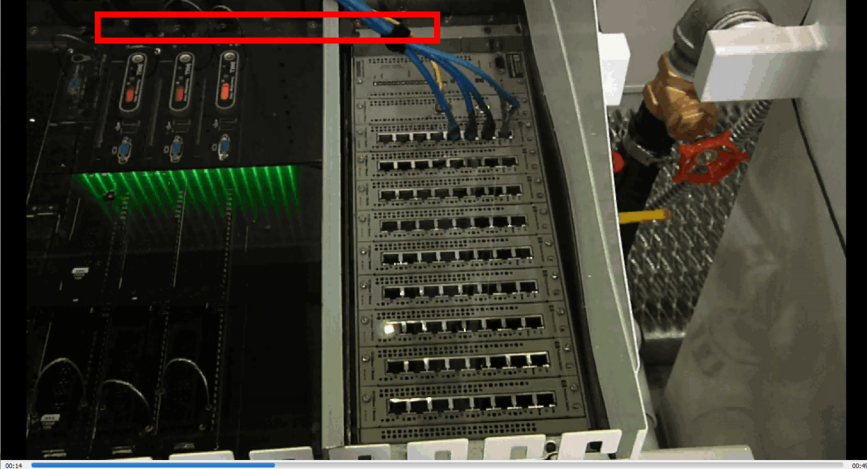
	
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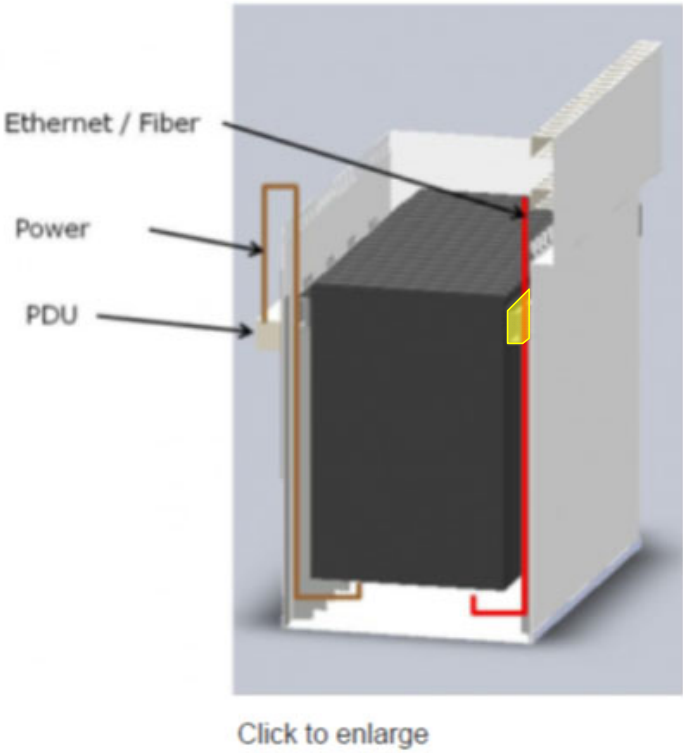
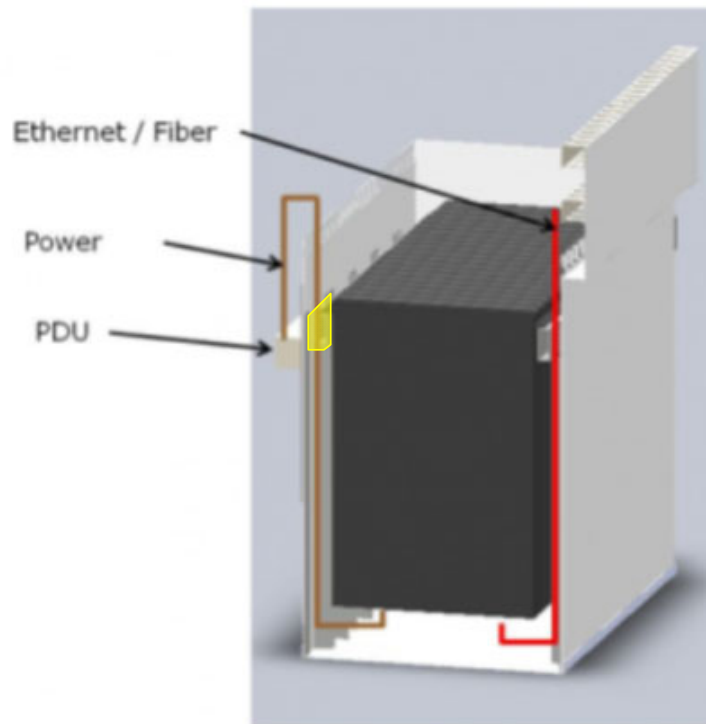
	 Click to enlarge
[6.4] a primary circulation facility adapted to circulate the dielectric fluid through the tank, comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the	<i>See Limitation 1.4.</i> A primary circulation facility as recited was known or rendered obvious by the CarnotJet™ system. According to Patent Owner, a plenum is “a structure for dispensing liquid.” The CarnotJet™ included a plenum for dispensing liquid through

