WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box No. V

Regarding claim 4, Best discloses the system of claim 1, and Best further discloses wherein the primary circulation facility further comprises:
at least first and second primary circulation sub-facilities (880 on the left and right in Fig. 11), each adapted to operate independently to circulate the dielectric fluid through the tank (Para. [0107], regarding "multiple fans 880 may be mounted under each of the server racks 830 and 832 in the volume of liquid coolant between the plurality of servers in each respective rack and the bottom of the tank to increase the mixing of the dielectric liquid coolant within the tank");
wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities so to maintain the temperature of the dielectric fluid in the tank substantially (Para. [0082], regarding "The controller 380 may also monitor the flow of the liquid coolant through the tank and/or fluid circuit. Based upon such information, the computer controller may output signals to the pump 330 and heat rejection or cooling apparatus 350 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 350 for sufficiently cooling each respective server when the tank 310 is sufficiently full of the liquid coolant") between a predetermined minimum temperature and a predetermined maximum temperature (Para. [0082], "The cooling system 300 includes a computer controller 380 with suitable applications software which may receive monitor signals of various operational parameters from various components of the system 300 and the environment and may generate control signals to control various components of the system 300 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 plurality of servers while reducing the total amount of energy needed to cool the servers.").

Regarding claim 5, Best discloses the system of claim 1, and Best further discloses wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location (Para. [0081], regarding "The fluid valve 390 may be remotely controlled to connect the heated liquid coolant being pumped through the collection piping from the tank 310 to a controller-selected one of alternative remotely or distally located
heat exchangers associated with alternative heat rejection or cooling apparatus 350").

Regarding claim 6, Best discloses a tank module (810) adapted for use in an appliance immersion cooling system (800), the tank module comprising:
a tank (810) adapted to immerse in a dielectric fluid a plurality of electrical appliances (Para. [0099], regarding "the servers 820 can be inserted over the hard-drives prior to the submersion of the server into the dielectric liquid coolant"), each in a respective appliance slot distributed vertically along, and extending transverse to, a long wall of the tank (Para. [0097], regarding "the mounting members (not shown) may be fixedly attached along the length L of each longer side of the tank 810 and in the middle of the tank 810 between the two shorter ends of the tank to support the rack ears 836 of a standard rack-mountable server 820 shown in FIG. 12A."), the tank comprising:
a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots (Para. [0102], regarding "in a common manifold area above each of the servers to improve the circulation of the liquid coolant through the plurality of servers"), adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (Para. [0102], regarding "in a common manifold area above each of the servers to improve the circulation of the liquid coolant through the plurality of servers"; said manifold being a common one improving circulation will be substantially uniform);
a primary circulation facility adapted to circulate the dielectric fluid through the tank (Para. [0107], regarding "multiple fans 880 may be mounted under each of the server racks 830 and 832 in the volume of liquid coolant between the plurality of servers in each respective rack and the bottom of the tank to increase the mixing of the dielectric liquid coolant within the tank"), comprising:
a plenum, positioned adjacent the bottom of the tank (Para: [0107], regarding "multiple fans 880 may be mounted under each of the server racks 830 and 832 in the volume of liquid coolant between the plurality of servers in each respective rack and the bottom of the tank to increase the mixing of the dielectric liquid coolant within the tank"; a plenum being defined as "a space in which a gas, usually air, is contained at a pressure greater than atmospheric pressure", makes the space below the racks and above the tank bottom the claim plenum), adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (Para. [0107], regarding "multiple fans 880 may be mounted under each of the server racks 830 and 832 in the volume of liquid coolant between the plurality of servers in each respective rack and the bottom of the tank to increase the mixing of the dielectric liquid coolant within the tank"); and
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 (Para. [0082], regarding "The controller 380 may also monitor the flow of the liquid coolant through the tank and/or fluid circuit. Based upon such information, the computer controller may output signals to the pump 330 and heat rejection or cooling apparatus 350 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 350 for sufficiently cooling each respective server when the tank 310 is sufficiently full of the liquid coolant").

Regarding claim 7, discloses the module of claim 6, and Best further discloses wherein the tank (810) and primary circulation facility (880) comprise a tightly co-located module (As in Fig. 11).

Regarding claim 8, discloses the module of claim 6, and Best further discloses wherein the tank further comprises:
an interconnect panel facility adapted to mount appliance support equipment (Para. [0099], regarding "a liquid-resistant or liquid-proof enclosure 892 for the movable hard-drive 890 in each of the servers 820 can be inserted over the hard-drives prior to the submersion of the server into the dielectric liquid coolant to protect moving components (e.g., a platen) from being damaged by the viscous liquid coolant").

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Regarding claim 9, discloses the module of claim 6, and Best further discloses wherein the primary circulation facility further comprises: at least first and second primary circulation sub-facilities (880 on the left and right in Fig. 11), each adapted to operate independently to circulate the dielectric fluid through the tank (Para. [0107], regarding "multiple fans 880 may be mounted under each of the server racks 830 and 832 in the volume of liquid coolant between the plurality of servers in each respective rack and the bottom of the tank to increase the mixing of the dielectric liquid coolant within the tank");
wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities so to maintain the temperature of the dielectric fluid in the tank substantially (Para. [0082], regarding "The controller 380 may also monitor the flow of the liquid coolant through the tank and/or fluid circuit. Based upon such information, the computer controller may output signals to the pump 330 and heat rejection or cooling apparatus 350 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 350 for sufficiently cooling each respective server when the tank 310 is sufficiently full of the liquid coolant") between a predetermined minimum temperature and a predetermined maximum temperature (Para. [0082], "The cooling system 300 includes a computer controller 380 with suitable applications software which may receive monitor signals of various operational parameters from various components of the system 300 and the environment and may generate control signals to control various components of the system 300 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 plurality of servers while reducing the total amount of energy needed to cool the servers.").

Regarding claim 10, discloses the module of claim 6, and Best further discloses wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location (Para. [0081], regarding "The fluid valve 390 may be remotely controlled to connect the heated liquid coolant being pumped through the collection piping from the tank 310 to a controller-selected one of alternative remotely or distally located
heat exchangers associated with alternative heat rejection or cooling apparatus 350").

Claims 1-10 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

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(71) Applicant: **MIDAS GREEN TECHNOLOGY, LLC** [US/US]; 8500 Shoal Creek, Building 2, Suite K, Austin, TX 78757 (US).

(72) Inventors: **BOYD, Christopher, L.**; 1309 Bonham Terrace, Austin, TX 78704 (US). **KOEN, James, P.**; 2302 Falcon Drive, Round Rock, TX 78681 (US). **LAGUNA, David, Christopher**; 2011 E. 6th Street, Austin, TX 78702 (US). **TURNER, Thomas, R.**; 4210 Malaga Dr., Georgetown, TX 78628 (US). **SWINDEN, Kenneth, D.**; 132 Mustang Creek North Loop, Hutto, TX 78634 (US). **GARCIA, Mario, Conti**; 9624 Woody Ridge View, Austin, TX 78730 (US). **TRIBOU, John, Charles**; 9109 Middlebie Dr., Austin, TX 78750 (US).

(74) Agent: **MEYERS, Jeffrey, Van**; J.V. Myers & Associates, PC, P.O. Box 130, Driftwood, TX 78619 (US).

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(54) Title: APPLIANCE IMMERSION COOLING SYSTEM

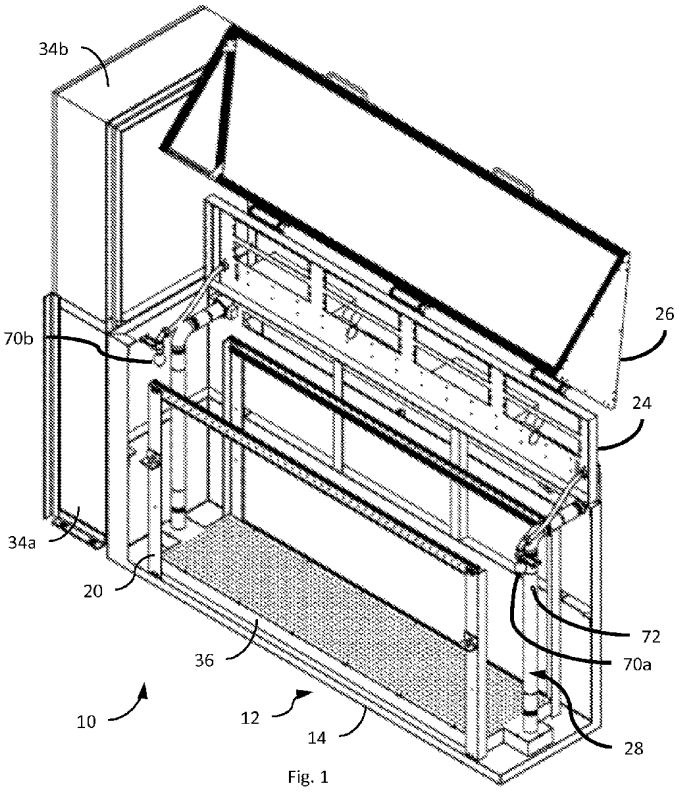


Fig. 1

(57) Abstract: A appliance immersion tank system comprising: a generally rectangular tank adapted to immerse in a dielectric fluid a plurality of appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, the long axis of the tank; a primary circulation facility adapted to circulate the dielectric fluid through the tank; 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 a control facility adapted 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.

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APPLIANCE IMMERSION COOLING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to the following Provisional Applications:

1. Serial Number 61/737,200, filed 14 December 2012 ("*First Parent Provisional*"); and

2. Serial Number 61/832,211, filed 7 June 2013 ("*Second Parent Provisional*");

and hereby claims benefit of the filing dates thereof pursuant to 37 CFR §1.78(a)(4). (Collectively, "*Parent Provisionals*"). The subject matter of the Parent Provisionals, each in its entirety, is expressly incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention.

[0002] The present invention relates generally to electrical appliance cooling systems, and, in particular, to an improved appliance immersion cooling system and method of operation.

2. Description of the Related Art.

[0003] In general, in the descriptions that follow, we will *italicize* the first occurrence of each special term of art which should be familiar to those skilled in the art of *immersion cooling* systems. In addition, when we first introduce a term that we believe to be new or that we will use in a context that we believe to be new, we will **bold** the term and provide the definition that we intend to apply to that term.

[0004] US 4,590,538, "Immersion Cooled High Density Electronic Assembly", Cray (filed 18 November 1981 and issued 20 May 1986) ("Cray"), is an early example of an immersion system for cooling electronic components during normal operation. On information and belief, the machine disclosed therein was the Cray-2 super-computer ("Cray-2") manufactured by Cray Research, Inc. ("Cray Research"), of Chippewa Falls, Wisconsin. Of particular interest to the present application is the description of the significant advantages resulting from

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using an *electrically non-conductive* or *dielectric fluid* to extract heat from electronic circuit assemblies during normal operation (see, *e.g.*, col. 1, line 66 - col. 2, line 29).

[0005] On information and belief, Cray Research released, in 1985, a marketing brochure entitled "The CRAY-2 Computer System" (a copy of which is submitted herewith) describing the Cray-2. Of particular interest in this brochure is the description therein of the significant advantages resulting from using a dielectric fluid to extract heat from electronic circuit assemblies during normal operation (see, pages 10 and 13).

[0006] US 5,167,511, "High Density Interconnect Apparatus", Krajewski, *et al.* (issued 27 November 1992) ("Krajewski"), discloses another example of an immersion system for cooling electronic components during normal operation (see, *e.g.*, col. 2, lines 43-51). On information and belief, a machine implementing the Krajewski system was also marketed by Cray Research as a follow-on super-computer to the Cray-2.

[0007] One particular problem in the vertical-stack-type systems disclosed in the above references is the necessity of draining the cooling fluid whenever physical access to the electronic modules was required. In general, such an operation, besides being time consuming, requires the entire system to be switched off, especially if the component requiring attention is an essential element in the system architecture, such as the central processing unit ("CPU"). One possible solution to this problem is to immerse circuit assemblies vertically into a tank containing the cooling fluid such that each of the various assemblies can be withdrawn independently from the tank for servicing, replacement, upgrade, *etc*. One interesting example of such a system is disclosed in a web-presentation entitled "Puget Custom Computer's mineral-oil-cooled PC", by Nilay Patel ("Puget") (posted 12 May 2007 at 11:57AM; a copy of which is submitted herewith). As noted by the author, the lack of supplemental apparatus in the Puget system to extract waste heat from the oil inherently limited its operating capabilities.

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[0008] Another problem with the Cray Research systems in particular is the nature and cost of the chosen cooling fluid: *fluorocarbon* liquids. As is known, other dielectric fluids, such as *mineral oil*, have better heat transfer characteristics; of course, being an oil, the use thereof does represent a greater residue problem on modules that may be repairable. Notwithstanding, the Puget system implemented precisely this design choice.

[0009] US Patent Application Publication 2011/0132579, "Liquid Submerged, Horizontal Computer Appliance Rack and Systems and Method of Cooling such a Appliance Rack", Best, *et al.* ("Best"), discloses a appliance immersion tank system, include support apparatus for extracting waste heat from the tank cooling fluid and dissipating to the environment the heat so extracted. Although an improvement in several respects over the prior art discussed above, this system exhibits, *inter alia*, the following problems: generally non-uniform flow patterns through the several appliance slots within the tank, potentially resulting in uneven cooling across all slots; constricted dielectric fluid supply and return ports resulting in unnecessarily high fluid flow velocities at the respective points of connection to the tank; poor *scalability*; and inadequate attention to *fail-soft operation*.

[0010] The subject matter of all of the prior art references discussed above, each in its entirety, is expressly incorporated herein by reference.

[0011] We submit that what is needed is an improved appliance tank immersion system and method of operation. In particular, we submit that such a system should provide performance generally comparable to the best prior art techniques but more efficiently and effectively than known implementations of such prior art techniques.

BRIEF SUMMARY OF THE INVENTION

[0012] In accordance with a preferred embodiment of our invention, ...

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0013] Our invention may be more fully understood by a description of certain preferred embodiments in conjunction with the attached drawings in which:

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[0014] Fig. 1 illustrates, in partial cut-away form, a front perspective of a tank module of an appliance immersion cooling system constructed in accordance with our invention;

[0015] Fig. 2 illustrates a rear perspective of the tank module shown in Fig. 1;

[0016] Fig. 3 illustrates a close-up perspective of a detail A of Fig. 2;

[0017] Fig. 4 illustrates a close-up perspective of a detail B of Fig. 2;

[0018] Fig. 5 illustrates, in perspective view, several details of the tank shown in Fig. 1, with special emphasis on the dielectric fluid recovery weir integrated into the long rear wall of the tank;

[0019] Fig. 6 illustrates, in cross-section view, the section C-C in Fig. 5;

[0020] Fig. 7 illustrates, in perspective view, the plenum facility shown in Fig. 1;

[0021] Fig. 8 illustrates, in top plan view, the orifice plate portion of the plenum facility shown in Fig. 7;

[0022] Fig. 9 illustrates, in perspective view, the chamber portion of the plenum facility shown in Fig. 7;

[0023] Fig. 10 illustrates, in top plan view, a plurality of appliance slots distributed vertically along, and extending transverse to, a long axis of the tank of Fig. 1;

[0024] Fig. 11 illustrates, in longitudinal cross-sectional view, the plurality of appliance slots distributed vertically along, and extending transverse to, the long axis of the tank of Fig. 1;

[0025] Fig. 12 illustrates, in flow schematic form, one instantiation of a flow arrangement suitable for implementing our invention; and

[0026] Fig. 13 illustrates, in control schematic form, one instantiation of a flow control facility suitable for implementing our invention.

[0027] In the drawings, similar elements will be similarly numbered whenever possible. However, this practice is simply for convenience of reference and to avoid unnecessary proliferation of numbers, and is not intended to imply or

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suggest that our invention requires identity in either function or structure in the several embodiments.

DETAILED DESCRIPTION OF THE INVENTION

[0028] Shown in Fig. 1 (front view) and Fig. 2 (rear view) is a tank module 10 adapted for use in an appliance immersion cooling system constructed in accordance with a preferred embodiment of our invention. For convenience of reference, we have illustrated in Fig. 1 the tank facility 12 of the immersion module 10 in partial cut-away to emphasize several important internal facilities; we have shown the tank facility 12 in isolation in Fig. 5. In general, the tank facility 12 comprises: a tank 14 adapted to immerse in a dielectric fluid a plurality of electrical appliances 16, *e.g.*, contemporary computer *servers* (see, *e.g.*, Fig. 11), each in a respective appliance slot 18a distributed vertically along, and extending transverse to, a long axis of the tank 14 (see, generally, Fig. 10); an appliance rack facility 20 of convention design adapted to suspend the appliances 16 (see, *e.g.*, Fig. 11) in respective appliance slots 18 (see, Fig. 10); a weir 22 (best seen in isolation in Fig. 5 and Fig. 6), integrated horizontally into one long wall of the tank 14 adjacent all appliance slots 18, and adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each of the appliance slots 18; an interconnect panel facility 24 attached to the upper rear edge of the tank 14 and adapted to mount various appliance *power distribution* equipment, cable interconnection panels and the like (none shown); and a cover 26 adapted to be opened and closed from the front of the tank 14 (and which may include a translucent portion to allow viewing of the interior of the tank 14 when in the closed position). In addition to the tank facility 12, the immersion module 10 comprises: a primary circulation facility 28 (portions of which are shown in both Fig. 1 and Fig. 2); a secondary fluid circulation facility 30 (of which only redundant heat exchangers 32a and 32b are shown in Fig. 2); and control equipment cabinets 34a and 34b, each adapted to accommodate the module status and control equipment associated with a respective one of the primary circulation facilities 28a and 28b (see, Fig. 13).

[0029] As can be best seen in Fig. 2, the primary circulation facility 28 (comprising redundant sub-facilities 28a and 28b) comprises both passive

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(*conduits, couplers, etc.*) and active (*valves, pumps, sensors, etc.*) components; a subset of the passive components are shared, whereas, in general, the active components are duplicated and adapted to cooperate in operation as separate, redundant sub-facilities. Excluding the tank 14, the primary shared component is the plenum facility 36 (see, Fig. 1 and Fig. 7) comprising an orifice plate 36a (see, Fig. 8) and a plenum chamber 36b (see, Fig. 9). As can be seen in Fig. 1, cooled dielectric fluid is pumped into both ends of the plenum facility 36 via a shared distribution header 38 (see, Fig. 2 and Fig. 3). In general, the plenum plate 36a comprises at least one row of orifices vertically aligned with each appliance slot 18a, with the dimensions and flow rates of each set being adapted to provide substantially equal flow of the dielectric fluid upwardly into each appliance slot 18a. Preferably, each appliance slot 18a is supplied via several rows of orifices, thus generally tending to reduce the volume of the dielectric fluid exiting each orifice and to make the flow of dielectric fluid more uniform upwardly through the appliance slots 18. One further shared component is the dielectric fluid recovery facility 40 (Fig. 2) comprising a dielectric fluid recovery reservoir 42 (see, Fig. 3, Fig. 4 and Fig. 13) positioned vertically beneath the overflow lip of the weir 22 and adapted smoothly to receive the dielectric fluid as it flows over the weir 22; the dielectric fluid recovery reservoir 42 is further adapted to allow the recovered fluid to be removed from the reservoir 42 via redundant recovery ports 44a and 44b (only port 44a can be seen in Fig. 2 as the port 44b is obscured by the heat exchanger 32a; but see Fig. 12). As can be seen in both Fig. 3 and Fig. 4, we consider it desirable to provide a *vortex breaker* at the input of each of the recovery ports 44. Also, we provide a removable recovery reservoir cover 46 adapted to also cover a major portion of the distribution header 38; note that, in both Fig. 2 and Fig. 3, we have illustrated the reservoir cover 46 in a partially raised orientation so as to better depict details that would otherwise be obscured. Note that we have constructed the reservoir 42 such that the average height of dielectric fluid above the recovery ports 44 develops sufficient *hydrostatic head* to meet the requirements of the pumps 48, while also tending to minimize the likelihood of breaking suction during normal operation.

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[0030] At this point in the primary circulation facility 28, we provide fully redundant sub-facilities 28a and 28b, each comprising a primary circulation pump (48a and 48b) and associated passive and active components which, collectively, provide the motive power for circulating the dielectric fluid through the shared components and tank 14. As can be generally seen, each of these sub-facilities 28a and 28b is adapted to recover the dielectric fluid exiting the tank 14 via the weir 22, re-pressurize the recovered fluid, pass the re-pressurized fluid through a respective one of the heat exchangers 32a and 32b, and then back to the plenum facility 36 via the header 38.

[0031] Shown in Fig. 12 is one flow arrangement suitable for integrating our tank module 10 into a fully redundant, appliance immersion cooling system, comprising the primary circulation facility 28 and the secondary fluid circulation facility 30. In general, the secondary fluid circulation facility 30 comprises redundant secondary circulation sub-facilities 30a and 30b, each of which is adapted to circulate a cooling fluid, *e.g.*, treated water, through the respective heat exchanger 32a and 32b to extract heat from dielectric fluid counter-circulating therethrough and to dissipate to the environment the heat so extracted. In the illustrated embodiment, each of the secondary fluid sub-facilities 30a and 30b comprise conventional cooling towers 50a (including fan facility 52a) and 50b (including fan facility 52b), and secondary circulation pumps 54a and 54b. To facilitate flexible operation in installations including multiple immersion modules 10 in combination with a plurality of secondary circulation sub-facilities 30, a common header arrangement can be implemented as illustrated in the secondary fluid circulation loop, with flow control valves located at key flow control points as is known.

[0032] Shown in Fig. 13 is a control facility 56 adapted to monitor and control the operation of both the immersion module 10 (including all active components of the primary circulation facility 28), and the secondary fluid circulation facility 30. As will be evident to those skilled in this art, efficient operation of our immersion module 10 requires continuous monitoring and control of several essential operating parameters, including fluidic temperatures, pressures, conductivity and *pH* at several points in the primary and secondary circulation loops.

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Although the several sensory and control functions can be implemented using traditional dedicated hardware components, we prefer to employ at least one *programmable logic controller* ("*PLC*"), commercially available from any of a number of respected vendors, *e.g.*, the *Allen-Bradley* brand of PLCs from Rockwell Automation, Inc. In the instantiation illustrated in Fig. 13, we have depicted: a primary controller 58a adapted to monitor and control the operation of the primary circulation sub-facility 28a as a function of the temperature of the dielectric fluid in the tank 14; a secondary controller 60a adapted to monitor and control the operation of the secondary fluid circulation sub-facility 30a as a function of the temperature of the dielectric fluid flowing through the heat exchanger 32a; and a master controller 62 adapted to coordinate the activities of the primary controller 58a and secondary controller 60a. As can be seen, we have incorporated into the primary circulation sub-facility 28a: supply and return *sensors*, including a *temperature probe*, T, inserted into a *thermowell* (not shown) installed in the bottom of the reservoir 42 adjacent a respective return port 44a (note that, in Fig. 4, only one of the holes that receive the thermowells is illustrated, but both holes are illustrated in Fig. 12); a pair of sensor facilities, S, which may sense temperature, pressure and conductivity, as deemed desirable); and return (and, if desired, supply) *flow control valves* and controls for the primary circulation pump 48a; of course, a redundant set of these components exists for the primary circulation sub-facility 28b. In general, the goal is to maintain the temperature of the dielectric fluid in the tank 14 between a predetermined minimum temperature and a predetermined maximum temperature.

[0033] As noted above, we have provided separate control equipment cabinets 34a and 34b, each adapted to accommodate the several components comprising a respective one of the primary controllers 58a and 58b. For convenience of access, we prefer to co-locate with each of the cooling towers 50 a protective housing (not shown) for the respective secondary controller 60. Of course, the control facility 56 can be instantiated as a single, multi-module PLC facility, with similar or other combinations of monitoring devices as deemed most appropriate for a particular installation. Alternatively, one or more, and perhaps all, of the

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functions performed by the controllers 58, 60 and 62 may be implemented in the form of dedicated *application-specific software* executing on a conventional computer platform having the appropriate resources; indeed, it would be entirely feasible to implement the entire control facility 56 on a server 16 installed in a tank 14.

[0034] One desirable enhancement that we recommend is a remote control facility, implemented, *e.g.*, via the master controller 62 (or by way of a direct, per-controller *interface*), adapted to facilitate remote monitoring of system status (*e.g.*, temperatures, pressures, *etc.*) and control over system control parameters (*e.g.*, temperature and pressure limits, *etc.*) to the primary controllers 58 and secondary controllers 60. For example, using a conventional data communication hardware module 64, *e.g.*, an *ethernet* card implementing the *TCP/IP* protocol, a modern *web browser* can be adapted to provide a *graphical user interface* ("*GUI*") with sufficient functionality to facilitate monitoring and control of an entire installation from a remote location. Such a GUI may be implemented using any of a number of programming paradigms, *e.g.*, *PHP*, *.NET* and the like.

[0035] Operational control of redundant, continuous process flow systems is generally well known. Preferable, each of the several redundant sub-facilities are routinely activated to assure current functionality, and to allow the inactive sub-facility to be serviced according to an established schedule. We believe this continuous rotation of system resources to be so important that we recommend switching the sub-facilities at least once, and preferably, several times, per day; although this is possible to implement manually, we prefer to enable the master controller 62 to control the sequencing of the several switch-over operations. One further aspect of this sophistication in control is the ability to perform *stress testing* of the several sub-systems under controlled conditions so as to assure appropriate response to real-time emergencies.

[0036] In our First Parent Provisional, we have disclosed an alternate embodiment comprising an appliance immersion tank facility wherein the function of the plenum facility 36 is performed by a manifold facility comprising a ladder-arrangement of tubular spray bars, each bar of which supplies dielectric fluid to a respective appliance slot. As we noted, one particular advantage of this

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arrangement is that individual spray bars may be shut off if the respective appliance slot is not occupied and, thus, save energy. To further increase energy efficiency, we have provided optional vertical flow barriers adapted to partition the tank into an active portion, having active appliances, and a stagnant portion, having no active appliances. One further enhancement we disclosed is the provision of temperature sensors per appliance slot, such that the flow rate through each spray bar can be dynamically varied as a function of the temperature of the dielectric fluid exiting the respective slot. Other operative configurations will be readily perceived by those skilled in this art.

[0037] In a manner analogous to the embodiment described in our First Parent Provisional, it would be advantageous, from an energy point of view, to provide a plurality of flow barrier plates 66 (shown by way of example only in Fig. 11), each adapted to be attached to the top of the plenum facility 36 so as substantially to block the flow of the dielectric fluid through the row(s) of orifices in the plenum plate 36a corresponding to at least a respective one of the appliance slots 18a; an elastomeric layer (not shown) could be provided on the interface surface of the plate(s) 66 to enhance the sealing effect. Such an arrangement would allow the total flow through the plenum facility 36 to be adjusted, in the field, as a function of the actual number of active appliances 16 in the tank 14. Further, this arrangement can incorporate a relocatable vertical baffle plate 68 (see Fig. 11) adapted substantially to partition the tank 14 into an active portion 14a containing the active appliances 16 and an inactive portion 14b containing no appliances (or at least no active appliances 16); preferably, the baffle plate 68 is adapted to be mounted in the appliance rack facility 28 in a manner similar to an actual appliance 16 (the baffle plate 68 need not fully block the flow of dielectric fluid between the active portion 14a and inactive portion 14b, but only significantly impede the flow between these portions). Note that, in the example scenario illustrated in Fig. 11, we have shown one possible arrangement of a total of 8 active appliances 16 distributed across 16 appliance slots 18a so as to spread the total heat load across adjacent empty slots 18a. Such an optimal arrangement is possible only if less than a majority of the available appliance slots 18a are occupied by an active appliance 16. Clearly, such optional

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adjunct facilities enhance flexibility in operation, accommodating dynamic adjustment of the flow rates in the primary circulation sub-facilities 28a and 28b under variable heat loads, while providing opportunities to conserve energy that might otherwise be expended moving the dielectric fluid through the inactive portion 14b of the tank 14. Other operative configurations will be readily perceived by those skilled in this art.

[0038] In our Second Parent Provisional, we have disclosed another embodiment comprising a more conventional, less-modularized instantiation with appropriate flow and control facilities. In this embodiment, we chose to implement tank clusters, comprising, *e.g.*, 4 appliance immersion tank facilities, with substantially all of the other equipment being constructed from stand-alone, commercially available components. Such an arrangement offers greater opportunities to select and install improved components, or to add enhancements to the installation, as deemed desirable after initial installation. Other operative configurations will be readily perceived by those skilled in this art.

[0039] As we noted above with reference to the embodiment illustrated in Fig. 12, the secondary flow header facility is well adapted to allow any secondary circulation sub-facility 30 to be connected to any active heat exchanger 32. Such a facility provides great flexibility in dealing with unusual system conditions, especially in installations wherein the secondary circulation sub-facilities 30a and 30b are each sized to support a cluster of tank modules 10. Imagine, for example, that, while one of the secondary circulation facilities 30, say sub-facility 30a, is being serviced, the activities of the set of appliances 16 in one tank 14 in the cluster are higher than normal, resulting in a rise in temperature in that tank 14 above the desired maximum. In response, the master controller 62 can direct Primary Controllers 58a and 58b assigned to tank 14 to operate both of the primary circulation sub-facilities 28a and 28b simultaneously, *i.e.*, in parallel. Using the secondary flow header facility, the heat being extracted by both of the heat exchangers 32a and 32b may be dissipated using the resources of the single on-line secondary circulation sub-facility 30b. Thus, one clear advantage of this alternate embodiment is the ability dynamically to perform *load balancing* across

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all system resources. Other operative configurations to support sub-system load balancing will be readily perceived by those skilled in this art.

[0040] Preferably, one or more filters (not shown) are included in the flow path through each of the primary circulation sub-facilities 28a and 28b to remove any particulates or other undesirable foreign matter that may have been picked up by the dielectric fluid on its passage though the entire primary circulation facility 28; chemical sensors may also be provided to detect the presence of unexpected chemicals that may indicate failure of sub-components within one of the appliances 16. Similar components, such as pH sensors, may also included in the secondary fluid circulation facility 30.

[0041] As can be seen generally in Fig. 1, we provide a pair of low dielectric fluid level sensors 70a and 70b adapted to trigger an alarm signal in the event that, for whatever reason, the level of the dielectric fluid in the tank 14 drops below a predetermined minimum level. Additionally, the responsive primary controller 58 can initiate other actions to address the detected problem, including activating audio alarms, transmitting electronic alert signals and the like.

[0042] To solve a reciprocal problem, namely leakage from an external portion of the primary circulation loop 28 resulting in the dielectric fluid in the tank 14 being *back-siphoned* through the plenum facility 36, we recommend incorporating a *siphon breaker* 72 (see, Fig. 1) in the supply pipe at a predetermined location well above the plenum facility 36 but somewhat below the level of the weir 24. Such a siphon breaker can be as simple as a relatively small diameter hole 72 drilled through the supply pipe at the selected location; due to the relatively high viscosity of the dielectric fluid, even when heated, any resulting leakage during normal operation will be relatively insignificant. Other operative responses to address these and other unusual fluidic conditions will be readily perceived by those skilled in this art.

[0043] As is known (see, *e.g.*, Best), many conventional, commercially available electrical/electronic appliances include components that will not function correctly if immersed in a dielectric fluid, especially one as *viscous* as mineral oil: cooling fans and rotating media disk drives. In general, all cooling fans are

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unnecessary in an immersion cooling system and can be simply removed. The media drives, however, are usually necessary for normal appliance operation. One option is to remove each drive, totally seal the drive against fluid entry, and reinstall the now-sealed drive (pre-sealed drives are also available). Another option is to remove the drive and mount it on the interconnect panel facility 24; typically special cabling will be required to re-attach the drive to the internal appliance *socket*. Yet another option is to replace the rotating media drive with a *solid-state drive* having no moving components. Other operative configurations will be readily perceived by those skilled in this art.

[0044] It will be recognized that, in all of the embodiments described herein, emphasis was placed on minimizing the total volume of the dielectric fluid circulating throughout each immersion module 10. We submit that the key concept here is to move the secondary fluid to the point of heat exchange with the primary fluid, rather than to move the primary fluid to the point of heat exchange with the secondary fluid. Thus, in our preferred embodiment, all of the essential components of the primary circulation facility 28 are tightly co-located with the tank 14 so as to form a highly-integrated module. Further, our placement of the reservoir 42 outside of (but immediately adjacent to) the tank 14 tends to reduce the total volume of the dielectric fluid (as opposed to the alternative arrangement we proposed in our First Provisional, wherein a recovery trough was disposed within the tank 14); then, we positioned the components comprising the primary circulation sub-facilities 28 so as to be vertically beneath the *footprint* of the reservoir 42. In addition to conserving valuable floor space in a typical *data center* installation, the resulting modular configuration facilitates both easy initial installation and subsequent upgrade to efficiently satisfy increasing data center workloads. Indeed, our invention greatly enhances system *scalability*, a key concern to data center operators. Finally, our system-wide redundancy substantially assures fail-soft operation during periods of unusual environmental conditions, infrastructure instability or political unrest.

[0045] Although we have described our invention in the context of particular embodiments, one of ordinary skill in this art will readily realize that many

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modifications may be made in such embodiments to adapt either to specific implementations. By way of example, it will take but little effort to adapt our invention for use with electronic appliances other than contemporary servers; and to adjust the dimensions of the appliance accommodation slots accordingly. Similarly, practitioners in the art will readily recognize that other, known secondary circulation facilities may be employed effectively, including forced air, *vapor compression* systems, *earth-water sink loops*, *waste heat recovery and recycling* systems, and the like (see, *e.g.*, the several alternatives discussed in Best). Further, the several elements described above may be implemented using any of the various known manufacturing methodologies, and, in general, be adapted so as to be operable under either hardware or software control or some combination thereof, as is known in this art.

[0046] Thus it is apparent that we have provided an improved system and method of operation for immersion cooling of appliances and the like. In particular, we submit that such a method and apparatus provides performance generally comparable to the best prior art techniques but more efficiently and effectively than known implementations of such prior art techniques.

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CLAIMS

What we claim is:

1. An appliance immersion cooling system comprising:

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:

a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot;

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;

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

a control facility adapted 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.

2. The system of claim 1 wherein the tank and primary circulation facility comprise a tightly co-located module.

3. The system of claim 1 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

4. The system of claim 1 wherein the primary circulation facility further comprises:

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at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities so to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

5. The system of claim 1 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

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6. A tank module adapted for use in an appliance immersion cooling system, the tank module comprising:

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:

a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot;

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

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.

7. The module of claim 6 wherein the tank and primary circulation facility comprise a tightly co-located module.

8. The module of claim 6 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

9. The module of claim 6 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities so to maintain the temperature

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of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

10. The module of claim 6 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

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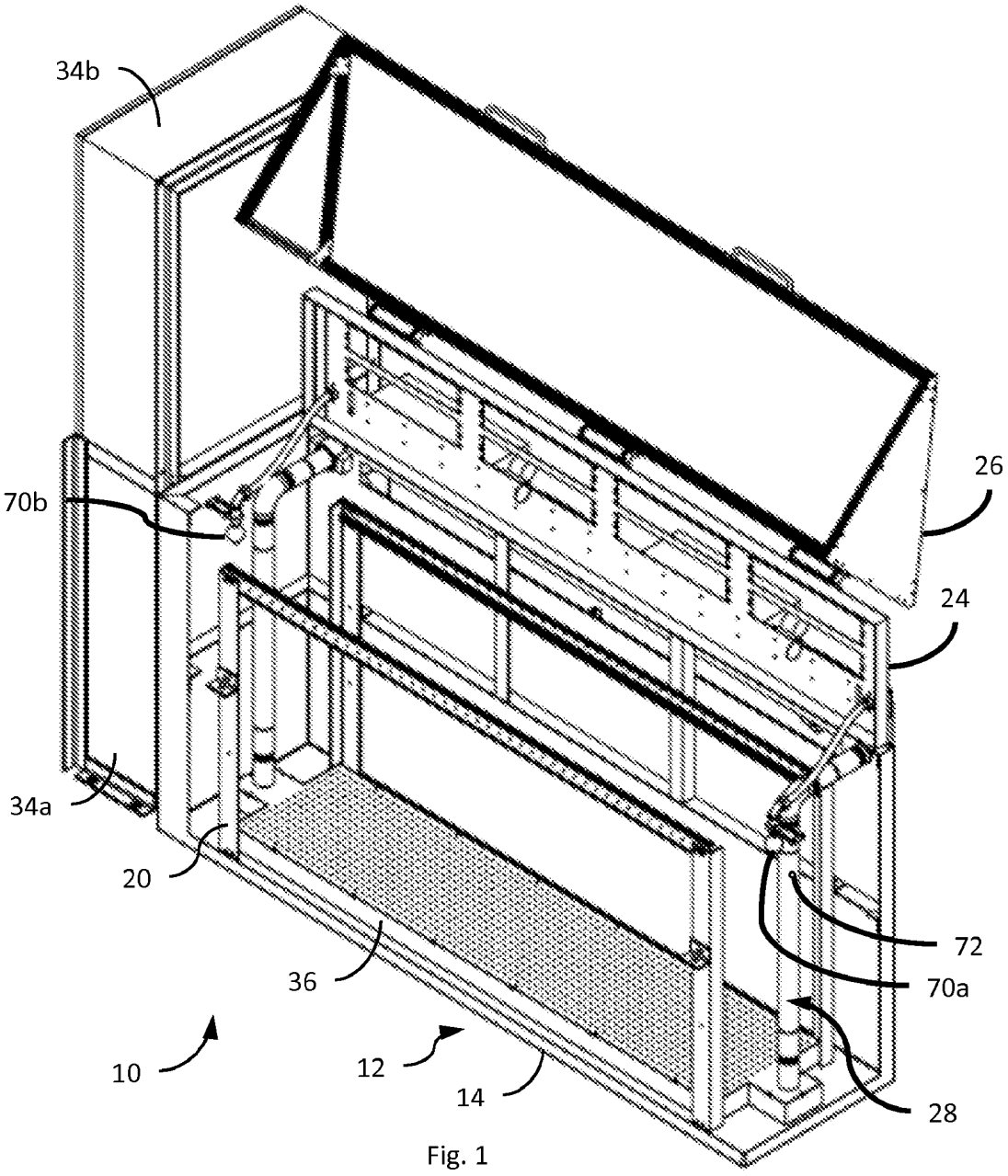


Fig. 1

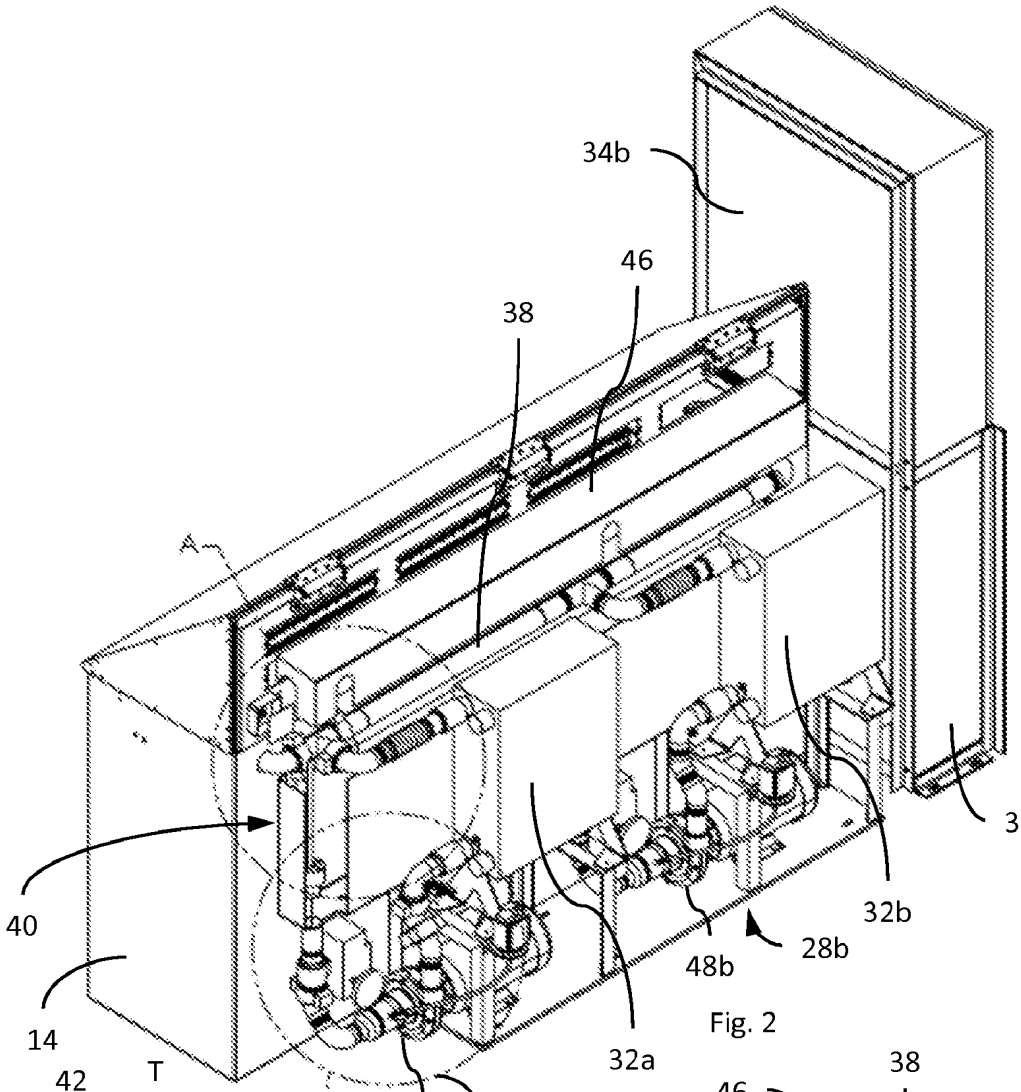


Fig. 2

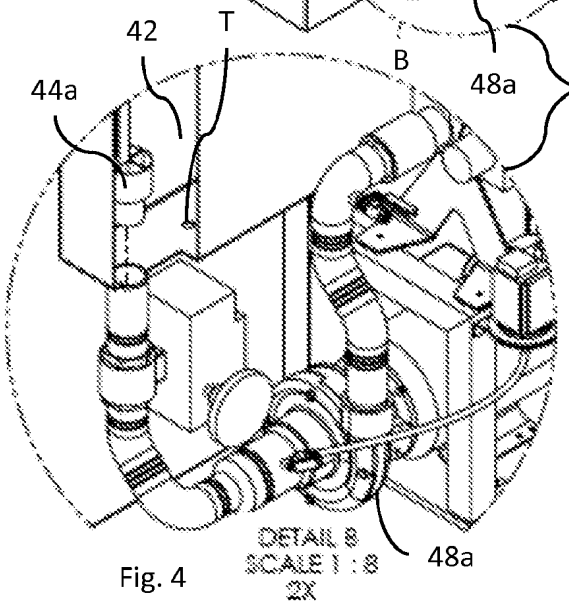


Fig. 4

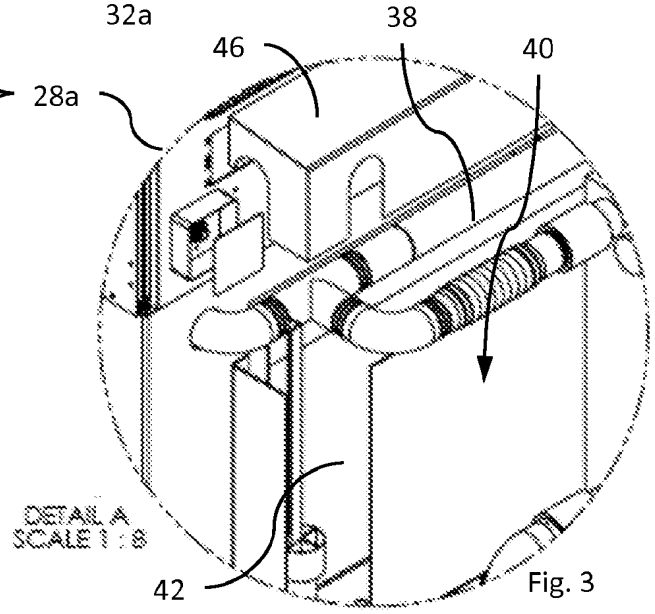


Fig. 3

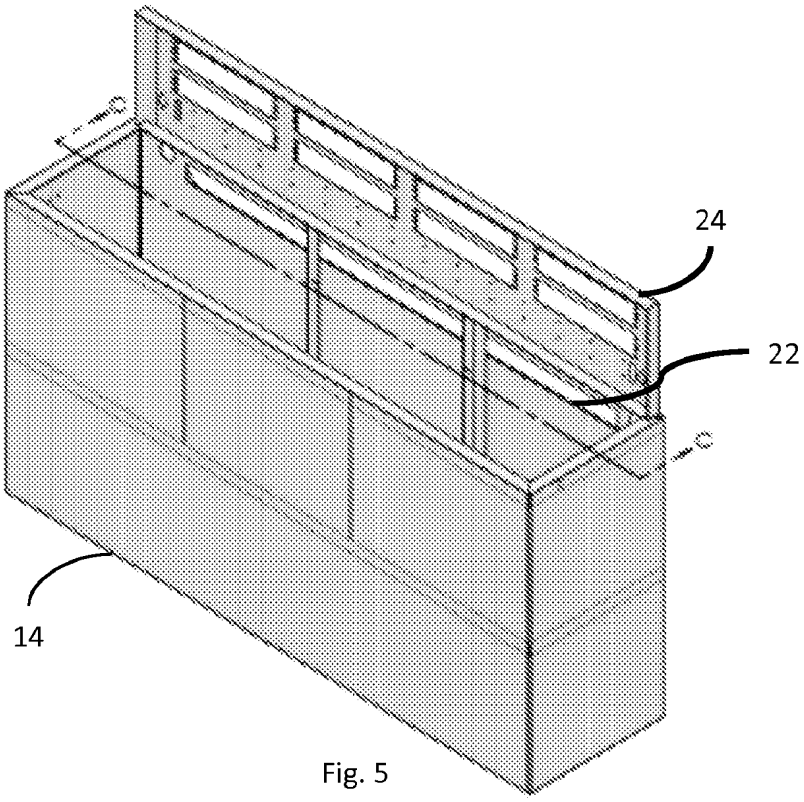
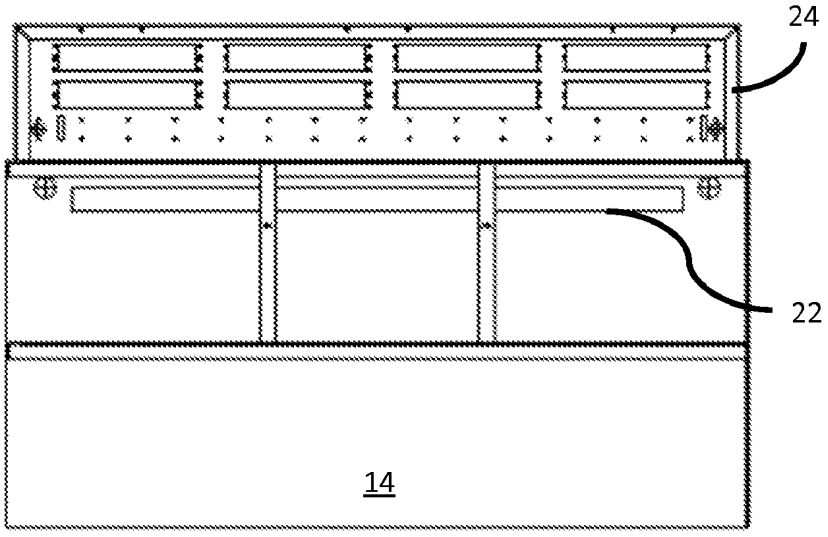