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downward holes along the plenum's body, in the location shown in yellow highlights below:

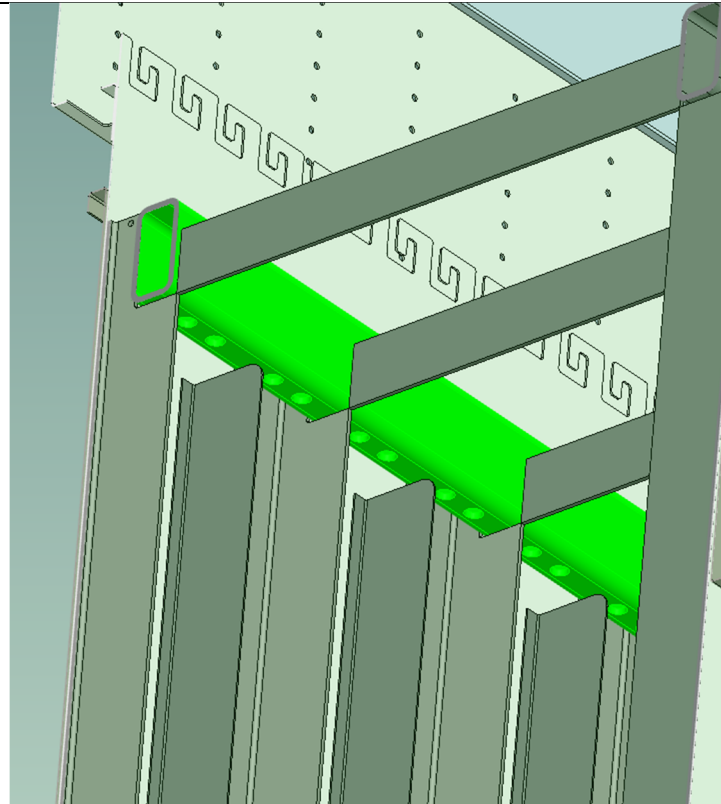


[Click to enlarge](#)

This plenum is also shown in green in the illustration below, with outlet holes along a bottom of the plenum.

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While this plenum of the CarnotJet™ is not positioned adjacent the bottom of the tank, the fluidic effect is the same—as fluid flows out of the holes in the bottom of the plenum, it flows downward along a side of the servers to the bottom of the tank and then upward through the servers from a bottom of the tank.

Additionally or alternatively, it would have been obvious to move the plenum from the upper location shown above to a location adjacent the bottom of the tank to achieve the same flow upward through the servers.

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[6.5] a control facility adapted to control the operation of the primary fluid circulation facility as a function of the temperature of the dielectric fluid in the tank.	<i>See Limitation 1.6.</i> The CarnotJet™ system included a control facility that meet this limitation. For example, CarnotJet-2011 at p. 3 discloses: “The product [CarnotJet™] also includes: . . . Computer controlled primary cooling loop, with sensor monitoring, logging, real-time diagnostics and email and SNMP alerts.” Additional references also provide evidence that the CarnotJet™ included a control facility as claimed. For example: • <i>GRC Design-2012:</i> ○ <i>P. 1 (“The CarnotJet™ includes three main components: Rack, Pump Module, and Control Module.”).</i> ○ <i>Pp. 3-4 (“The Control Module manages coolant flow and heat-exchanger fan speed (or pump speed) using a closed-loop temperature control algorithm to ensure that the process is always operating as efficiently as possible for a given heat load. Advanced features such as temperature analysis, pressure and coolant level verification, power consumption, smart monitoring and diagnostics, and intelligent optimization allow for lights-out management. Control Module outputs include log files of the above parameters, e-mail and SMNP diagnostic alerts, and hourly status condition updates.”).</i>
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