Fig. 5



Section C-C
Fig. 6

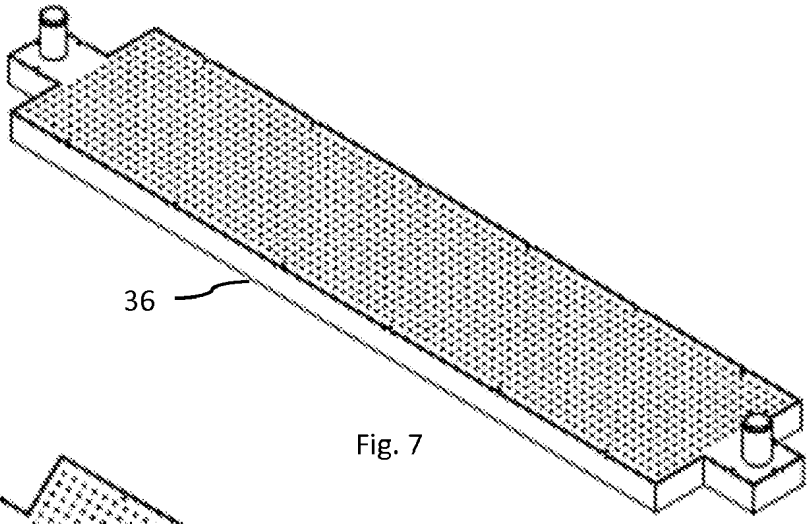


Fig. 7

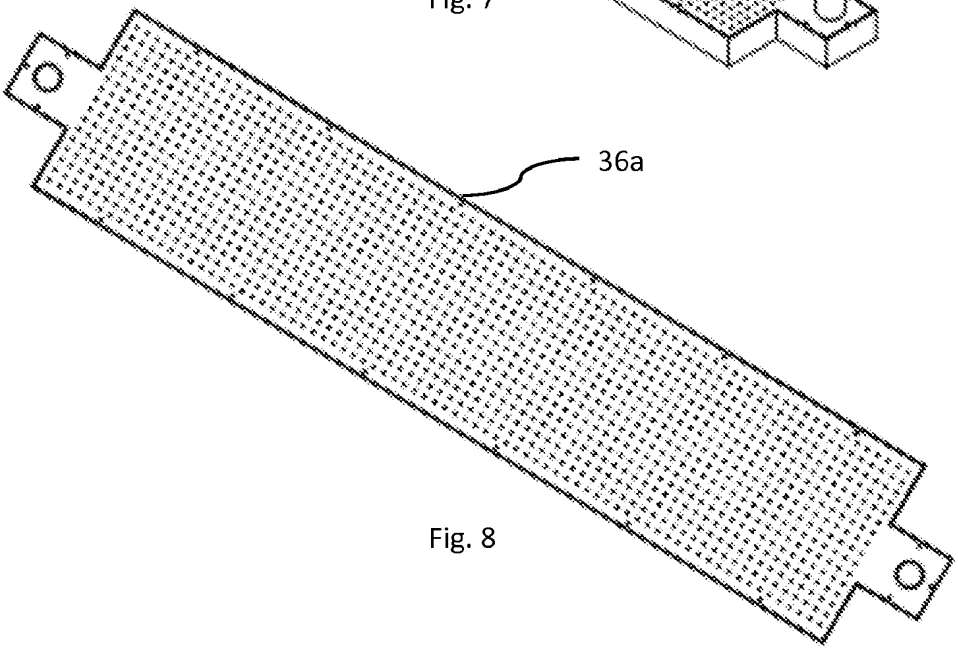


Fig. 8

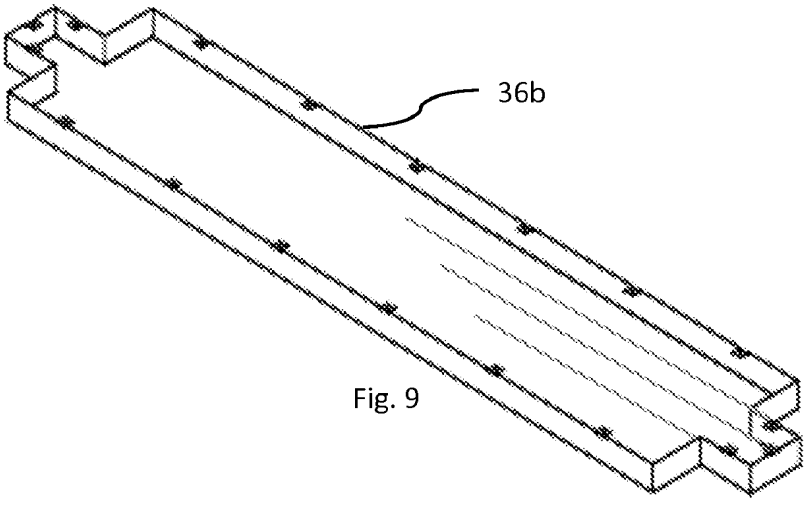


Fig. 9

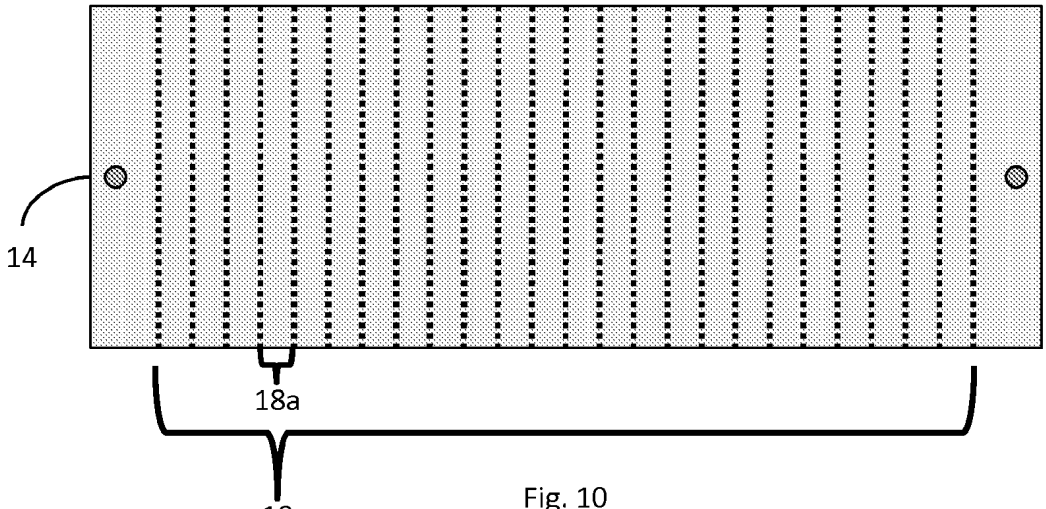


Fig. 10

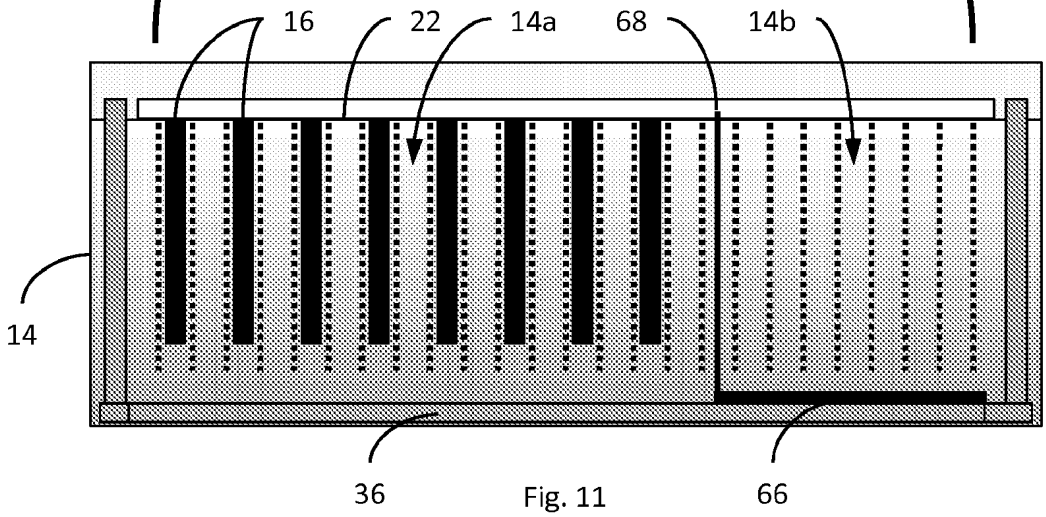


Fig. 11

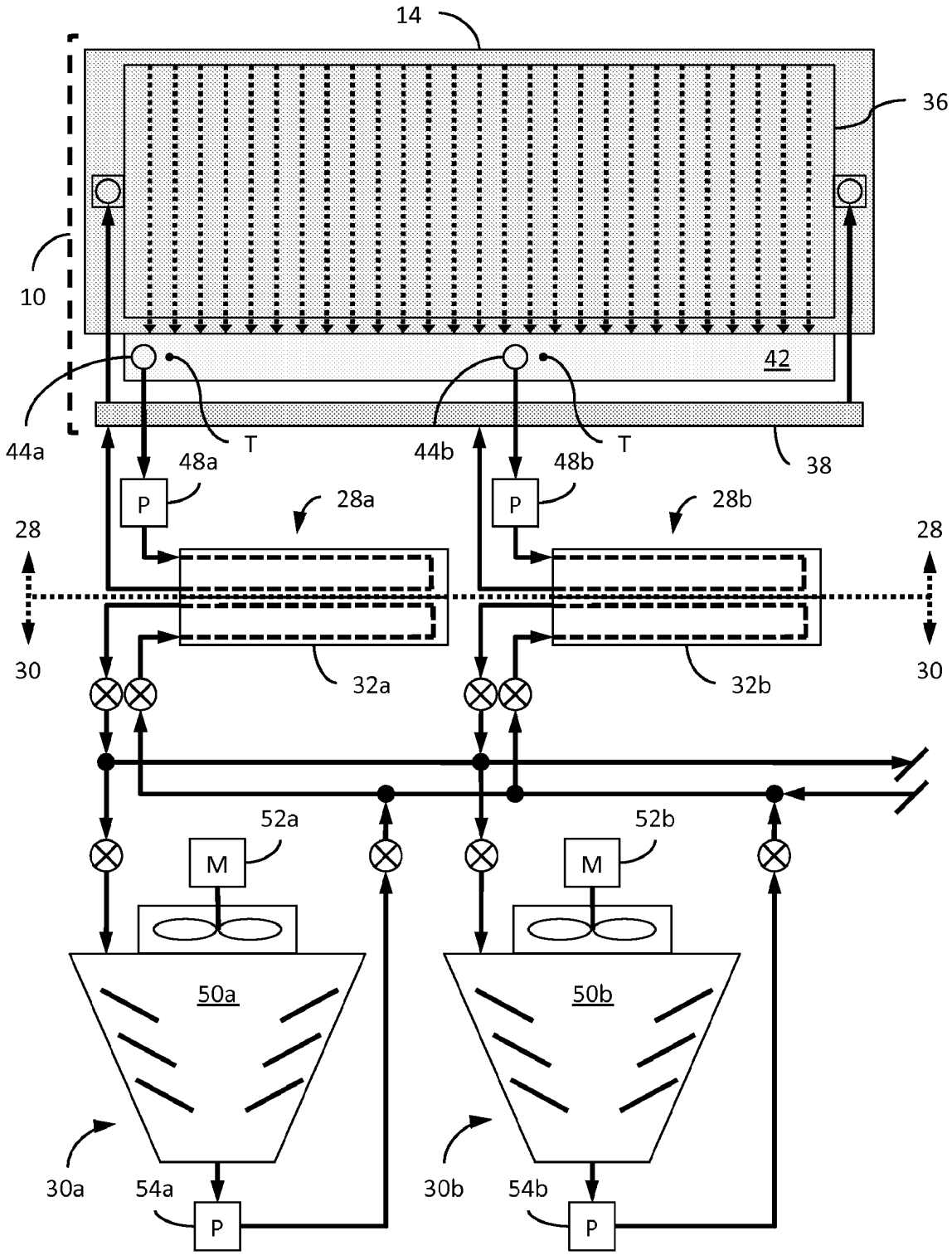

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Fig. 12

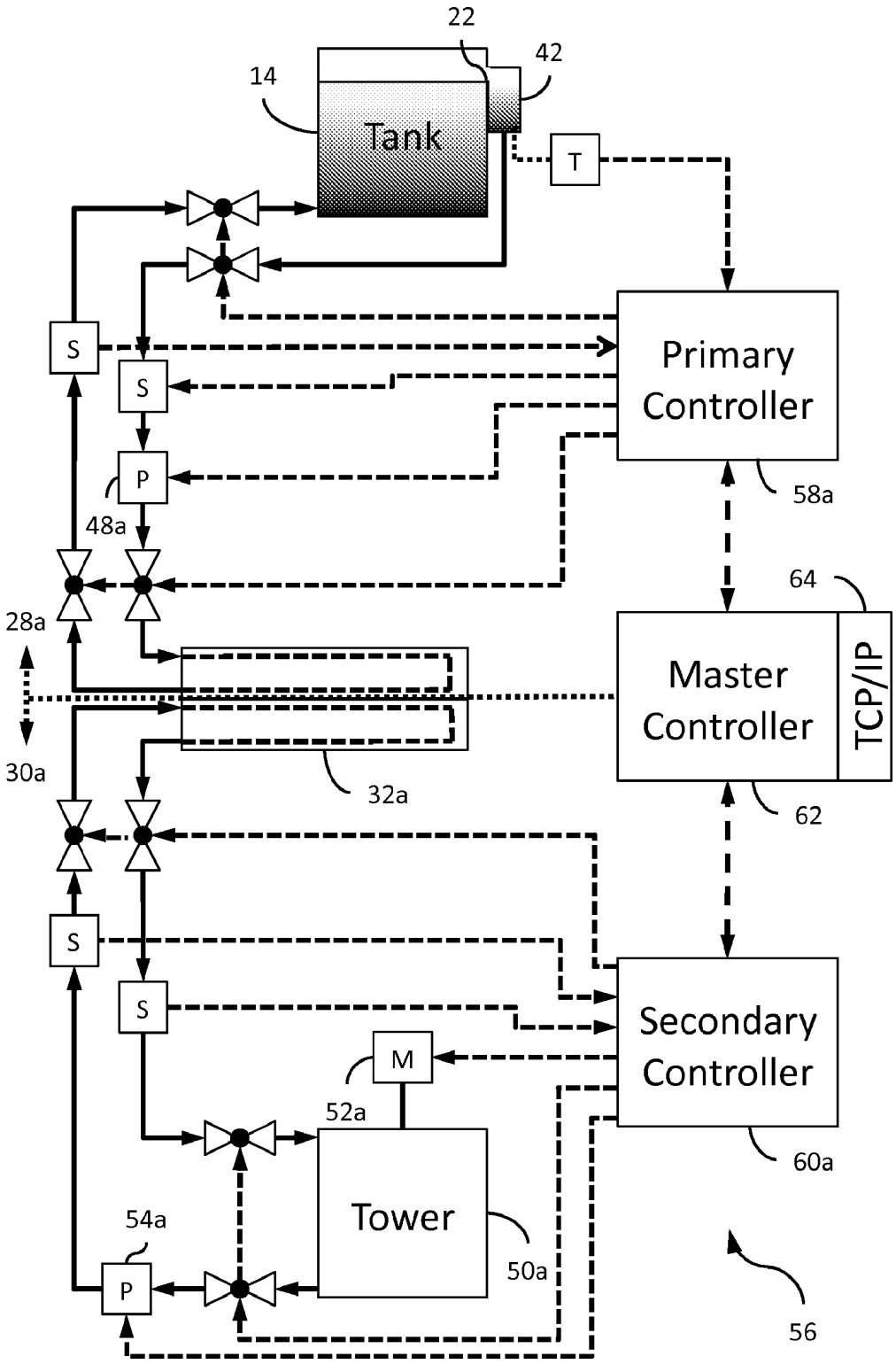

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Fig. 13

590234

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APPLICATION NUMBER: *61/832,211*
FILING DATE: *June 07, 2013*
RELATED PCT APPLICATION NUMBER: *PCT/US13/75126*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US61/832,211*

Certified by

David J. Kappos

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Doc Code: **TR.PROV**
Document Description: Provisional Cover Sheet (SB16)

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Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1 — Remove

Given Name	Middle Name	Family Name	City	State	Country
John	H.	Miller Jr.	Austin	TX	US

Inventor 2 — Remove

Given Name	Middle Name	Family Name	City	State	Country
James	P.	Koen	Austin	TX	US

Inventor 3 — Remove

Given Name	Middle Name	Family Name	City	State	Country
John	C.	Tribou	Austin	TX	US

Inventor 4 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Mike		Rainone	Palestine	TX	US

Inventor 5 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Talbot		Presley	Palestine	TX	US

Inventor 6 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Jeffrey	Van	Myers	Driftwood	TX	US

Inventor 7 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Christopher	L	Boyd	Austin	TX	US

Inventor 8 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Kenneth	D	Tooke	Austin	TX	US

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Inventor 9					Remove
Given Name	Middle Name	Family Name	City	State	Country i
David	Christopher Thoma	Laguna	Austin	TX	US

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Title of Invention	Server Immersion Tank System
Attorney Docket Number (if applicable)	JMG001-02

Correspondence Address

Direct all correspondence to (select one):

◉ The address corresponding to Customer Number	○ Firm or Individual Name
Customer Number	44070

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.
◉ No.
○ Yes, the name of the U.S. Government agency and the Government contract number are:

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Entity Status

Applicant claims small entity status under 37 CFR 1.27

(•) Yes, applicant qualifies for small entity status under 37 CFR 1.27

( ) No

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Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Jeffrey Van Myers/			Date (YYYY-MM-DD)	2013-06-07
First Name	Jeffrey	Last Name	Myers	Registration Number (If appropriate)	27362

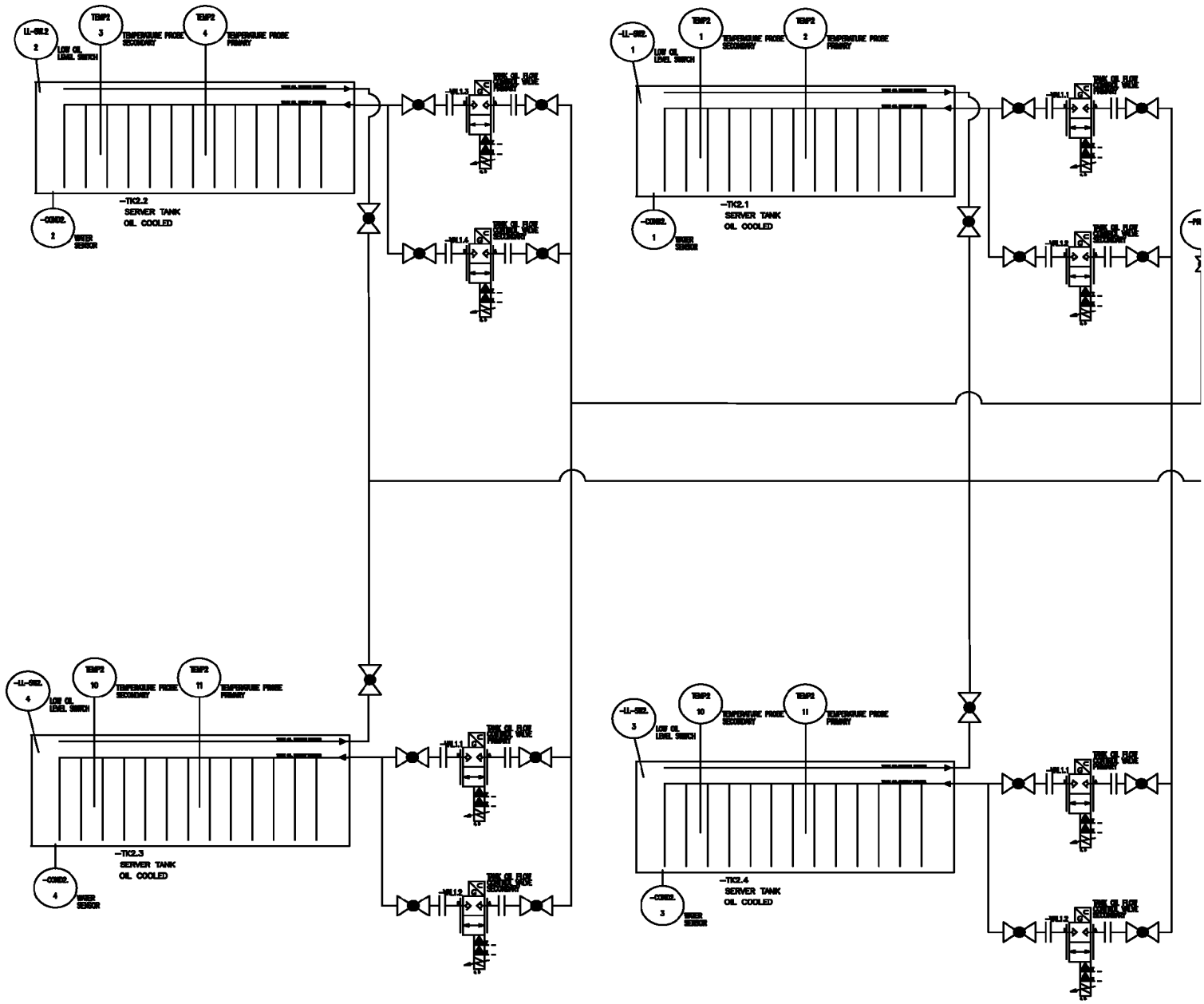
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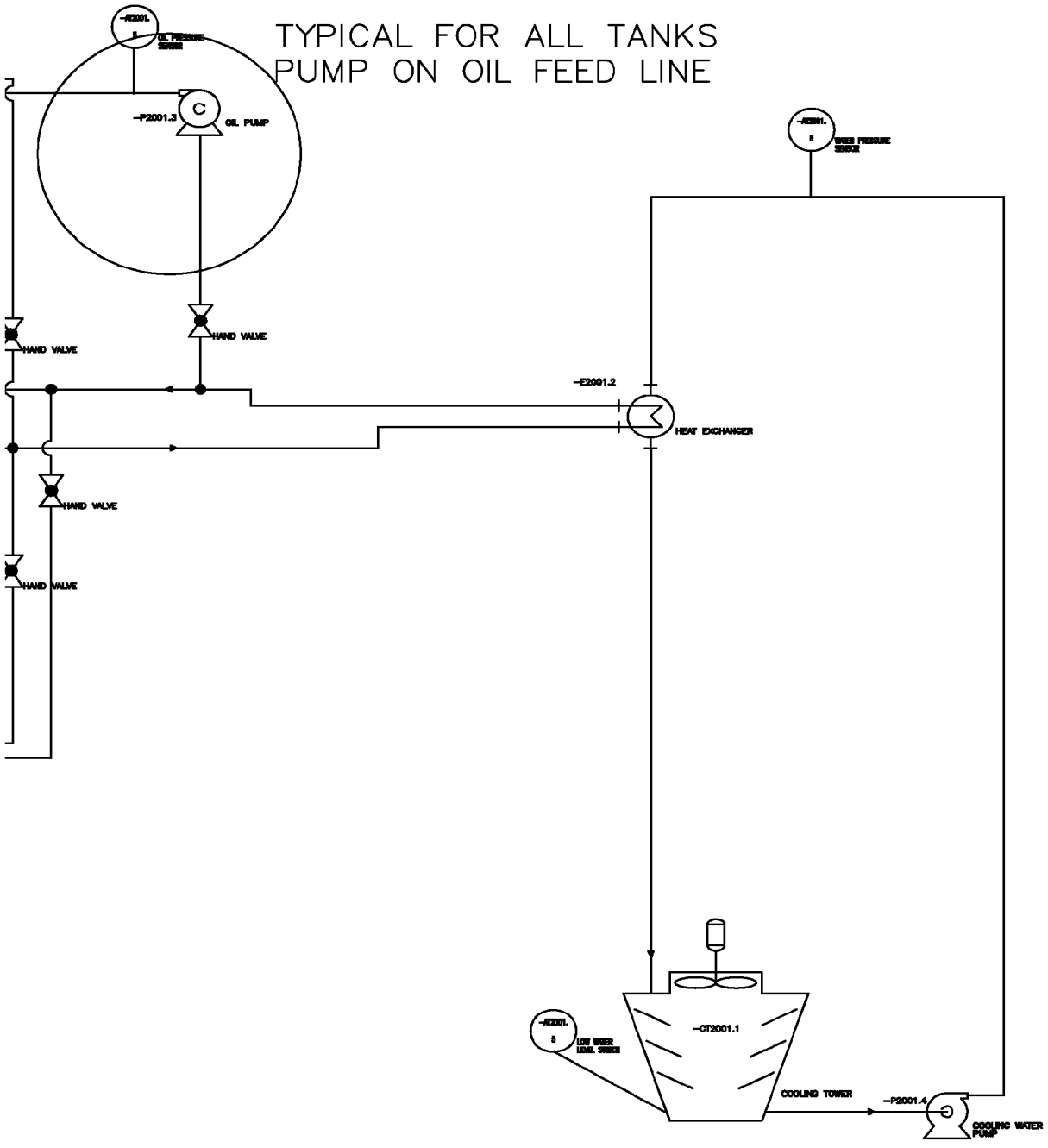


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NO.	DATE	REVISION	BY
A	12-19-12	ORIGINAL ISSUE	KDS

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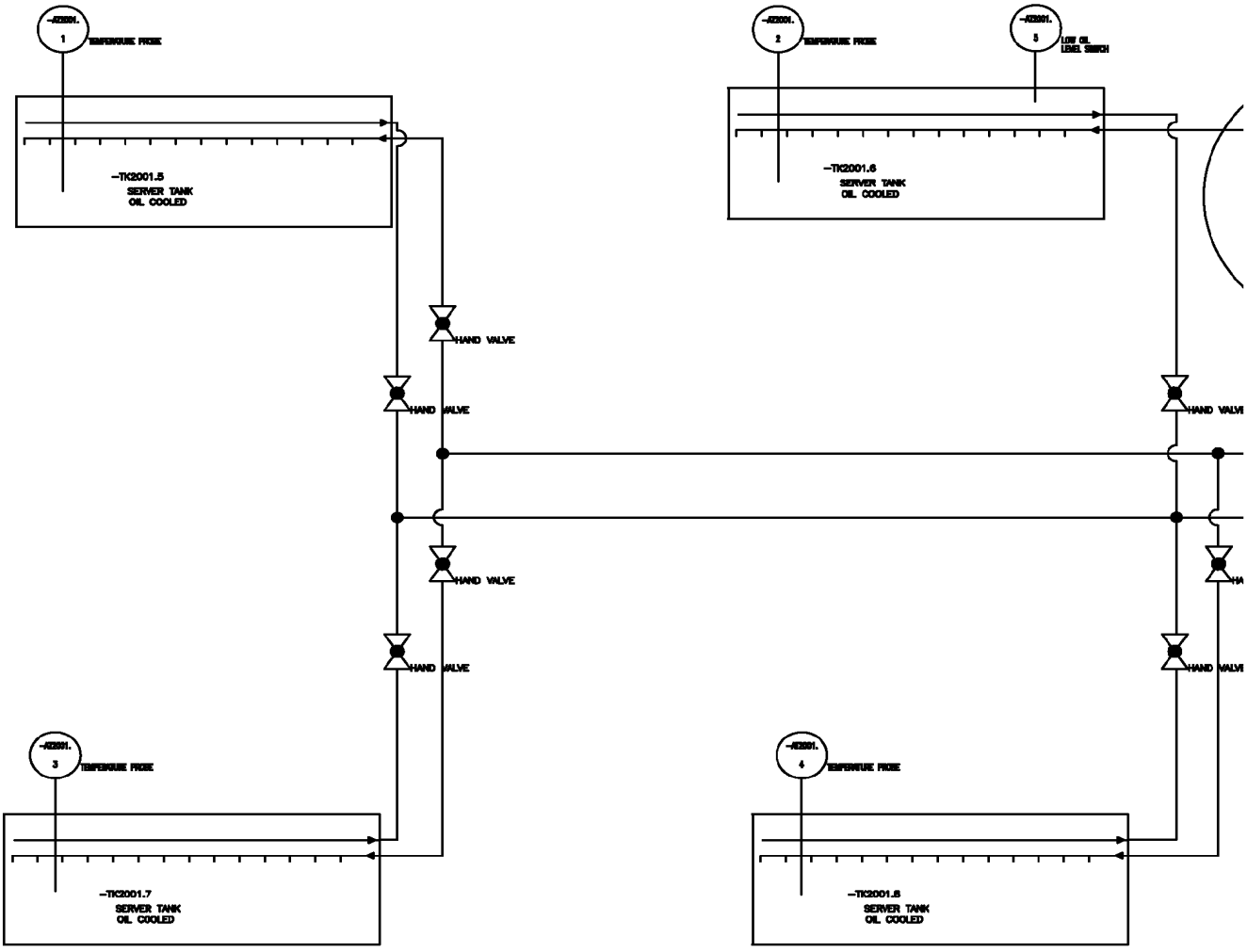


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PH (512) 930-9908
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DWG TITLE

MIDAS
OIL PUMP PER TANK
SIMPLE ON/OFF CONTROL
P&ID

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JOB NO 485-015	DRAWN BY KDS
SIZE A3	DATE 12-19-12
DWG NO	
SHEET NO 1 OF 1	

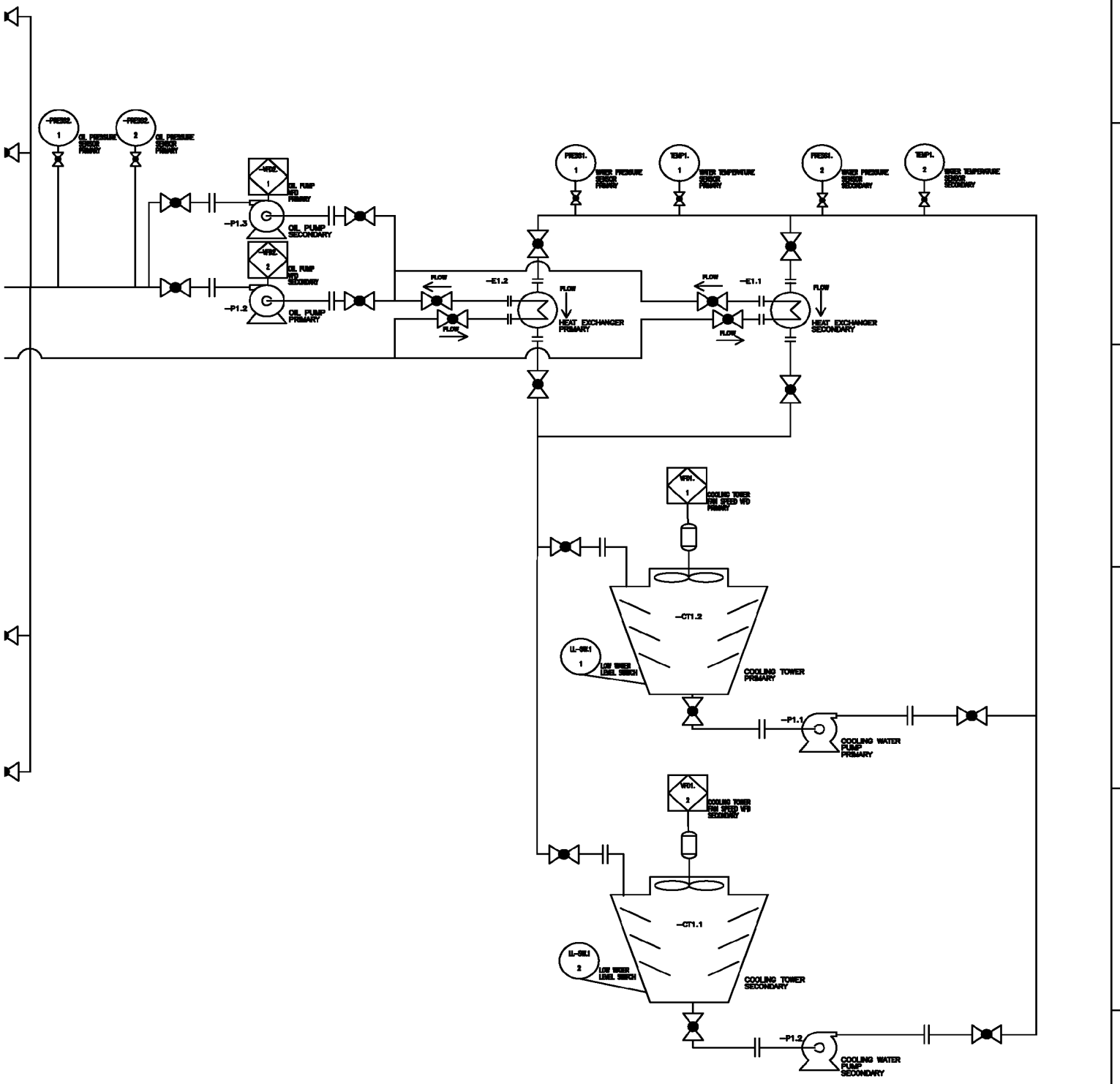


NOTES:
1. ON/OFF CONTROL PER TANK
2, OIL PUMP AT EACH TANK WILL REGULATE FLOW TO TANKS DURING COOLING OPERATION BASED ON HEAT OF EACH TANK.
3. WHEN TEMPERATURE IN ANY SERVER TANK RAISES ABOVE 95 F THE OIL PUMP FOR THAT TANK, WATER PUMP, AND COOLING TOWER FAN ALL START.
4. WHEN TEMPERATURE IN THAT SERVER TANKS DROPS BELOW 95 F THE OIL PUMP TURNS OFF.
5. WHEN THE OIL PUMP TURNS OFF THE WATER PUMP AND COOLING TOWER FAN CONTINUE TO RUN FOR 30 MINUTES.
6. ANY UNUSED SERVER TANKS ARE MANUALLY VALVED OUT.
7. ADDED LEVEL SENSOR TO COOLING TOWER WATER.

NO.	DATE	REVISION	BY
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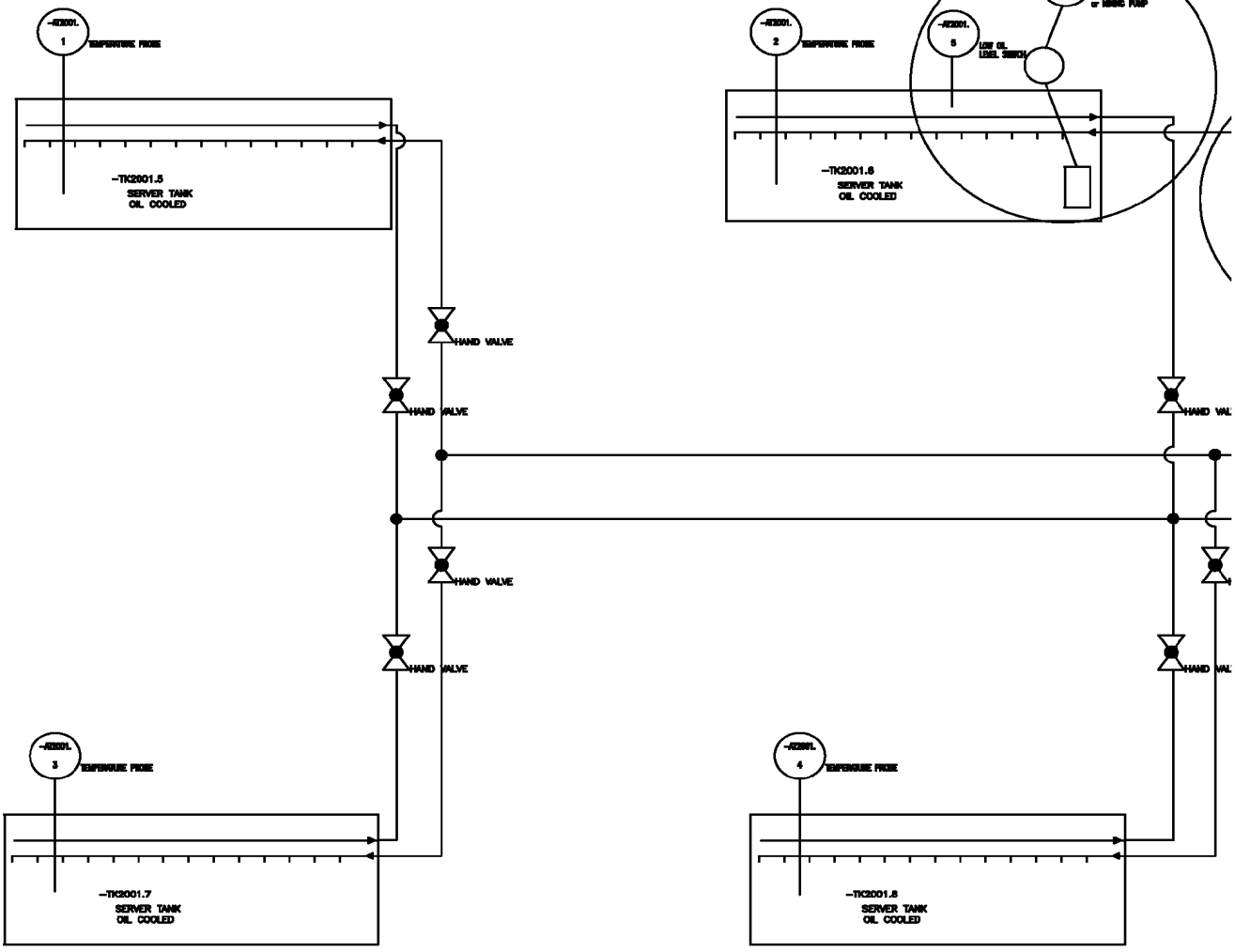
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DWG TITLE

MIDAS
4 TANK SYSTEM
P$ID

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JOB NO 485-015	DRAWN BY KDS
SIZE A3	DATE 12-19-12
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SHEET NO 1 OF 1	



NOTES:

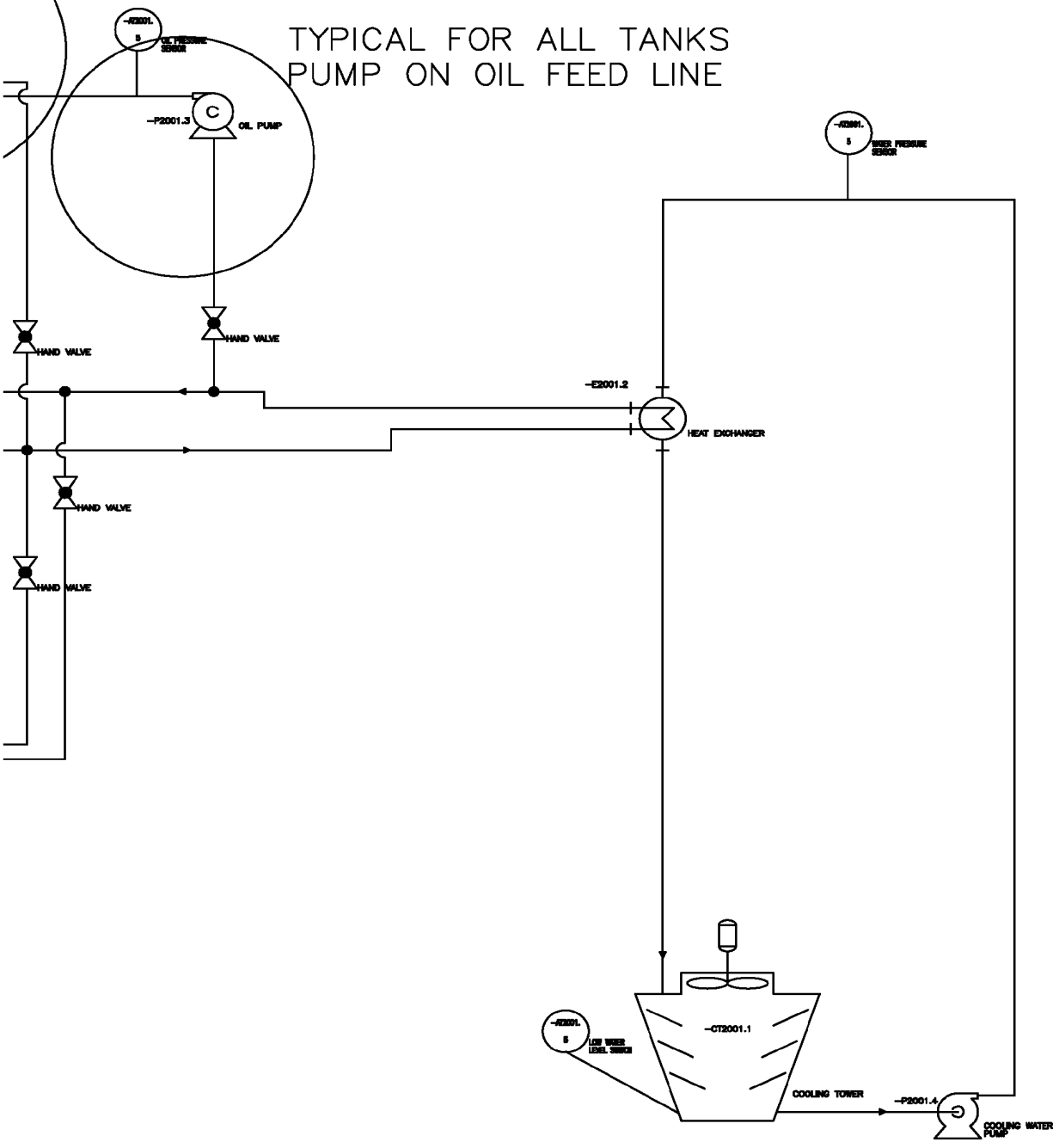
1. ON/OFF CONTROL PER TANK
2, OIL PUMP AT EACH TANK WILL REGULATE FLOW TO TANKS DURING COOLING OPERATION BASED ON HEAT OF EACH TANK.
3. WHEN TEMPERATURE IN ANY SERVER TANK RAISES ABOVE 95 F THE OIL PUMP FOR THAT TANK, WATER PUMP, AND COOLING TOWER FAN ALL START.
4. WHEN TEMPERATURE IN THAT SERVER TANKS DROPS BELOW 95 F THE OIL PUMP TURNS OFF.
5. WHEN THE OIL PUMP TURNS OFF THE WATER PUMP AND COOLING TOWER FAN CONTINUE TO RUN FOR 30 MINUTES.
6. ANY UNUSED SERVER TANKS ARE MANUALLY VALVED OUT.
7. ADDED LEVEL SENSOR TO COOLING TOWER WATER
8. ADDED OPTIONAL TANK STIRRING DEVICE

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STIRRING DEVICE OR MIX PUMP



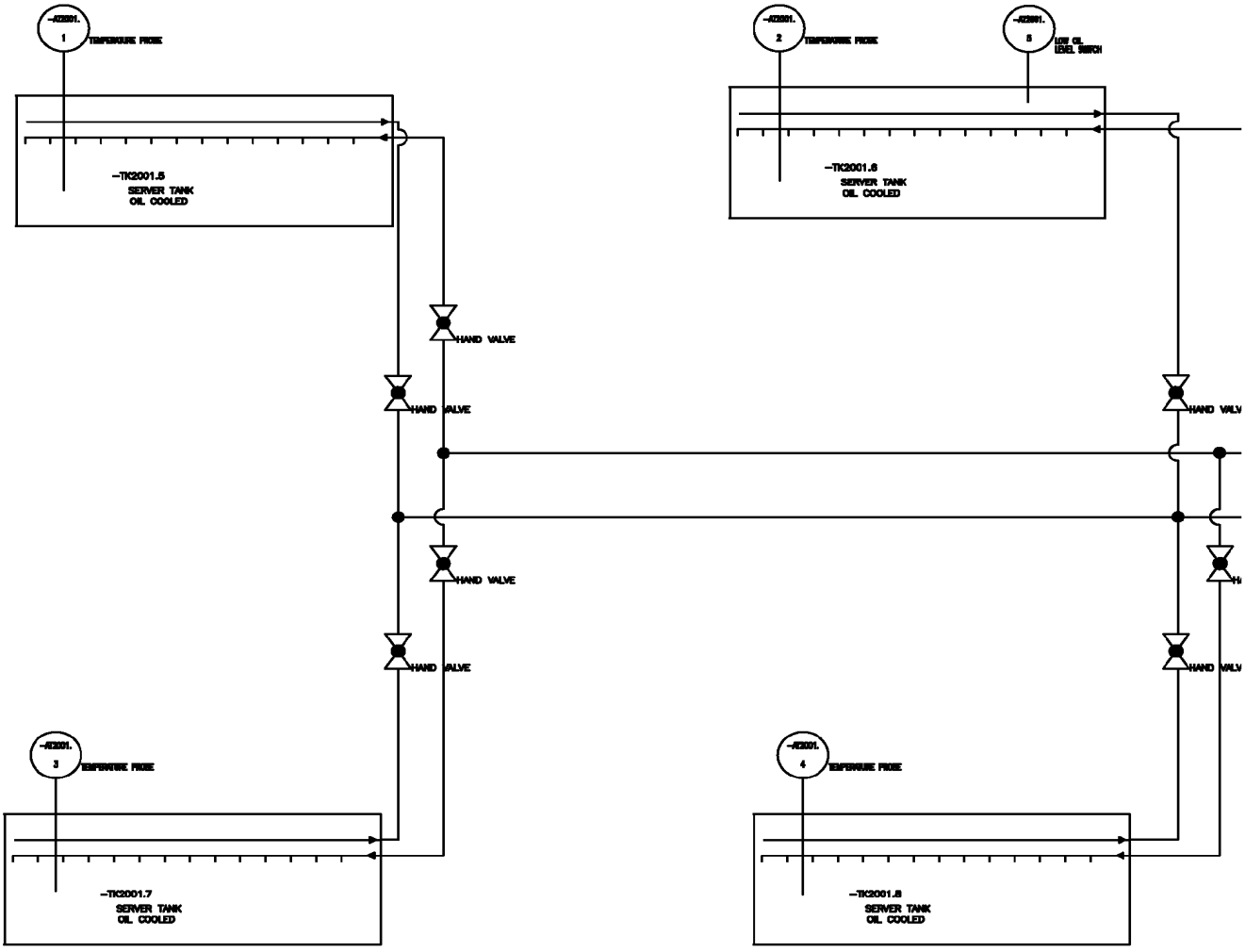
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MIDAS
OIL PUMP PER TANK
SIMPLE ON/OFF CONTROL
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SHEET NO 1 OF 1	



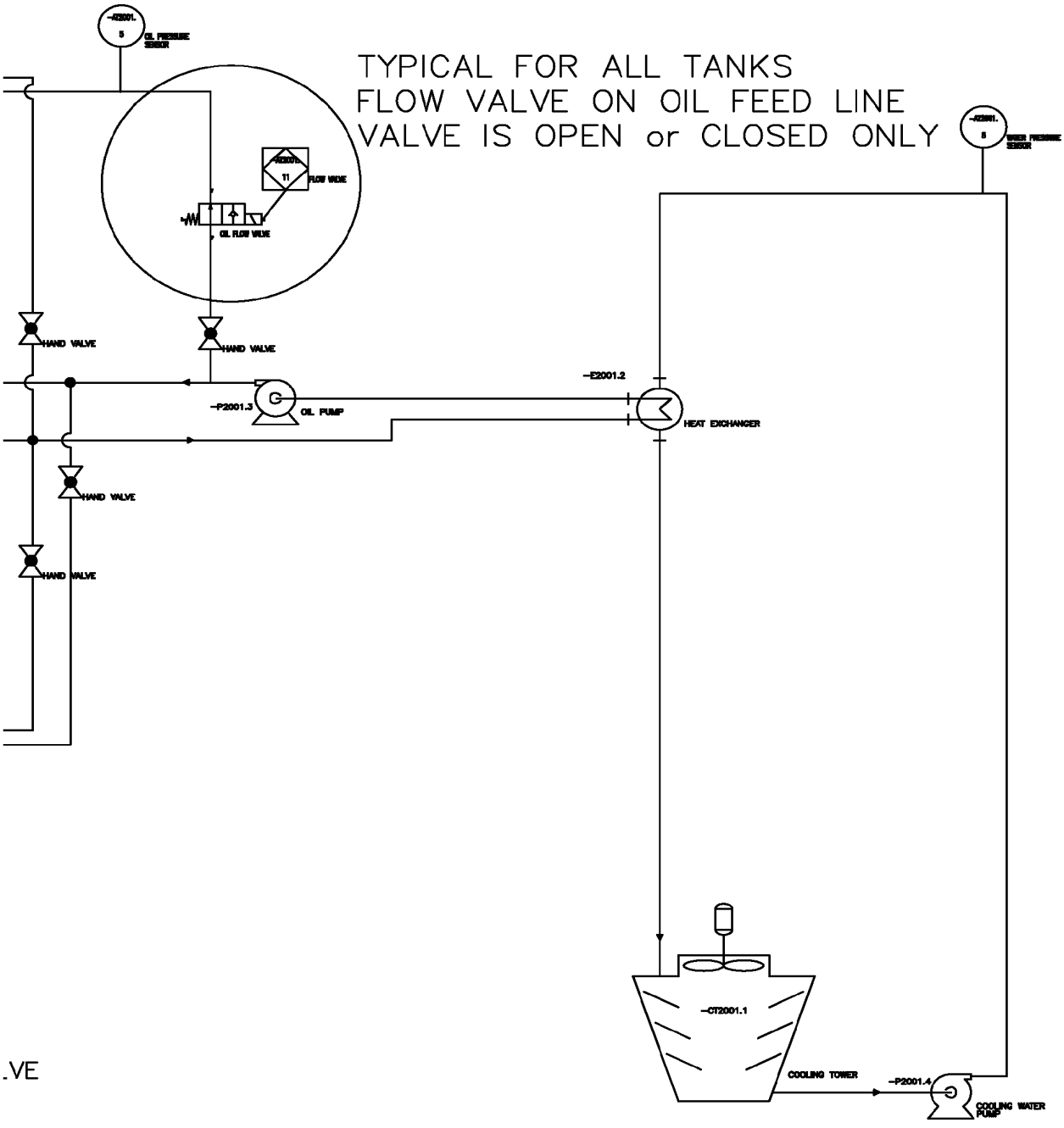
NOTES:

1. ON/OFF CONTROL PER TANK
2, FLOW VALVE AT EACH TANK WILL REGULATE FLOW TO TANKS DURING COOLING OPERATION BASED ON HEAT OF EACH TANK.
3. WHEN TEMPERATURE IN ANY SERVER TANK RAISES ABOVE 95 F THE OIL PUMP, WATER PUMP, AND COOLING TOWER FAN ALL START. ALSO, THE FLOW VALVE FOR THAT TANK OPENS.
4. WHEN TEMPERATURE IN THAT SERVER TANKS DROPS BELOW 95 F THE FLOW VALVE FOR THAT TANK CLOSES.
5. WHEN ALL SERVER TANKS ARE BELOW 95 F THE OIL PUMP TURNS OFF.
5. WHEN THE OIL PUMP TURNS OFF THE WATER PUMP AND COOLING TOWER FAN CONTINUE TO RUN FOR 30 MINUTES.
6. ANY UNUSED SERVER TANKS ARE MANUALLY VALVED OUT.

NO.	DATE	REVISION	BY
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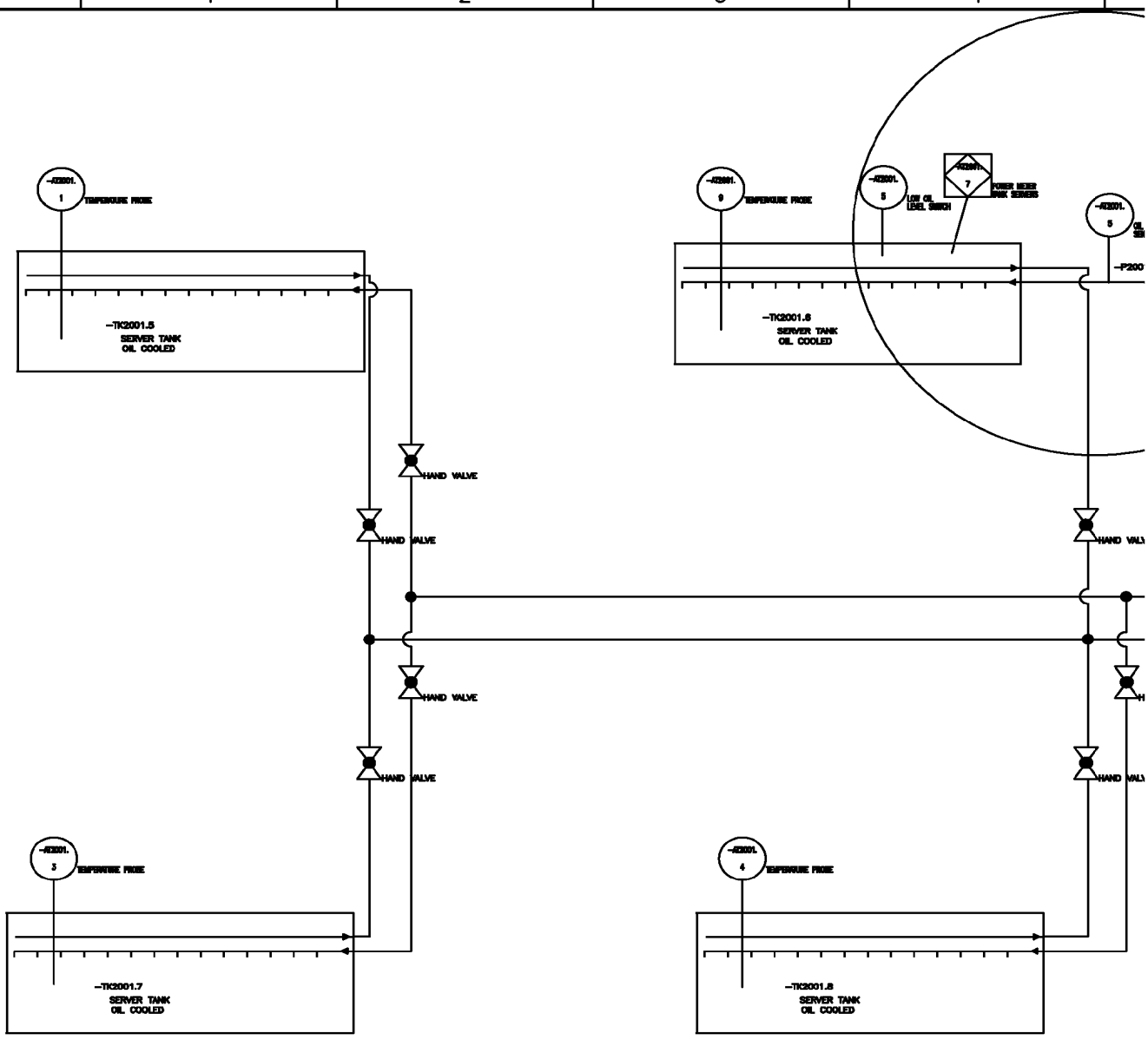
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GEORGETOWN, TEXAS 78627
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FAX (512) 930-9909
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DWG TITLE

MIDAS
VALVE AT EACH TANK
SIMPLE ON/OFF CONTROL
P&ID

APPROVED	CHECKED BY
JOB NO 485-015	DRAWN BY KDS
SIZE A3	DATE 12-19-12
DWG NO	
SHEET NO 1 OF 1	



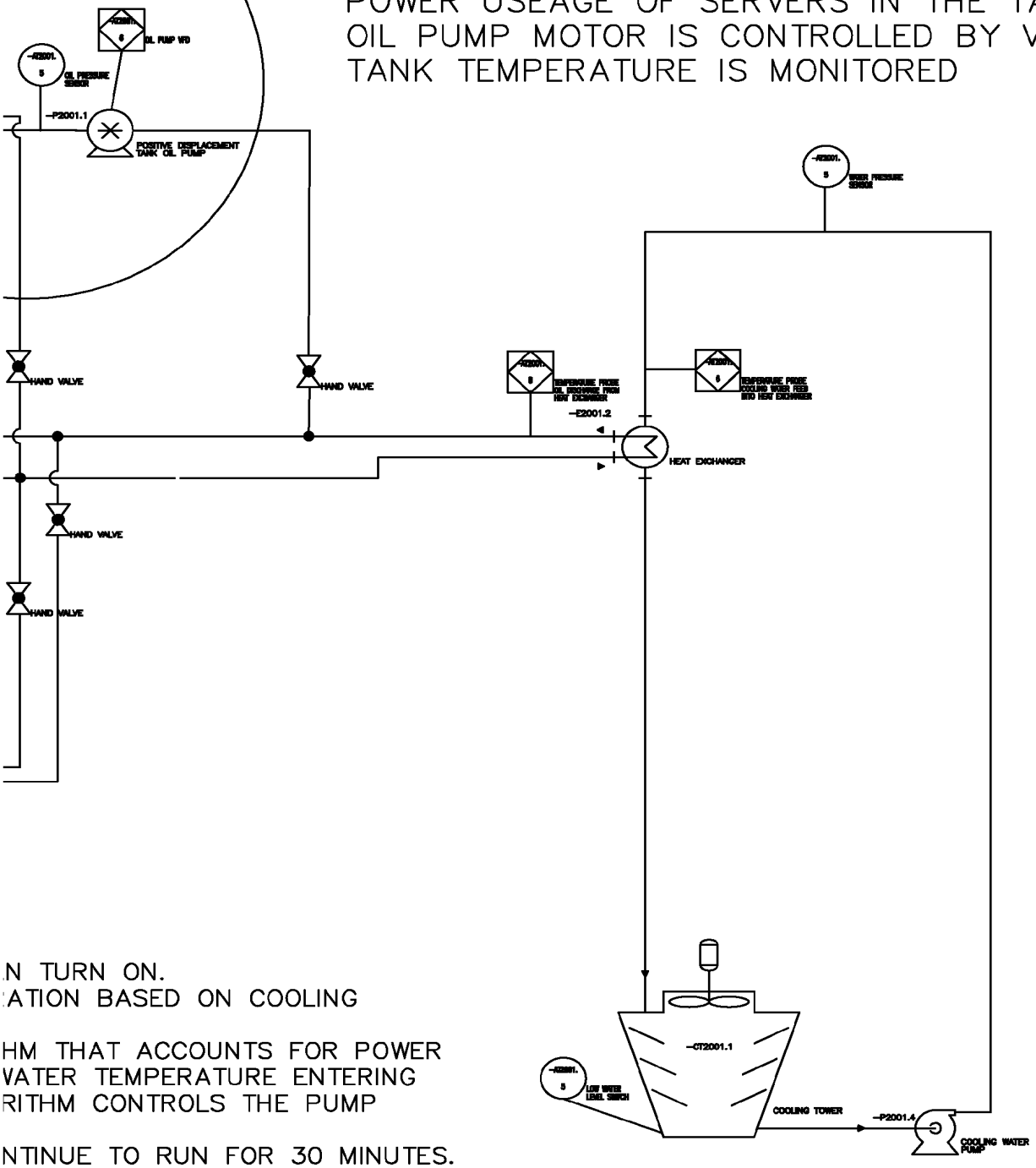
NOTES:
1. PROPORTIONAL CONTROL PER TANK.
2. WHEN ANY OF THE 4 OIL PUMPS RUN THE COOLING TOWER WATER PUMP AND FAN TUI
3, OIL PUMP AT EACH TANK WILL REGULATE FLOW TO TANKS DURING COOLING OPERATION REQUIREMENTS OF EACH TANK.
4. CONTROL OF TEMPERATURE IN EACH TANK IS BASE ON A FEEDFORWARD ALGORITHM TH USED BY SERVERS IN THE TANK, TANK TEMP, EFF. OF HEAT EXCHANGER, COOLING WATER THE HEAT EXCHANGER, REQUIREMENTS OF ALL 4 TANKS. THE OUTPUT OF THE ALGORITHM SPEED.
5. WHEN ALL OIL PUMPS TURN OFF THE WATER PUMP AND COOLING TOWER FAN CONTINU
6. ANY UNUSED SERVER TANKS ARE MANUALLY VALVED OUT.

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TYPICAL FOR ALL TANKS, POWER STRIP MONITORS POWER USEAGE OF SERVERS IN THE TANK, TANK OIL PUMP MOTOR IS CONTROLLED BY VFD, OIL TANK TEMPERATURE IS MONITORED



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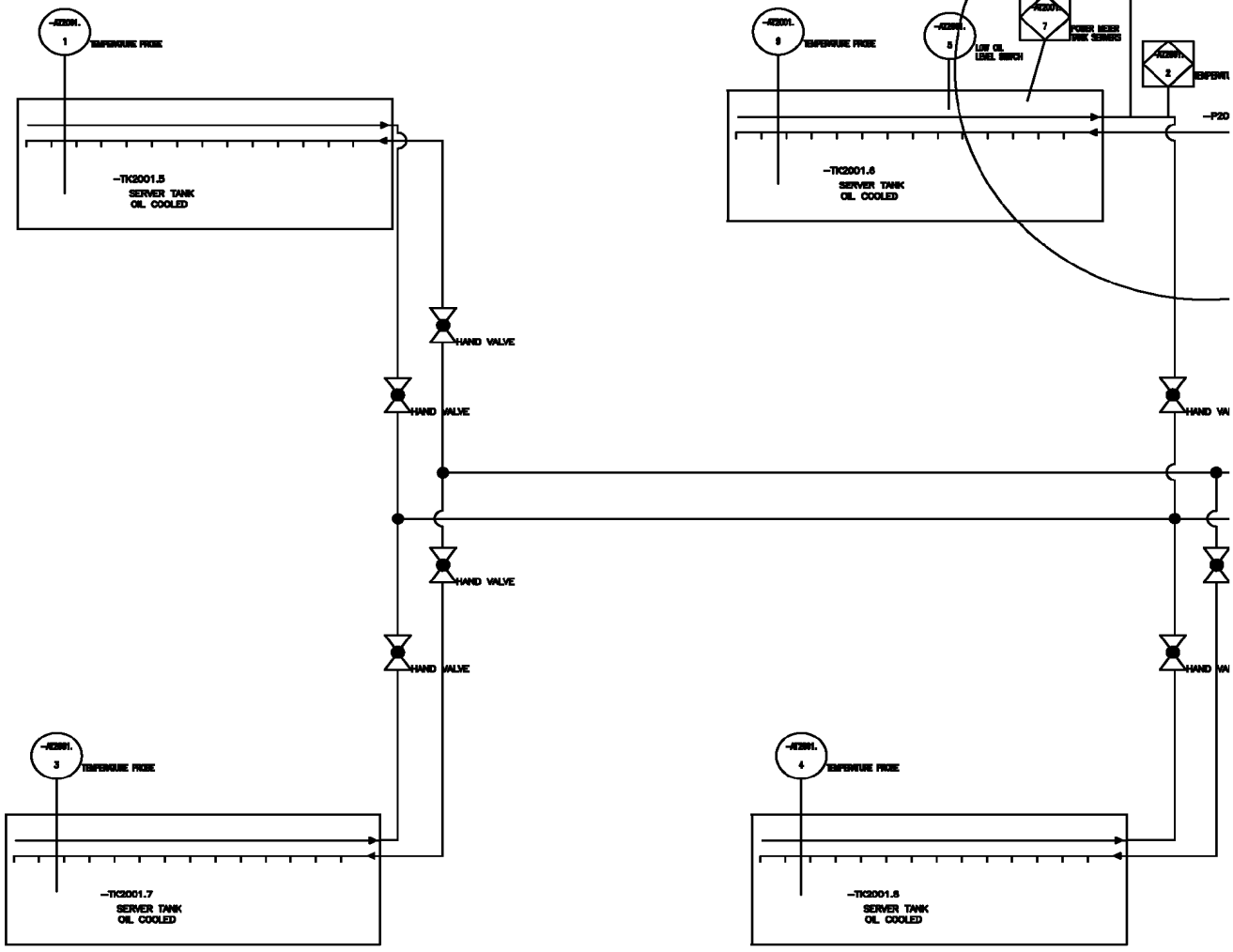
EERING, INC.

P.O. BOX 5063
GEORGETOWN, TEXAS 78627
PH (512) 930-9908
FAX (512) 930-9909
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DWG TITLE

MIDAS
OIL VFDs, TEMP PROBE
PROPORTIONAL CONTROL
P&ID

APPROVED	CHECKED BY
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SIZE A3	DATE 12-19-12
DWG NO	
SHEET NO 1 OF 1	



NOTES:

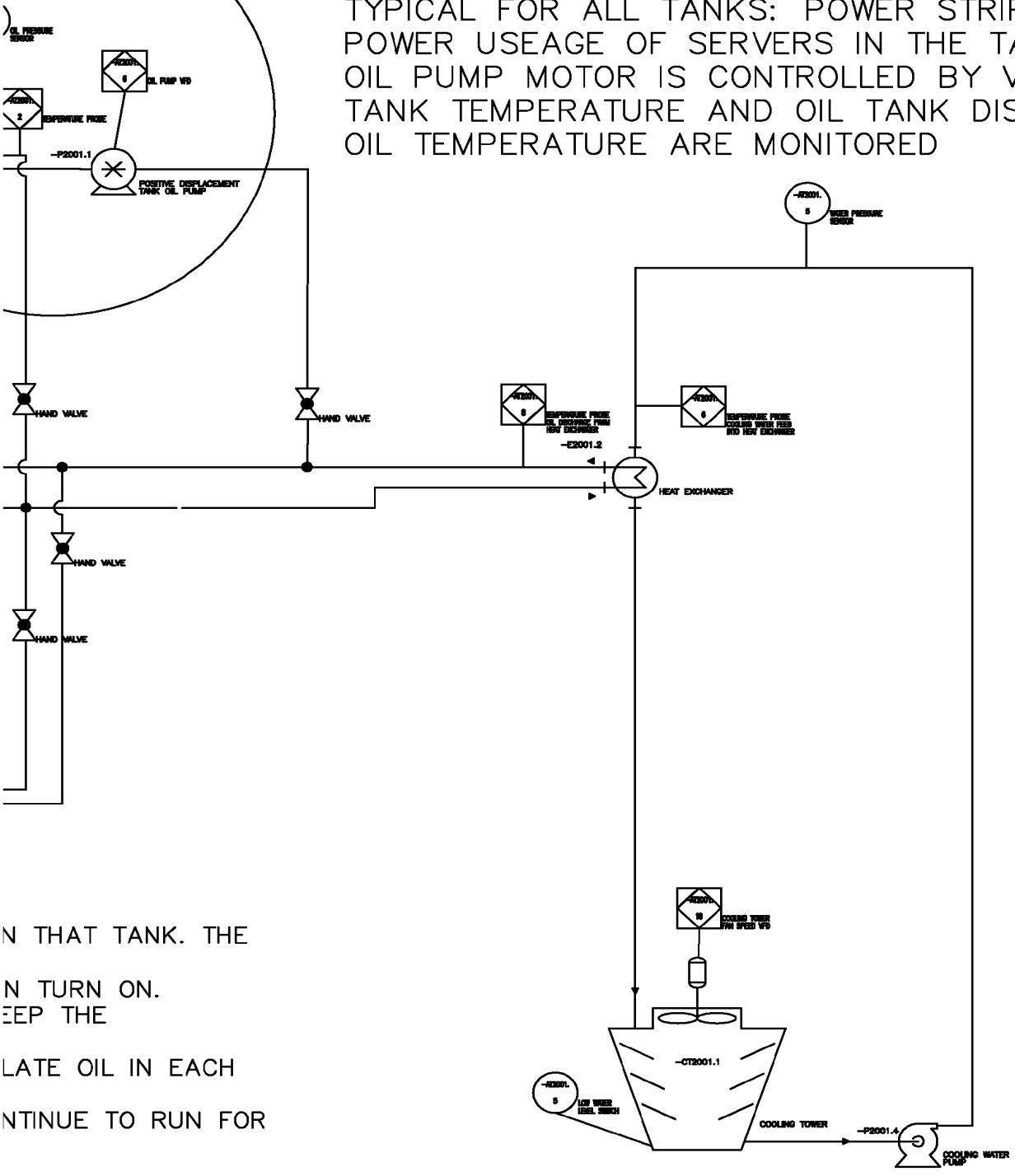
1. PROPORTIONAL CONTROL PER TANK. BASED ON THE POWER USAGE OF SERVERS IN THA OIL PUMP SPEED IS BASED ON THE COOLING NEEDS OF IT'S TANK.
2. WHEN ANY OF THE 4 OIL PUMPS RUN THE COOLING TOWER WATER PUMP AND FAN TUI
3, WHEN RUNNING THE COOLING TOWER FAN SPEED IS CONTROLLED BY A VFD TO KEEP T TEMPERATURE OF THE COOLING WATER ENTERING THE HEAT EXCHANGER AT 95 F.
4. TANK OIL PUMPS CAN BE RAN AT A SLOW SPEED (20%) ALL THE TIME TO CIRCULATE TANK TO PREVENT ANY HOT SPOTS.
5. WHEN ALL OIL PUMPS TURN OFF THE WATER PUMP AND COOLING TOWER FAN CONTINU 30 MINUTES.
6. ANY UNUSED SERVER TANKS ARE MANUALLY VALVED OUT.

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TYPICAL FOR ALL TANKS: POWER STRIP MONITORS POWER USEAGE OF SERVERS IN THE TANK, TANK OIL PUMP MOTOR IS CONTROLLED BY VFD, OIL TANK TEMPERATURE AND OIL TANK DISCHARGE OIL TEMPERATURE ARE MONITORED



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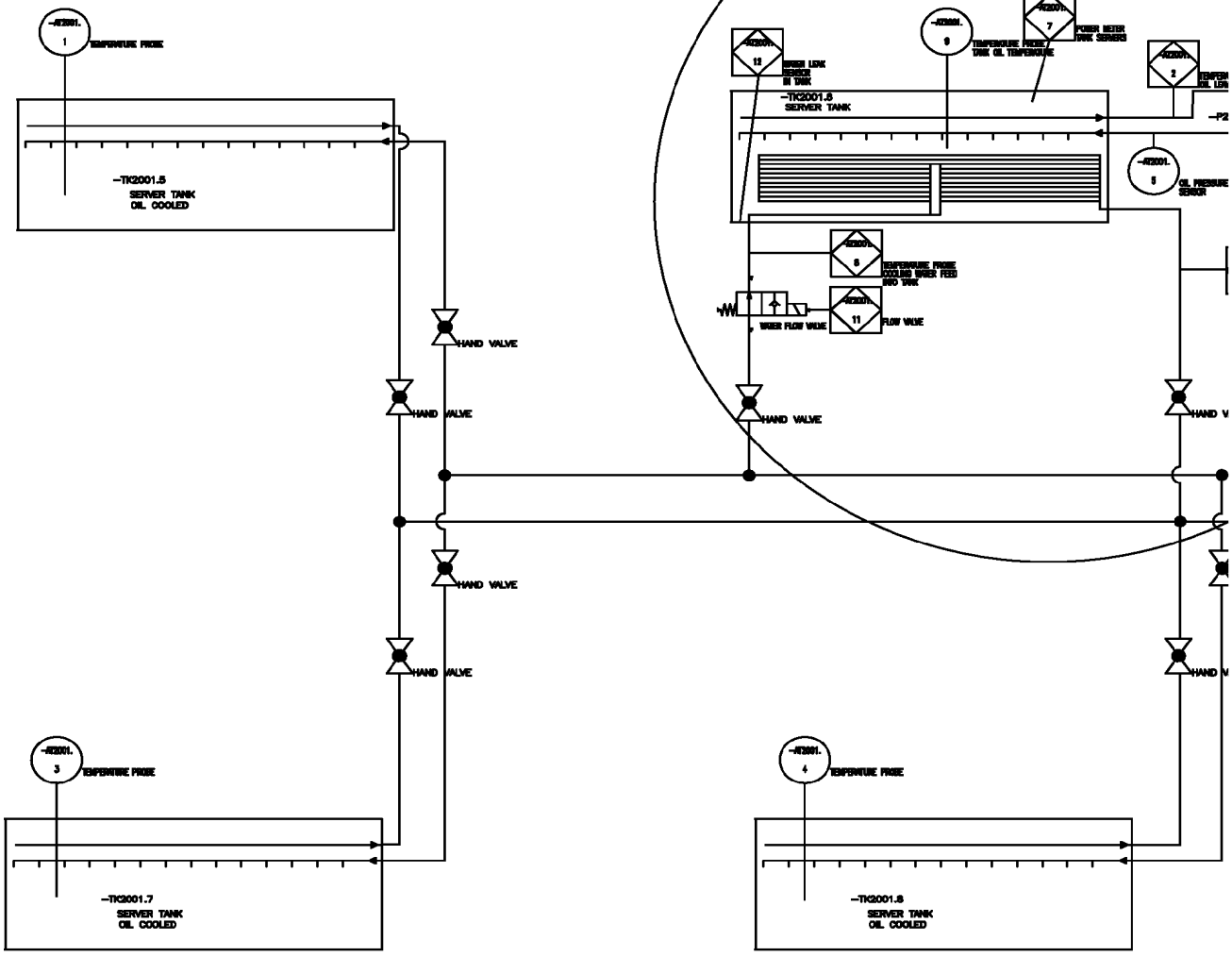
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PROPORTIONAL CONTROL
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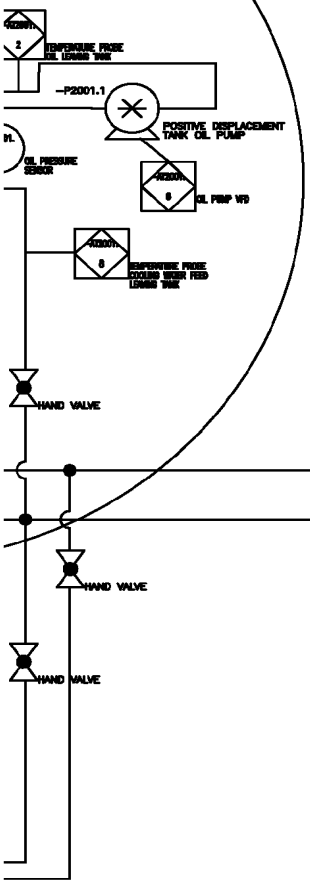
1. PROPORTIONAL CONTROL PER TANK. BASED ON THE POWER USAGE OF SERVERS IN TH. OIL PUMP SPEED IS BASED ON THE COOLING NEEDS OF IT'S TANK.
2. WHEN ANY OF THE 4 OIL PUMPS RUN THE COOLING TOWER WATER PUMP AND FAN TU
3, WHEN RUNNING THE COOLING TOWER FAN SPEED IS CONTROLLED BY A VFD TO KEEP T TEMPERATURE OF THE COOLING WATER ENTERING THE SUPPLY MANIFOLD AT 95 F.
4. TANK OIL PUMPS CAN BE RAN AT A SLOW SPEED (20%) ALL THE TIME, OR ON A TIME CIRCULATE OIL IN EACH TANK TO PREVENT ANY HOT SPOTS.
5. WHEN ALL OIL PUMPS TURN OFF THE WATER PUMP AND COOLING TOWER FAN CONTINU 30 MINUTES.
6. ANY UNUSED SERVER TANKS ARE MANUALLY VALVED OUT.

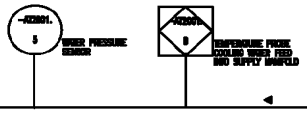
NO.	DATE	REVISION	BY
A	12-19-12	ORIGINAL ISSUE	KDS

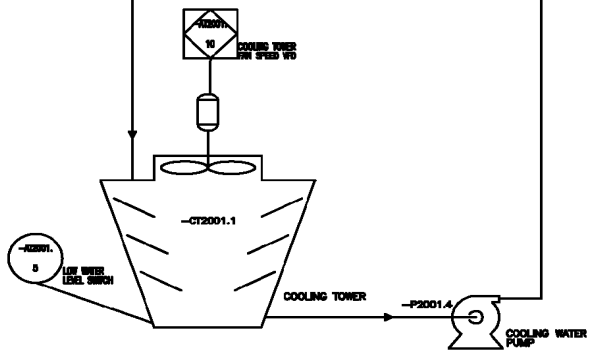
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TYPICAL FOR ALL TANKS: POWER STRIP MONITORS POWER USEAGE OF SERVERS IN THE TANK, TANK OIL PUMP MOTOR IS CONTROLLED BY VFD, OIL TANK TEMPERATURE AND OIL TANK DISCHARGE OIL TEMPERATURE ARE MONITORED







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EERING, INC.

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GEORGETOWN, TEXAS 78627
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DWG TITLE

MIDAS
OIL VFDs & FAN VFD
PROPORTIONAL CONTROL
P&ID

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JOB NO 485-015	DRAWN BY KDS
SIZE A3	DATE 12-19-12
DWG NO	
SHEET NO 1 OF 1	

Electronic Acknowledgement Receipt

EFS ID:	15976940
Application Number:	61832211
International Application Number:	
Confirmation Number:	3648
Title of Invention:	Server Immersion Tank System
First Named Inventor/Applicant Name:	John H. Miller, Jr.
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-02
Receipt Date:	07-JUN-2013
Filing Date:	
Time Stamp:	11:25:35
Application Type:	Provisional

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$130
RAM confirmation Number	9123
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Provisional Cover Sheet (SB16)	JMG001_PCS_130607.pdf	2071470 24eabb671de54338a9d2554724aa6164b6054bb2	no	4
Warnings:					
Information:					
2	Specification	JMG001_p_130607.pdf	459013 8d41ea3e4b21764de986ba992fdee13e5931e37e	no	14
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	28954 e3fba237d162734cee0dc2bbaf4bb91f1b56b33d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2559437		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

WIPO
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INTELLECTUAL PROPERTY
ORGANIZATION

DOCUMENT MADE AVAILABLE UNDER THE PATENT COOPERATION TREATY (PCT)

International application number:		**PCT/US2013/075126**
International filing date:		**13 December 2013 (13.12.2013)**
Document type:		**Certified copy of priority document**
Document details:	Country/Office:	**US**
	Number:	**61/832,211**
	Filing date:	**07 June 2013 (07.06.2013)**
Date of receipt at the International Bureau:		**03 January 2014 (03.01.2014)**

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a),(b) or (b-*bis*)

34, chemin des Colombettes
1211 Geneva 20, Switzerland
www.wipo.int

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
14/355,533	Christopher L. Boyd	JMG001-01

44070
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

INTERNATIONAL APPLICATION NO.	
PCT/US13/75126	
I.A. FILING DATE	PRIORITY DATE
12/13/2013	12/14/2012

CONFIRMATION NO. 3995
371 FORMALITIES LETTER

OC000000074004906

Date Mailed: 03/18/2015

Notification of Insufficiency Under 37 CFR 1.492 and/or 1.495 (DO/EO/US)

The following items have been submitted by the applicant or the International Bureau to the United States Patent and Trademark Office as a Designated / Elected Office (37 CFR 1.495).

- Indication of Small Entity Status
- Priority Document
- Copy of the International Application filed on 04/30/2014
- English Translation of the IA filed on 04/30/2014
- Copy of the International Search Report filed on 04/30/2014
- Copy of IPE Report filed on 04/30/2014
- Inventor's Oath or Declaration filed on 04/30/2014
- Request for Immediate Examination filed on 04/30/2014
- U.S. Basic National Fees filed on 04/30/2014
- Priority Documents filed on 04/30/2014
- Power of Attorney filed on 04/30/2014
- Application Data Sheet (37 CFR 1.76) filed on 04/30/2014

The following items **MUST** be furnished within the period set forth below:

- To avoid abandonment, a surcharge (for late submission of search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.492(h) of $70 for a small entity in compliance with 37 CFR 1.27 , must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fees required for this application is $**490** for a Small Entity:

- $**70** Surcharge.
- The application search fee has not been paid. Applicant must submit $**60** to complete the search fee. Note a surcharge will be required if submitted later than commencement of the national stage (37 CFR 1.492(h)).
- The application examination fee has not been paid. Applicant must submit $**360** to complete the examination fee for a small entity in compliance with 37 CFR 1.27. Note a surcharge will be required if submitted later than commencement of the national stage (37 CFR 1.492(h)) and the basic national fee was not paid before July 1, 2005.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTHS FROM THE DATE OF THIS NOTICE. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 379 of 656; IPR2025-00196

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

PATRICIA A BOOKER

Telephone: (571) 272-3882

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/355,533	04/30/2014		140	JMG001-01	10	2

CONFIRMATION NO. 3995

44070
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

FILING RECEIPT

OC000000074004905

Date Mailed: 03/18/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Christopher L. Boyd, Austin, TX;
James P. Koen, Round Rock, TX;
David Christopher Laguna, Austin, TX;
Thomas R. Turner, Georgetown, TX;
Kenneth D. Swinden, Hutto, TX;
Mario Conti Garcia, Austin, TX;
John Charles Tribou, Austin, TX;

Applicant(s)

Christopher L. Boyd, Austin, TX;
James P. Koen, Round Rock, TX;
David Christopher Laguna, Austin, TX;
Thomas R. Turner, Georgetown, TX;
Kenneth D. Swinden, Hutto, TX;
Mario Conti Garcia, Austin, TX;
John Charles Tribou, Austin, TX;

Assignment For Published Patent Application

MIDAS GREEN TECHNOLOGY, LLC, Austin, TX

Power of Attorney: The patent practitioners associated with Customer Number 44070

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/US13/75126 12/13/2013
which claims benefit of 61/737,200 12/14/2012
and claims benefit of 61/832,211 06/07/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 03/16/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/355,533**

Projected Publication Date: 06/25/2015

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

Appliance Immersion Cooling System

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative,

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 384 of 656; IPR2025-00196

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/355,533

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	140		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	60		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	560		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
14355533	

Applicant(s) Christopher Boyd

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1					
2		1				
3		1				
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6	1					
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Total Indep	2		0		0	
Total Depend	8	↵	0	↵	0	↵
Total Claims	10		0		0	

	*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend
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J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

Courtesy Reminder for
Application Serial No: 14/355,533

Attorney Docket No: JMG001-01
Customer Number: 44070
Date of Electronic Notification: 03/18/2015

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

To view your correspondence online or update your email addresses, please visit us anytime at **https://sportal.uspto.gov/secure/myportal/privatepair.** If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.

Electronic Patent Application Fee Transmittal

Application Number:	14355533
Filing Date:	30-Apr-2014
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Filer:	Jeffrey Van Myers
Attorney Docket Number:	JMG001-01

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Natl Stage Search Fee - U.S. was the ISA	2641	1	60	60
Natl Stage Exam Fee - all other cases	2633	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**490**

Electronic Acknowledgement Receipt

EFS ID:	22613959
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	12-JUN-2015
Filing Date:	30-APR-2014
Time Stamp:	12:10:13
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$490
RAM confirmation Number	22629
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	35738 6ae6a0fda6169befc97d52bf5062a6ae47ca980d	no	2

Warnings:

Information:

Total Files Size (in bytes):	35738

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Patent Application Fee Transmittal

Application Number:	14355533
Filing Date:	30-Apr-2014
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Filer:	Jeffrey Van Myers
Attorney Docket Number:	JMG001-01

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	2251	1	100	100
Miscellaneous:				
		Total in USD ($)		**100**

Electronic Acknowledgement Receipt

EFS ID:	22624525
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	13-JUN-2015
Filing Date:	30-APR-2014
Time Stamp:	15:43:50
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$100
RAM confirmation Number	7032
Deposit Account	
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	29968 ea655fd1ea8ac08e871c8047bf58406646cd5873	no	2

Warnings:

Information:

Total Files Size (in bytes):	29968

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	22624525
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	13-JUN-2015
Filing Date:	30-APR-2014
Time Stamp:	15:43:50
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$100
RAM confirmation Number	7032
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	29968 ea655fd1ea8ac08e871c8047bf58406646cd5873	no	2

Warnings:

Information:

Total Files Size (in bytes):	29968

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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New International Application Filed with the USPTO as a Receiving Office
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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01

CONFIRMATION NO. 3995

44070
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

PUBLICATION NOTICE



Title: Appliance Immersion Cooling System

Publication No.US-2015-0181762-A1
Publication Date:06/25/2015

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 398 of 656; IPR2025-00196

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/355,533	04/30/2014	3744	560	JMG001-01	10	2

CONFIRMATION NO. 3995

UPDATED FILING RECEIPT

44070
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

OC000000075754976

Date Mailed: 06/26/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Christopher L. Boyd, Austin, TX;
James P. Koen, Round Rock, TX;
David Christopher Laguna, Austin, TX;
Thomas R. Turner, Georgetown, TX;
Kenneth D. Swinden, Hutto, TX;
Mario Conti Garcia, Austin, TX;
John Charles Tribou, Austin, TX;

Applicant(s)

Christopher L. Boyd, Austin, TX;
James P. Koen, Round Rock, TX;
David Christopher Laguna, Austin, TX;
Thomas R. Turner, Georgetown, TX;
Kenneth D. Swinden, Hutto, TX;
Mario Conti Garcia, Austin, TX;
John Charles Tribou, Austin, TX;

Assignment For Published Patent Application

MIDAS GREEN TECHNOLOGY, LLC, Austin, TX

Power of Attorney: The patent practitioners associated with Customer Number 44070

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/US13/75126 12/13/2013
which claims benefit of 61/737,200 12/14/2012
and claims benefit of 61/832,211 06/07/2013

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 03/16/2015

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/355,533**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

Appliance Immersion Cooling System

Preliminary Class

165

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/355,533

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	140		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	60		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	560		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
14/355,533	Christopher L. Boyd	JMG001-01

44070
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

INTERNATIONAL APPLICATION NO.	
PCT/US13/75126	
I.A. FILING DATE	PRIORITY DATE
12/13/2013	12/14/2012

CONFIRMATION NO. 3995
371 ACCEPTANCE LETTER

OC000000075754977

Date Mailed: 06/26/2015

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

04/30/2014
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Indication of Small Entity Status
- Copy of the International Application filed on 04/30/2014
- English Translation of the IA filed on 04/30/2014
- Copy of the International Search Report filed on 04/30/2014
- Copy of IPE Report filed on 04/30/2014
- Inventor's Oath or Declaration filed on 04/30/2014
- Request for Immediate Examination filed on 04/30/2014
- U.S. Basic National Fees filed on 04/30/2014
- Priority Documents filed on 04/30/2014
- Power of Attorney filed on 04/30/2014
- Application Data Sheet (37 CFR 1.76) filed on 04/30/2014

Petitioner Green Revolution Cooling, Inc., Ex-1002
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Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

PATRICIA A BOOKER

Telephone: (571) 272-3882

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 405 of 656; IPR2025-00196

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 11/04/2016

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
11/04/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

Office Action Summary	Application No. 14/355,533	Applicant(s) BOYD ET AL.	
	Examiner DEVON RUSSELL	Art Unit 3744	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4/30/14*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-10* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-10* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *4/30/14* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2 and 7 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

The term “tightly co-located” is not sufficiently understood, or specially defined by the specification, for its metes and bounds to be definite.

Claim Rejections - 35 USC § 103

3. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-10 are rejected under pre-AIA 35 U.S.C. 102 (b) as anticipated by Best (US 2011/0132579) or, in the alternative, under pre-AIA 35 U.S.C. 103(a) as obvious over Best in view of Pfahnl et al. (US 2006/0126292).

Regarding claims 1 and 6, Best teaches an appliance immersion cooling system comprising: a tank (e.g. 610, 710, 810) adapted to immerse (622, 722, 822) in a dielectric fluid (Para. [0025]) a plurality of electrical appliances (120), each in a respective appliance slot (Figs. 4, 6, 11) distributed vertically along, and extending transverse to, a long wall of the tank (L; e.g. Figs. 3-4), the tank comprising: a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (Para. [0102]; the “common manifold area" defined by the tops of the slots and the devices 120, 820);

a primary circulation facility adapted to circulate the dielectric fluid through the tank (see 440/450, 540/550, etc.), comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (Para. [0086]; Figs. 5-6; H_L); 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 (150; 250; 350); and a control facility adapted 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 (380, 370; Fig. 2, “temp data”).

If it is not accepted that Best positively discloses the weir, Pfahnl also teaches a cooling system wherein a dielectric fluid (air) as a coolant fully surrounds a rack (see figures) of electrical appliances (servers) in a tank (118), wherein the dielectric fluid is introduced (via 110a) into a plenum (110) positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (as directed by openings 122) and a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots (the bottom wall of 112 with openings 122)adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (via 122).

It would have been obvious to one of ordinary skill in the art at the time of the invention to form the manifold of Best with the weir formed as a bottom wall of said manifold with holes opening between each of the electronic device slots, as taught by Pfahnl, such that the dielectric fluid would still be directed in its proper flow direction despite the lack of a full rack of electronic devices.

Best further teaches that: the tank and primary circulation facility comprise a tightly co-located module (the devices are all inherently physically connected to one

another and located in the same facility; see also Figs. 1B or 11), as per claims 2 and 7; interconnect panel facilities adapted to mount appliance support equipment (840), as per claims 3 and 8; first and second primary circulation sub-facilities (880 on the left/right of tank; e.g. Fig. 14), each adapted to operate independently to circulate the dielectric fluid through the tank (see Fig. 14), the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature (Para. [0082]), as per claims 4 and 9; and, the control facility (380) further comprises a communication facility (its software; Para. [0082] which performs the communications) adapted to facilitate monitoring and control of the control facility from a remote location (Para. [0081]-[0082]), as per claims 5 and 10.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVON RUSSELL whose telephone number is (571)270-1858. The examiner can normally be reached on M-Th, 9-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alex Elve can be reached on 571.272.1173. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DEVON RUSSELL/
Examiner, Art Unit 3744

Notice of References Cited	Application/Control No. 14/355,533	Applicant(s)/Patent Under Reexamination BOYD ET AL.	
	Examiner DEVON RUSSELL	Art Unit 3744	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-4,590,538 A	05-1986	Cray, Jr.; Seymour R.	H05K7/20236	361/700
*	B	US-5,167,511 A	12-1992	Krajewski; Nicholas J.	H01R4/01	361/785
*	C	US-5,297,621 A	03-1994	Taraci; Richard	G01R31/2891	165/104.13
*	D	US-2005/0259402 A1	11-2005	Yasui, Hidehiko	H02M7/003	361/716
*	E	US-2006/0126292 A1	06-2006	Pfahnl; Andreas C.	H05K7/20563	361/695
*	F	US-2006/0274501 A1	12-2006	Miller; Charles A.	G01R31/2863	361/690
*	G	US-2011/0075353 A1	03-2011	Attlesey; Chad Daniel	G06F1/20	361/679.47
*	H	US-2011/0240281 A1	10-2011	Avery; Randall N.	G05D23/1917	165/287
*	I	US-2011/0132579 A1	06-2011	Best; Christiaan Scott	H05K7/20763	165/104.31
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	Art Unit
	DEVON RUSSELL	3744

CPC- SEARCHED		
Symbol	Date	Examiner
H05K7/20236	11/1/16	DR

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
see EAST history	11/1/16	DR

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/DEVON RUSSELL/ Examiner.Art Unit 3744	

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BIB DATA SHEET

CONFIRMATION NO. 3995

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/355,533	04/30/2014 RULE	165	3744	JMG001-01

APPLICANTS

INVENTORS

Christopher L. Boyd, Austin, TX;
James P. Koen, Round Rock, TX;
David Christopher Laguna, Austin, TX;
Thomas R. Turner, Georgetown, TX;
Kenneth D. Swinden, Hutto, TX;
Mario Conti Garcia, Austin, TX;
John Charles Tribou, Austin, TX;

**** CONTINUING DATA ***************************

This application is a 371 of PCT/US13/75126 12/13/2013
which claims benefit of 61/737,200 12/14/2012
and claims benefit of 61/832,211 06/07/2013

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
03/16/2015

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /DEVON L RUSSELL/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		TX	7	10	2

ADDRESS

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619
UNITED STATES

TITLE

Appliance Immersion Cooling System

FILING FEE RECEIVED		
560	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	466	h05k7/20236.cpc.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/11/01 10:51
S2	1	14/355533.app.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/28 15:36
S3	8	("4590538" "5167511").pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/10/28 15:38
S4	2	("4590538" "5167511").pn.	US-PGPUB; USPAT	OR	ON	2016/10/28 15:40
S5	4	("20110132579" "20060126292" "20110075353" "20110240281").pn.	US-PGPUB; USPAT	OR	ON	2016/10/28 15:41
S6	53	("20060064709" | "20070213000" | "20080158818" | "7318322" | "7911782" | "20040246683" | "7184269" | "20060123436" | "20070199340" | "5297621" | "7307841" | "7609518" | "20110075353" | "7911793" | "20100290190" | "20110132579" | "20030053293" | "20080026509" | "8009419" | "20060274501" | "20070025081" | "4834257" | "20080029250" | "20070267741" | "7210304" | "20100246118" | "7086247" | "7905106" | "6374627" | "6600656" | "20040008490" | "20100302678" | "20110240281" | "20020185262" | "20050114876" | "20060250755" | "20090260777" | "7403392" | "20060135042" | "20030127240" | "20050259402" | "20080030945" | "20070034360" | "20100226094" | "20050083657" | "20060026610" | "20080017355" | "20080055845" | "6909606" | "20080196870" | "6621707" | "20070006599" | "20080017355" | "7318322" | "4590538").PN.	US-PGPUB; USPAT	OR	ON	2016/10/28 15:59

11/ 1/ 2016 10:53:00 AM
C:\ Users\ drussell1\ Documents\ EAST\ Workspaces\ 14355533.wsp

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/01/2016								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 12/07/2016

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
12/07/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/355,533	BOYD ET AL.	
	Examiner	Art Unit	
	DEVON RUSSELL	3744	

All participants (applicant, applicant's representative, PTO personnel):

(1) *DEVON RUSSELL*. (3)_____.

(2) *Jeffrey Myers (27,362)*. (4)_____.

Date of Interview: *30 November 2016*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☒103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *Best (20110132579); Pfahnl (US 20060126292)*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The applicant described differences between the disclosed weir and the weir of Pfahnl. The examiner agreed that it would be fruitful to pursue such differences with structural limitations if there is support in the specification. A discussion about the potential differences which are as yet unclaimed between the plenum and the prior art was not resolved.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/DEVON RUSSELL/ Examiner, Art Unit 3744	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Christopher L. Boyd, *et al.* Serial No.: 14/355,533 Filed: 30 April 2014 For: Appliance Immersion Cooling System	31 January 2017 Art Unit: 3744 Examiner: D. Russell

Amendment

HONORABLE COMMISSIONER OF PATENTS AND TRADEMARKS,

SIR:

In the Office Action mailed 4 November 2016 (Office Action), the Examiner rejected claims 1-10 in the subject Application. In response, Applicants submit the following amendments and remarks:

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 422 of 656; IPR2025-00196

Claims

1. (Presently amended) An appliance immersion cooling system comprising:

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:

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;

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;

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

a control facility adapted 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.

2. (Presently amended) The system of claim 1 wherein the tank and primary circulation facility comprise a ~~tightly co-located~~ highly-integrated module.

3. (Original) The system of claim 1 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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4. (Original) The system of claim 1 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities so to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

5. (Original) The system of claim 1 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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6. (Presently amended) A tank module adapted for use in an appliance immersion cooling system, the tank module comprising:

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:

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;

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

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.

7. (Presently amended) The module of claim 6 wherein the tank and primary circulation facility comprise a ~~tightly co-located~~ highly-integrated module.

8. (Original) The module of claim 6 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

9. (Original) The module of claim 6 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities so to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

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10. (Original) The module of claim 6 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

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Remarks

1. In the Office Action, the Examiner rejected claims 2 and 7 under 35 USC 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventors regard as their invention. In particular, the Examiner has asserted that the term "tightly co-located" is not sufficiently understood, or specifically defined by the specification, for its metes and bounds to be definite. As explained in paragraph [0044], the Applicants intend the term "tightly co-located" to characterize the essential components of the primary circulation facility 28 as being physically located sufficiently close to the tank 14 "so as to form a highly-integrated module", see, lines 6-8. As noted in lines 3-6, the principle purpose in so arranging these components is to "move the secondary fluid to the point of heat exchange with the primary fluid, rather than to move the primary fluid to the point of exchange with the secondary fluid." As noted, "[i]n addition to conserving valuable floor space in a typical data center installation, the resulting modular configuration facilitates both easy initial installation and subsequent upgrade to efficiently satisfy increasing data center workloads", see, lines 14-17. In view of these details and the example configuration set forth in the drawings, Applicants respectfully submit that the term "tightly co-located" *is* sufficiently well defined to satisfy the requirements of 35 USC §112(b). Notwithstanding, in an effort to reduce issues, Applicants have amended claims 2 and 7 to replace the term "tightly co-located" with the term "highly-integrated", an alternative term used in the specification to describe this physical arrangement.

2. In the Office Action, the Examiner has rejected 1-10 under 35 USC §102(b) as anticipated by US Application Serial No. 2011/0132579, Best, *et al.* ("Best"). In section 5 of the Office Action, the Examiner has suggested that, in Best, the "common manifold area" defined between the tops of the devices and the surface of the fluid corresponds to Applicants "weir"; and that the "common manifold area" defined between the bottoms of the devices and the bottom of the tank corresponds to Applicants "plenum". However, neither of these "pseudo-structures" is present when the tank is empty of fluid; whereas both of these physical structures are required by Applicants' apparatus claims 1 and 6, even in the absence of fluid.

Perhaps recognizing that this §102(b) position is not as strong as might be desired, the Examiner has, in the alternative, rejected claims 1-10 under 35 USC 1§03(a) as being obvious over Best in view of US Application Serial No. 2006/0126292, Pfannl, *et al.* ("*Pfannl*"). In this rejection, the Examiner has suggested that, in Pfannl, the openings 122 into the outlet plenum 112, collectively, perform substantially the same function as Applicants' weir. However, Applicants respectfully note that, in both claim 1 and claim 6, the weir is defined as being "integrated horizontally into the long wall of the tank adjacent all appliance slots, [and] adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot". In contrast, in Pfannl, each of the openings 122 into the plenum 112 is disposed adjacent only to a respective single ONE of the appliance slots, and none is disposed adjacent to ALL of the appliance slots. Further, the rate of air flow through each of the openings 122 into the plenum 112 is NOT substantially uniform since the outlet port 112a itself does not lie adjacent to each of the openings 122. It follows, therefore, that the function performed by the set of openings 122 into the plenum 112 is **not** equivalent to the function performed by Applicants' weir.

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In an effort to further distinguish Applicants' weir from the plenum structure in Pfannl, Applicants have amended claims 1 and 6 to emphasize that it is the "overflow lip" of the weir that is "adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot". Support for this amendment can be found in paragraph [0029].

3. Applicants respectfully submit that claims 1-10, as amended herein, patentably distinguish over the prior art of record. Accordingly, Applicants request reconsider of the claims, as amended herein, and allowance thereof.

Respectfully submitted,
Christopher L. Boyd, *et al.*

/Jeffrey Van Myers/

Jeffrey Van Myers
Attorney for Applicants
Reg. No. 27,362
Ph: 512.858.7453

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 428 of 656; IPR2025-00196

Electronic Acknowledgement Receipt

EFS ID:	28222415
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	31-JAN-2017
Filing Date:	30-APR-2014
Time Stamp:	16:43:59
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Arguments/Remarks Made in an Amendment	JMG001_a1_170131.pdf	88486 001d7c1fcb32be57d664d6d110518f89e7df96bc	no	7

Warnings:

Information:	
Total Files Size (in bytes):	88486

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/355,533	Filing Date 04/30/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **01/31/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 10	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
CAROL BARNES

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 05/17/2017

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
05/17/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

Office Action Summary	Application No. 14/355,533	Applicant(s) BOYD ET AL.	
	Examiner DEVON RUSSELL	Art Unit 3744	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/31/17*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-10* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-10* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Claim Amendments

1. The claims dated 1/31/17 are entered. Claims 1-2 and 6-7 are amended. Claims 1-10 are pending and addressed below

Claim Rejections - 35 USC § 103

2. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-10 are rejected under pre-AIA 35 U.S.C. 102 (b) as anticipated by Best (US 2011/0132579) or, in the alternative, under pre-AIA 35 U.S.C. 103(a) as obvious over Best in view of Pfahnl et al. (US 2006/0126292).

Regarding claims 1 and 6, Best teaches an appliance immersion cooling system comprising: a tank (e.g. 510, 610, 710, 810) adapted to immerse (622, 722, 822) in a dielectric fluid (Para. [0025]) a plurality of electrical appliances (120), each in a respective appliance slot (Figs. 4, 6, 11) distributed vertically along, and extending transverse to, a long wall of the tank (L; e.g. Figs. 3-4), the tank comprising: a weir (e.g. 450, 550, heated liquid coolant outlet in Fig. 14, etc.) having an overflow lip (the bottom lip of the opening (interpreted as in the applicant's specification wherein the 'lip' is only the bottom surface of the opening 22), integrated horizontally into the long wall of the tank adjacent all appliance slots (see the long wall in each figure in which the weir is located), adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (Para. [0102]; the "common manifold area" defined by the tops of the slots and the devices 120, 820);

a primary circulation facility adapted to circulate the dielectric fluid through the tank (see 440/450, 540/550, etc.), comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (Para. [0086]; Figs. 5-6; H_L); 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 (150; 250; 350); and a control facility adapted 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 (380, 370; Fig. 2, "temp data").

If it is not accepted that Best positively discloses the weir, Pfahnl also teaches a cooling system wherein a dielectric fluid (air) as a coolant fully surrounds a rack (see figures) of electrical appliances (servers) in a tank (118), wherein the dielectric fluid is introduced (via 110a) into a plenum (110) positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (as directed by openings 122) and a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots (the bottom wall of 112 with openings 122)adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (via 122).

It would have been obvious to one of ordinary skill in the art at the time of the invention to form the manifold of Best with the weir formed as a bottom wall of said manifold with holes opening between each of the electronic device slots, as taught by Pfahnl, such that the dielectric fluid would still be directed in its proper flow direction despite the lack of a full rack of electronic devices.

Best further teaches that: the tank and primary circulation facility comprise a highly integrated module (the devices are all inherently physically connected to one another and located in the same facility; see also Figs. 1B or 11), as per claims 2 and 7; interconnect panel facilities adapted to mount appliance support equipment (840), as per claims 3 and 8; first and second primary circulation sub-facilities (880 on the left/right of tank; e.g. Fig. 14), each adapted to operate independently to circulate the dielectric fluid through the tank (see Fig. 14), the control facility is further adapted to

coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature (Para. [0082]), as per claims 4 and 9; and, the control facility (380) further comprises a communication facility (its software; Para. [0082] which performs the communications) adapted to facilitate monitoring and control of the control facility from a remote location (Para. [0081]-[0082]), as per claims 5 and 10.

Response to Arguments

5. Applicant's arguments filed 1/31/17 have been fully considered but they are not persuasive.

In regards to the assertion that the "plenum" of Best is a pseudo-structure only present when the tank is full of fluid, the examiner disagrees. The plenum is defined by the walls and bottom of the tank and the bottom surfaces of the devices 120. In the optionally presented 103 rejection, the plenum is also structurally defined by the piece forming openings 122 in the bottom portion 110.

Applicant's arguments that the "weir" in the prior art does not lie adjacent "all appliance slots" the examiner believes that grammatically, the phrase "adjacent all appliance slots", as presently claimed modifies "the long wall of the tank" and not the weir. Furthermore, as described by Best, the positioning of his weirs still results in even flow through the devices as described in paragraph [0102].

Finally, the examiner would like to point out that, as far as the “weir” structure is defined in the disclosure it merely amounts to an opening in a wall and its "lip" is never defined as more than the bottom surface of that opening. If the applicant believes that there is further structural limitation that should be associated with the term weir, he is requested to point out where the disclosure supports that in any further communications.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVON RUSSELL whose telephone number is (571)270-1858. The examiner can normally be reached on M-Th, 9-4.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alex Elve can be reached on 571.272.1173. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DEVON RUSSELL/
Primary Examiner, Art Unit 3744

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	Art Unit
	DEVON RUSSELL	3744

CPC- SEARCHED		
Symbol	Date	Examiner
H05K7/20236	11/1/16	DR
H01L23/42, 44;	5/10/17	DR

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
361	699	5/10/17	DR

SEARCH NOTES		
Search Notes	Date	Examiner
see EAST history	11/1/16	DR

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/DEVON RUSSELL/ Examiner.Art Unit 3744	/DEVON RUSSELL/ Primary Examiner.Art Unit 3744

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/01/2016	05/11/2017							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 07/06/2017

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
07/06/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	14/355,533	BOYD ET AL.	
	Examiner	Art Unit	
	DEVON RUSSELL	3744	

All participants (applicant, applicant's representative, PTO personnel):

(1) *DEVON RUSSELL*. (3)_____.

(2) *Jeffrey Myers*. (4)_____.

Date of Interview: *28 June 2017*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☒ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☒103 ☒Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: _____.

Identification of prior art discussed: *JP 5956100*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

The features of the "plenum" and "weir" of claim 1 were discussed with relation to the art currently of record and the newly appended JP reference. No agreement as to patentability was reached over the phone, but the examiner directed the applicant to file an SB 439 to facilitate further email communications about claim construction prior to the prosecution of a potential RCE.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☒ Attachment

/DEVON RUSSELL/ Primary Examiner, Art Unit 3744	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Notice of References Cited	Application/Control No. 14/355,533	Applicant(s)/Patent Under Reexamination BOYD ET AL.	
	Examiner DEVON RUSSELL	Art Unit 3744	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A	US-				
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N	JP 5956100 B1	07-2016			G06F1/20
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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(51)Int.Cl.		F I		
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		H05K	7/20	W

請求項の数 14　(全 15 頁)

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早期審査対象出願

(73)特許権者　514215055
株式会社ＥｘａＳｃａｌｅｒ
東京都千代田区神田小川町２丁目１番地
(74)代理人　100102406
弁理士　黒田　健二
(74)代理人　100100240
弁理士　松本　孝
(72)発明者　齊藤　元章
東京都千代田区神田駿河台４－２－５　ロイヤルパインレジデンス１４０４

審査官　宮下　誠

最終頁に続く

(54)【発明の名称】液浸冷却装置

(57)【特許請求の範囲】
【請求項１】
複数の電子機器を冷却液中に浸漬して直接冷却する液浸冷却装置であって、
底壁及び側壁によって形成される開放空間を有する冷却槽と、
前記冷却槽内に複数の内部隔壁を設けることにより前記開放空間を分割して形成される、配列された複数の収納部であって、各収納部に少なくとも１つの電子機器を収納するための収納部と、
前記少なくとも１つの電子機器を前記収納部から持ち上げ、及び前記収納部内に降ろすためのアームを有する、吊り上げ機構と、
を有し、
前記吊り上げ機構は、
前記アームを上昇及び下降させるためのガイド及び駆動源を備えたタワーと、
前記冷却槽に取り付けられたスライド機構であって、前記タワーを、前記冷却槽に対して、前記開放空間上に位置する水平面上で移動可能に支持するスライド機構と、
前記タワーが前記冷却槽の幅方向で移動する範囲が、少なくとも前記開放空間の幅を実質的に超えないように、前記タワーの移動を規制するストッパとを含む、
液浸冷却装置。
【請求項２】
前記スライド機構が、
前記冷却槽の幅方向に位置する一対の側壁の上端に設けられた、一対の縦方向レールと

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 446 of 656; IPR2025-00196

、
前記一対の縦方向レール上で移動可能に支持された可動ベースと、
前記可動ベース上に設けられた、一対の横方向レールとを含み、
前記タワーが、前記一対の横方向レール上で移動可能に支持されている、
請求項１に記載の液浸冷却装置。
【請求項３】
前記吊り上げ機構が、前記アームの上昇、下降、及び前記タワーの垂直方向における任意の高さでの静止を制御するコントローラをさらに含む、
請求項１に記載の液浸冷却装置。
【請求項４】
前記一対の縦方向レールが、前記可動ベースを前記冷却槽の前記開放空間上から外れた後方に位置させるための走行域を有する、請求項２に記載の液浸冷却装置。
【請求項５】
前記冷却槽が、前記開放空間を閉じるための天板を有し、
前記天板が前記冷却槽の開口部に置かれたときに、前記一対の縦方向レールが前記天板の幅の外に位置するように設けられている、請求項２に記載の液浸冷却装置。
【請求項６】
前記冷却槽が、冷却液の流入開口及び流出開口を有し、
前記流入開口は、各収納部の底部又は側面に形成され、前記流出開口は、前記冷却液の液面近傍に形成されている、
請求項１又は２に記載の液浸冷却装置。
【請求項７】
前記冷却槽が、冷却液の流入開口及び流出開口を有し、
前記複数の内部隔壁の少なくとも１つが、前記底壁を貫通し前記冷却液の液面近傍まで延びる複数の流入管又は複数の流出管と、前記複数の電子機器の各々が有するボードの縁部を保持するための複数のボードリテーナとを含み、
前記流入管の各々には、該流入管の長手方向に複数の小孔が、前記流入開口として形成され、
前記流出管の各々には、該流出管の長手方向に複数の小孔が、前記流出開口として形成され、
前記冷却液の前記液面近傍に、少なくとも１つの流出開口が形成されている、
請求項１又は２に記載の液浸冷却装置。
【請求項８】
複数の電子機器を冷却液中に浸漬して直接冷却する液浸冷却装置であって、
横方向に配置された複数の隣接する冷却槽であって、各冷却槽が底壁及び側壁によって形成される開放空間を有する冷却槽と、
各冷却槽内に複数の内部隔壁を設けることにより前記開放空間を分割して形成される、配列された複数の収納部であって、各収納部に少なくとも１つの電子機器を収納するための収納部と、
前記少なくとも１つの電子機器を前記収納部から持ち上げ、及び前記収納部内に降ろすためのアームを有する、少なくとも１つの吊り上げ機構と、
を有し、
前記少なくとも１つの吊り上げ機構は、
前記アームを上昇及び下降させるためのガイド及び駆動源を備えたタワーと、
前記隣接する冷却槽に取り付けられたスライド機構であって、前記タワーを、前記隣接する冷却槽に対して、前記開放空間上に位置する水平面上で移動可能に支持するスライド機構と、
前記タワーが前記隣接する冷却槽の幅方向で移動する範囲が、前記隣接する冷却槽の隣接する開放空間を形成する複数の側壁のうち、横方向に互いに最も離れた側壁間の距離を実質的に超えないように、前記タワーの移動を規制するストッパとを含む、

液浸冷却装置。
【請求項９】
前記スライド機構が、
前記各冷却槽の幅方向に位置する一対の側壁の上端に設けられた、一対の縦方向レールと、
前記一対の縦方向レール上で移動可能に支持された可動ベースと、
前記可動ベース上に設けられた、一対の横方向レールとを含み、
前記タワーが、前記一対の横方向レール上で移動可能に支持されている、
請求項８に記載の液浸冷却装置。
【請求項１０】
前記少なくとも１つの吊り上げ機構が、前記アームの上昇、下降、及び前記タワーの垂直方向における任意の高さでの静止を制御するコントローラをさらに含む、
請求項８に記載の液浸冷却装置。
【請求項１１】
前記一対の縦方向レールが、前記可動ベースを前記冷却槽の前記開放空間上から外れた後方に位置させるための走行域を有する、請求項９に記載の液浸冷却装置。
【請求項１２】
各冷却槽が、前記開放空間を閉じるための天板を有し、
前記天板が前記冷却槽の開口部に置かれたときに、前記一対の縦方向レールが前記天板の幅の外に位置するように設けられている、請求項９に記載の液浸冷却装置。
【請求項１３】
各冷却槽が、冷却液の流入開口及び流出開口を有し、
前記流入開口は、各収納部の底部又は側面に形成され、前記流出開口は、前記冷却液の液面近傍に形成されている、
請求項８又は９に記載の液浸冷却装置。
【請求項１４】
各冷却槽が、冷却液の流入開口及び流出開口を有し、
前記複数の内部隔壁の少なくとも１つが、前記底壁を貫通し前記冷却液の液面近傍まで延びる複数の流入管又は複数の流出管と、前記複数の電子機器の各々が有するボードの縁部を保持するための複数のボードリテーナとを含み、
前記流入管の各々には、該流入管の長手方向に複数の小孔が、前記流入開口として形成され、
前記流出管の各々には、該流出管の長手方向に複数の小孔が、前記流出開口として形成され、
前記冷却液の前記液面近傍に、少なくとも１つの流出開口が形成されている、
請求項８又は９に記載の液浸冷却装置。
【発明の詳細な説明】
【技術分野】
【０００１】
本発明は電子機器の液浸冷却装置に係り、特に、スーパーコンピュータやデータセンター等の超高性能動作や安定動作が要求され、かつそれ自体からの発熱量が大きな電子機器を、冷却槽内を流通する冷却液に浸漬して冷却する液浸冷却装置において、吊り上げ機構を備えたものに関するものである。
【背景技術】
【０００２】
スーパーコンピュータやデータセンターの冷却には、従来から空冷式と液冷式が用いられている。液冷式は、空気より格段に熱伝達性能の優れる液体を用いるため、一般的に冷却効率がよいとされている。例えば、東京工業大学が構築した「ＴＳＵＢＡＭＥ－ＫＦＣ」では、合成油を用いた液浸冷却システムが適用されている。しかし、冷却液に粘性の高い合成油を用いているため、油浸ラックから取り出した電子機器から、そこに付着した油

を完全に除去することが困難であり、電子機器のメンテナンス（具体的には、例えば調整、点検、修理、交換、増設。以下同様）が極めて困難であるという問題がある。更には、使用する合成油が、冷却系を構成するパッキン等を短期間に腐食させて漏えいするなどし、運用に支障を来す問題の発生も報告されている。

【０００３】

他方、上記のような問題を生ずる合成油ではなく、フッ化炭素系冷却液を用いる液浸冷却システムが提案されている。具体的には、フッ化炭素系の冷却液（３Ｍ社の商品名「Ｎｏｖｅｃ（３Ｍ社の商標。以下同様）７１００」、「Ｎｏｖｅｃ７２００」、「Ｎｏｖｅｃ７３００」で知られる、ハイドロフルオロエーテル（ＨＦＥ）化合物）を用いる例である（例えば、特許文献１、特許文献２）。

【０００４】

また、本発明者は、小規模液浸冷却スーパーコンピュータ向けの、小型で冷却効率の優れた液浸冷却装置をすでに開発している。当該装置は、高エネルギー加速器研究機構に設置されている小型スーパーコンピュータ「Ｓｕｉｒｅｎ」に適用され、運用されている（非特許文献１）。

【先行技術文献】

【特許文献】

【０００５】

【特許文献１】特開２０１３－１８７２５１号公報

【特許文献２】特表２０１２－５２７１０９号公報

【非特許文献】

【０００６】

【非特許文献１】「液浸冷却小型スーパーコンピュータ「ExaScaler-1」が、25%を超える性能改善により最新のスパコン消費電力性能ランキング「Green500」の世界第一位相当の値を計測」、２０１５年３月３１日、プレスリリース、株式会社ExaScaler他、URL:http://www.exascaler.co.jp/wp-content/uploads/2015/03/20150331.pdf

【発明の概要】

【発明が解決しようとする課題】

【０００７】

液浸冷却装置は、電子機器のメンテナンスのために、液浸ラック等の冷却槽から電子機器を取り出すための吊り上げ機構を必要とする。かかる吊り上げ機構として、従来からクレーン装置が一般に使用されてきた。

【０００８】

しかし、従来の液浸冷却装置においては、クレーン装置を設置し運用するために、冷却槽の設置面の周囲に足場を設けなければならなかった。このため、複数の冷却槽を隣接するように設置することが困難であり、スーパーコンピュータやデータセンターの運用に必要となる床面積が、全冷却槽の設置面積、クレーン装置の足場面積、保守作業のための通路面積を含めて大きくなるという問題がある。さらには、保守作業のための通路面積の一部をクレーン装置の足場面積が占めることにより、保守作業の安全性や冷却槽へのアクセス性が低下するという問題がある。

【０００９】

省スペースを実現する方法の一つとして、液浸冷却装置に吊り上げ機構が直接取り付けられる構成が考えられる。しかし、例えば、本発明者が開発した液浸冷却装置においては、複数の電子機器が冷却槽内に高密度に収納されているので、電子機器の損傷を防ぎながら安全に電子機器を吊り上げ又は吊り下げるのに適した吊り上げ機構を、開発することが必要である。

【００１０】

加えて、もし省スペースが実現されるときには、複数の液浸冷却装置を例えば横一列に密に配置すること等により、大規模なスーパーコンピュータやデータセンターの構築に必要な床面積を、さらに小さくすることが考えられる。しかし、このような複数の液浸冷却

装置の密な配置を実現するためには、隣り合う液浸冷却装置の一方の吊り上げ機構の動作範囲が、他方の吊り上げ機構の動作範囲によって影響を受けないようにすることができる吊り上げ機構を開発することが必要である。

【００１１】

従って、本発明の目的は、上記した従来技術の問題点を解決し、冷却槽の設置面の周囲に足場を必要としない、吊り上げ機構を備えた液浸冷却装置を提供することにある。

【００１２】

本発明の他の目的は、冷却槽内に高密度に収納されている電子機器を安全に吊り上げ又は吊り下げることができる、吊り上げ機構を備えた液浸冷却装置を提供することにある。

【００１３】

本発明のさらに他の目的は、複数の液浸冷却装置を密に配置することによっても、隣り合う液浸冷却装置の吊り上げ機構の動作範囲が互いに影響を受けないようにすることができる、吊り上げ機構を備えた液浸冷却装置を提供することにある。

【課題を解決するための手段】

【００１４】

上記の課題を解決するために、本発明の一局面によれば、複数の電子機器を冷却液中に浸漬して直接冷却する液浸冷却装置は、底壁及び側壁によって形成される開放空間を有する冷却槽と、前記冷却槽内に複数の内部隔壁を設けることにより前記開放空間を分割して形成される、配列された複数の収納部であって、各収納部に少なくとも１つの電子機器を収納するための収納部と、前記少なくとも１つの電子機器を前記収納部から持ち上げ、及び前記収納部内に降ろすためのアームを有する、吊り上げ機構と、を有する液浸冷却装置が提供される。当該液浸冷却装置が有する前記吊り上げ機構は、前記アームを上昇及び下降させるためのガイド及び駆動源を備えたタワーと、前記冷却槽に取り付けられたスライド機構であって、前記タワーを、前記冷却槽に対して、前記開放空間上に位置する水平面上で移動可能に支持するスライド機構と、前記タワーが前記冷却槽の幅方向で移動する範囲が、少なくとも前記開放空間の幅を実質的に超えないように、前記タワーの移動を規制するストッパとを含む。

【００１５】

本発明に係る液浸冷却装置の好ましい実施の形態において、前記スライド機構が、前記冷却槽の幅方向に位置する一対の側壁の上端に設けられた、一対の縦方向レールと、前記一対の縦方向レール上で移動可能に支持された可動ベースと、前記可動ベース上に設けられた、一対の横方向レールとを含み、前記タワーが、前記一対の横方向レール上で移動可能に支持されていてよい。

【００１６】

本発明に係る液浸冷却装置の好ましい実施の形態において、前記吊り上げ機構が、前記アームの上昇、下降、及び前記タワーの垂直方向における任意の高さでの静止を制御するコントローラをさらに含んでよい。

【００１７】

また、本発明に係る液浸冷却装置の好ましい実施の形態において、前記一対の縦方向レールが、前記可動ベースを前記冷却槽の前記開放空間上から外れた後方に位置させるための走行域を有していてよい。

【００１８】

また、本発明に係る液浸冷却装置の好ましい実施の形態において、前記冷却槽が、前記開放空間を閉じるための天板を有し、前記天板が前記冷却槽の開口部に置かれたときに、前記一対の縦方向レールが前記天板の幅の外に位置するように設けられていてよい。

【００１９】

さらに、本発明に係る液浸冷却装置の好ましい実施の形態において、前記冷却槽が、冷却液の流入開口及び流出開口を有し、前記流入開口は、各収納部の底部又は側面に形成され、前記流出開口は、前記冷却液の液面近傍に形成されていてよい。

【００２０】

また、本発明に係る液浸冷却装置の好ましい実施の形態において、前記冷却槽が、冷却液の流入開口及び流出開口を有し、前記複数の内部隔壁の少なくとも１つが、前記底壁を貫通し前記冷却液の液面近傍まで延びる複数の流入管又は複数の流出管と、前記複数の電子機器の各々が有するボードの縁部を保持するための複数のボードリテーナとを含み、前記流入管の各々には、該流入管の長手方向に複数の小孔が、前記流入開口として形成され、前記流出管の各々には、該流出管の長手方向に複数の小孔が、前記流出開口として形成され、前記冷却液の前記液面近傍に、少なくとも１つの流出開口が形成されていてよい。

【００２１】

本発明の他の局面によれば、複数の電子機器を冷却液中に浸漬して直接冷却する液浸冷却装置は、横方向に配置された複数の隣接する冷却槽であって、各冷却槽が底壁及び側壁によって形成される開放空間を有する冷却槽と、各冷却槽内に複数の内部隔壁を設けることにより前記開放空間を分割して形成される、配列された複数の収納部であって、各収納部に少なくとも１つの電子機器を収納するための収納部と、前記少なくとも１つの電子機器を前記収納部から持ち上げ、及び前記収納部内に降ろすためのアームを有する、少なくとも１つの吊り上げ機構と、を有する。前記少なくとも１つの吊り上げ機構は、前記アームを上昇及び下降させるためのガイド及び駆動源を備えたタワーと、前記隣接する冷却槽に取り付けられたスライド機構であって、前記タワーを、前記隣接する冷却槽に対して、前記開放空間上に位置する水平面上で移動可能に支持するスライド機構と、前記タワーが前記隣接する冷却槽の幅方向で移動する範囲が、前記隣接する冷却槽の隣接する開放空間を形成する複数の側壁のうち、横方向に互いに最も離れた側壁間の距離を実質的に超えないように、前記タワーの移動を規制するストッパとを含む。

【発明の効果】

【００２２】

本発明に係る液浸冷却装置によれば、底壁及び側壁によって形成される開放空間を有する冷却槽内に複数の内部隔壁を設けることにより、開放空間を分割して、配列された複数の収納部が形成される。冷却槽の開放空間の縦方向長さや横方向幅よりも小さい幅（例えば、従来の電子機器の約１／２、１／３、１／４の幅）の縦長の電子機器が、これら収納部に高密度に収納され、これら収納部を流通する冷却液により冷却される。

【００２３】

本発明においては、縦長の電子機器を収納部から持ち上げ、及び収納部内に降ろすためのアームを有する吊り上げ機構を採用している。そして、当該吊り上げ機構は、特に、アームを上昇及び下降させるためのガイド及び駆動源を備えたタワーと、冷却槽に取り付けられたスライド機構であって、タワーを、冷却槽に対して、開放空間上に位置する水平面上で移動可能に支持するスライド機構と、タワーが冷却槽の幅方向で移動する範囲が、少なくとも開放空間の幅を実質的に超えないように、タワーの移動を規制するストッパとを含む。かかる構成を有する本発明の液浸冷却装置によれば、冷却槽の設置面の周囲に足場が不要でありながら、冷却槽内に高密度に収納されている電子機器を安全に吊り上げ又は吊り下げることができる。加えて、複数の液浸冷却装置を密に配置することによっても、隣り合う液浸冷却装置の吊り上げ機構の動作範囲が互いに影響を受けないようにすることができる。

【００２４】

なお、本明細書における「開放空間」を有する冷却槽には、電子機器の保守性を損なわない程度の簡素な密閉構造を有する冷却槽も含まれるものである。例えば、冷却槽の開口部に、冷却槽の開放空間を閉じるための天板を置くことのできる構造や、パッキン等を介して天板を着脱可能に取り付けることのできる構造は、簡素な密閉構造といえる。

【００２５】

上記した本発明の目的及び利点並びに他の目的及び利点は、以下の実施の形態の説明を通じてより明確に理解される。もっとも、以下に記述する実施の形態は例示であって、本発明はこれに限定されるものではない。

【図面の簡単な説明】

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【００２６】
【図１】本発明の一実施形態に係る液浸冷却装置の全体構成を示す斜視図である。
【図２】本発明の一実施形態に係る液浸冷却装置の縦方向断面図である。
【図３】本発明の一実施形態に係る液浸冷却装置の平面図である。
【図４】本発明の一実施形態に係る液浸冷却装置の要部構成を示す斜視図である。
【図５】本発明の一実施形態に係る液浸冷却装置の要部構成を示す横方向断面図である。
【図６】本発明の一実施形態に係る液浸冷却装置の吊り上げ機構の一例を示す縦方向断面図である。
【発明を実施するための形態】
【００２７】
以下、本発明に係る液浸冷却装置の好ましい実施の形態を、図面に基づいて詳細に説明する。本実施形態の説明では、電子機器として、ＣＰＵ又はＧＰＵからなるプロセッサを搭載したプロセッサボードを複数、ボードの両面に配置した構造の電子機器（１ユニット）を、合計１６ユニット、冷却槽の分割された収納部に収納して冷却する、高密度液浸冷却装置の構成を説明する。なお、これは例示であって、高密度液浸冷却装置における電子機器のユニット数は任意であり、本発明に使用可能な電子機器の構成を何ら限定するものではない。
【００２８】
図１～図６を参照して、本発明の一実施形態に係る液浸冷却装置１は冷却槽１０を有し、冷却槽１０の底壁１１及び側壁１２によって開放空間１０ａが形成されている。冷却槽１０内に、横方向に内部隔壁１３ａ、１３ｂ、１３ｃ、１３ｄ、１３ｅを設けることにより、開放空間１０ａが均等に４分割され、配列された４個の収納部１４ａ、１４ｂ、１４ｃ、１４ｄが形成されている。本実施形態においては、冷却槽１０の開放空間１０ａの縦方向長さの約１／４の幅を有する、縦長の電子機器１００を、収納部１４ａ、１４ｂ、１４ｃ、１４ｄに４ユニットずつ、合計１６ユニット、高密度に収納することができる。
【００２９】
冷却槽１０の側壁１２の外周には、ケーシング１２ａが設けられている。冷却槽１０の正面側の側壁１２とケーシング１２ａとの間にスペースが形成されており、冷却槽１０の開放空間１０ａを閉じるための天板１０ｂを、このスペースに収納することができる。液浸冷却装置１の保守作業時には、天板１０ｂを当該スペース内に収納しておき、液浸冷却装置１の運用時には、このスペースから天板１０ｂを引き出して、冷却槽１０の開口部に置くことにより、開放空間１０ａを閉じることができる。
【００３０】
冷却槽１０には、電子機器１００の全体を浸漬するのに十分な量の冷却液（図示せず）が液面（図示せず）まで入れられている。冷却液としては、３Ｍ社の商品名「フロリナート（３Ｍ社の商標、以下同様）ＦＣ－７２」（沸点５６℃）、「フロリナートＦＣ－７７０」（沸点９５℃）、「フロリナートＦＣ－３２８３」（沸点１２８℃）、「フロリナートＦＣ－４０」（沸点１５５℃）、「フロリナートＦＣ－４３」（沸点１７４℃）として知られる、完全フッ素化物（パーフルオロカーボン化合物）からなるフッ素系不活性液体を好適に使用することができるが、これらに限定されるものではない。なお、フロリナートＦＣ－４０、ＦＣ－４３は、沸点が１５０℃よりも高く、極めて蒸発しにくいため、いずれかを冷却液に使用する場合、冷却槽１０内における液面の高さが長期間に亘って保たれ、有利である。
【００３１】
冷却槽１０の底壁１１の下に、冷却液の入口１５を両端に有する複数の流入ヘッダ１６と、冷却液の出口１８を両端に有する複数の流出ヘッダ１７が設けられている。これら流入ヘッダ１６及び流出ヘッダ１７は、冷却槽１０の底壁１１に対して、横方向に互い違いに配置されている。
【００３２】
内部隔壁１３ａ、１３ｂ、１３ｃ、１３ｄ、１３ｅの各々は、底部開口１５０を通して

底壁１１を貫通し、かつ冷却液の液面近傍まで延びる複数の流入管１６０及び複数の流出管１７０と、電子機器１００が有するボード１２０の縁部を保持するための複数のボードリテーナ１３０とを含む。本実施形態においては、底壁１１に一端が固定された複数本のボードリテーナ１３０の左右に、流入管１６０及び流出管１７０が、スペーサ１４０を介して互い違いに位置するよう構成されている。収納部１４ａ、１４ｂ、１４ｃ、１４ｄの各々において、冷却槽１０内で縦方向に向かい合う一対のボードリテーナ１３０に形成された凹部が、電子機器１００が有するボード１２０の縁部を、両側から機械的に保持する。この目的のために、ボード１２０の縁部には、ボードリテーナ１３０に形成された凹部の幅にフィットするように、棒状のサポートが取り付けられていてよい。

【００３３】

流入管１６０及び流出管１７０は、一例として矩形断面を有する。流入管１６０の各々には、流入管１６０の長手方向に複数の小孔が、流入開口１１６として形成されている。同様に、流出管１７０の各々には、流出管１７０の長手方向に複数の小孔が、流出開口１１７として形成されている。なお、これら複数の流入開口１１６は、流入管１６０の表面及び裏面の両方に形成してあり、同様に、複数の流出開口１１７は、流出管１７０の表面及び裏面の両方に形成してある。

【００３４】

加えて、収納部１４ａ、１４ｂ、１４ｃ、１４ｄの底部には、底壁１１を貫通する別の複数の小孔が、別の流入開口１１６及び流出開口１１７として形成されている。また、冷却槽１０の側壁１２のうち背面側の側壁１２の上部には、さらに別の流出開口１２７が形成されている。この背面側の側壁１２に形成された流出開口１２７は、冷却液の液面近傍に形成される流出開口に相当する。

【００３５】

本実施形態において、液浸冷却装置１の使用時に冷却液がどのように流通するかについて、簡単に説明する。両端の入口１５から流入ヘッダ１６に供給された、冷えた冷却液の一部は、収納部１４ａ、１４ｂ、１４ｃ、１４ｄの底部に形成された複数の流入開口１１６から吐出され、残りの部分は、底部開口１５０を通って流入管１６０内に供給される。そして、流入管１６０内に供給された冷却液は、流入管１６０に形成された複数の流入開口１１６から吐出される。

【００３６】

収納部１４ａ、１４ｂ、１４ｃ、１４ｄに収納された電子機器１００から熱を奪って暖められた冷却液は、冷却槽１０の背面側の側壁１２で、液面近傍に形成された流出開口１２７を通って、冷却槽１０の外に流れる。暖められた冷却液の一部は、収納部１４ａ、１４ｂ、１４ｃ、１４ｄの底部に形成された複数の流出開口１１７から流出ヘッダ１７内に吸引されると同時に、流出管１７０に形成された複数の流出開口１１７と底部開口１５０を通って流出ヘッダ１７内に吸引される。そして、流出ヘッダ１７内に吸引された冷却液は、出口１８を通って冷却槽１０の外に流れる。

【００３７】

冷却液の流入開口１１６が、各収納部１４ａ、１４ｂ、１４ｃ、１４ｄの底部又は側面に形成され、流出開口１２７が、冷却液の液面近傍に形成されることにより、高密度に収納された電子機器１００によって暖められた冷却液が、各収納部１４ａ、１４ｂ、１４ｃ、１４ｄ内で滞留するのを防ぎ、冷却効率が向上する。特に、複数本のボードリテーナ１３０の左右に、流入開口１１６が形成された流入管１６０及び流出開口１１７が形成された流出管１７０が、スペーサ１４０を介して互い違いに位置する構成は、冷却液の滞留防止作用をさらに高めることができるので、有利である。

【００３８】

次に、冷却槽１０内に高密度に収納された縦長の電子機器１００を、収納部１４ａ、１４ｂ、１４ｃ、１４ｄから持ち上げ、及び収納部１４ａ、１４ｂ、１４ｃ、１４ｄに降ろすための吊り上げ機構について、図面を参照して詳細に説明する。

【００３９】

吊り上げ機構２０は、電子機器１００を収納部１４ａ、１４ｂ、１４ｃ、１４ｄから持ち上げ、及び収納部１４ａ、１４ｂ、１４ｃ、１４ｄ内に降ろすためのアーム２２を有する。また、吊り上げ機構２０は、アーム２２を上昇及び下降させるためのガイド２１８及び駆動源２１３を備えたタワー２１と、冷却槽１０に取り付けられたスライド機構２３であって、タワー２１を、冷却槽１０に対して、開放空間１０ａ上に位置する水平面上で移動可能に支持するスライド機構２３とを含む。スライド機構２３が冷却槽１０に直接取り付けられるので、冷却槽１０の設置面の周囲に足場を必要としない。また、タワー２１が備えるガイド２１８及び駆動源２１３によって、アーム２２が上昇及び下降するので、昇降操作中にアームが前後左右に振動するようなことがなく、冷却槽内に高密度に収納されている電子機器を安全に吊り上げ又は吊り下げることができる。

【００４０】

本実施形態において、タワー２１は、サーボモータ等の駆動源２１３の軸が回転する速度を減速させる減速機２１４と、減速機２１４の軸の回転運動を、減速機２１４の軸と直交する軸の回転運動に変換するためのギア２１５と、一対のタイミングプーリ２１６と、タイミングベルト２１７とを含む。アーム２２のブラケット２２２の一方が、垂直方向（Ｚ方向）に設置されたガイド２１８に、ガイドローラ２１９を介して、移動可能に支持されている。また、アーム２２のブラケット２２２の他方が、ベルトホルダ２２０によってタイミングベルト２１７に固定されている。なお、ギア２１５の軸及びタイミングプーリ２１６の軸は、ベアリングホルダ２２３によって回転自在に保持されている。

【００４１】

本実施形態において、スライド機構２３は、冷却槽１０の幅方向に位置する一対の側壁１２の上端に設けられた、一対の縦方向レール２４と、一対の縦方向レール２４上で、移動可能に支持された可動ベース２５と、可動ベース２５上に設けられた、一対の横方向レール２６とを含み、タワー２１は、一対の横方向レール２６上で移動可能に支持されている。具体的には、可動ベース２５の下部に取り付けられた複数のガイドローラ２５１が、一対の縦方向レール２４上をスライドすることにより、タワー２１を縦方向（Ｙ方向）に移動させることができる。また、タワー２１の底部の固定ベース２１１に取り付けられた複数のガイドローラ２５１が、一対の横方向レール２６上をスライドすることにより、タワー２１を横方向（Ｘ方向）に移動させることができる。

【００４２】

図示の例では、一対の縦方向レール２４を冷却槽１０の側壁１２の上端に設置するための、一対のサポート２８が使用されている。サポート２８は、サポート２８の一端が、タワー２１の縦方向長さに実質的に等しい長さだけ、冷却槽１０の後方にはみ出して位置するように、側壁１２の上端に固定されている。このはみ出した一対のサポート２８上にも一対の縦方向レール２４が置かれる。これにより、一対の縦方向レール２４は、可動ベース２５を冷却槽１０の開放空間１０ａ上から外れた後方に位置させるための走行域を有する。冷却槽１０の裏面側の側壁１２に最も近い収納部１４ａから電子機器１００を持ち上げ、及び収納部１４ａ内に下ろすことができるようにするためである。また、一対のサポート２８及び一対の縦方向レール２４は、天板１０ｂが冷却槽１０の開口部に置かれたときに、天板１０ｂの幅の外に位置するように設置されている。天板１０ｂにより開放空間１０ａを閉じるときに、これらサポート２８及び縦方向レール２４が障害とならないようにするためである。

【００４３】

一対の縦方向レール２４の両端近傍に設けられたストッパ２７は、開放空間１０ａ上に位置する水平面上で、タワー２１が冷却槽１０の縦方向（Ｙ方向）で移動する範囲を規制するためのものである。特に、一対の横方向レール２６の両端近傍に設けられたストッパ２７は、タワー２１が冷却槽１０の幅方向（Ｘ方向）で移動する範囲が、少なくとも開放空間１０ａの幅を実質的に超えないように、タワー２１の移動を規制するためのものである。これにより、タワー２１が冷却槽１０の幅方向で移動するときに、タワー２１の固定ベース２１１又はハウジング２１２が、冷却槽１０の幅を超えてはみ出すことを防止する

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ことができ、複数の液浸冷却装置を密に配置することによっても、隣り合う液浸冷却装置の吊り上げ機構の動作範囲が互いに影響を受けないようにすることができる。

【００４４】

以上のように構成された吊り上げ機構２０の動作について説明する。タワー２１の脇に取り付けられたハンドルを持って、タワー２１を水平移動させ、アーム２２が、吊り上げ対象とする電子機器１００が有するボード１２０の直上に位置するところで停止させる。コントローラ（図示せず）を操作してタワー２１の駆動源２１３を駆動し、駆動源２１３の軸の回転を、ギア２１５を介してタイミングプーリ２１６に伝達し、アーム２２を最下部まで下降させる。この状態で、アーム２２の下部に取り付けられた一対の吊り金具２２１の先端を、電子機器１００が有するボード１２０の上端に形成された一対の孔に連結する。次に、コントローラ（図示せず）を操作して、タワー２１の駆動源２１３の軸の、逆方向の回転を、タイミングプーリ２１６に伝達し、アーム２２を上昇させる。電子機器１００は、吊り金具２２１によってアーム２２に吊り下げられた状態で、ボード１２０がボードリテーナ１３０内でスライドするように持ち上げられる。アーム２２を最上部まで上昇させたとき、電子機器１００が収納部１４ａ、１４ｂ、１４ｃ、１４ｄのボードリテーナ１３０から完全に抜け出した状態で、吊り下げられた状態となる。この状態で、必要であればタワー２１を水平移動させて、電子機器１００の保守作業を行うことができる。保守作業を終了したら、再びコントローラ（図示せず）を操作して、電子機器１００を収納部１４ａ、１４ｂ、１４ｃ、１４ｄ内に降ろし、元の位置に戻すことができる。

【００４５】

一方、コントローラ（図示せず）を操作して、アーム２２を上昇又は下降させている途中で、タワー２１の駆動源２１３の駆動を停止させることにより、タワー２１の垂直方向における任意の高さで、アーム２２を静止させることもできる。このとき、電子機器１００が収納部１４ａ、１４ｂ、１４ｃ、１４ｄのボードリテーナ１３０から完全に抜け出さずに保持された状態で、所望の高さまで吊り下げられた状態となる。この状態で、電子機器１００の保守作業を行うこともできる。減速機２１４は、このタワー２１の垂直方向における任意の高さでのアームの静止状態を含む電子機器１００の吊り下げ状態おいて、アーム２２に加わる下方向の荷重が、タイミングプーリ２１６及び駆動源２１３の軸に意図しない回転をさせるのを防ぐのに役立つ。

【００４６】

上記の一実施形態において、単一の冷却槽を有する例を説明したが、横方向に配置された複数の隣接する冷却槽を有してよい。この場合、少なくとも１つの吊り上げ機構が、複数の隣接する冷却槽において共通に使用されてよい。具体的には、少なくとも１つの吊り上げ機構は、アームを上昇及び下降させるためのガイド及び駆動源を備えたタワーと、隣接する冷却槽に取り付けられたスライド機構であって、タワーを、隣接する冷却槽に対して、開放空間上に位置する水平面上で移動可能に支持するスライド機構と、タワーが隣接する冷却槽の幅方向で移動する範囲が、隣接する冷却槽の隣接する開放空間を形成する複数の側壁のうち、横方向に互いに最も離れた側壁間の距離を実質的に超えないように、タワーの移動を規制するストッパとを含んでよい。

【００４７】

横方向に配置された複数の隣接する冷却槽を有する場合、スライド機構が、各冷却槽の幅方向に位置する一対の側壁の上端に設けられた、一対の縦方向レールと、一対の縦方向レール上で移動可能に支持された可動ベースと、可動ベース上に設けられた、一対の横方向レールとを含み、タワーが、一対の横方向レール上で移動可能に支持されているとよい。可動ベースの幅は、１つの冷却槽の幅と実質的に同じ幅か、複数の隣接する冷却槽に亘る幅のいずれでもよい。可動ベースが１つの冷却槽の幅と実質的に同じ幅を有する場合、隣接する冷却槽のうちの一方の冷却槽における一対の横方向レールと、他方の冷却槽における一対の横方向レールとを、適切な連結手段により連結可能に構成することができる。これにより、一方の一対の横方向レール上にあるタワーを、他方の一対の横方向レール上に移動させることができ、複数の隣接する冷却槽間で、１つのタワーを共用することがで

きる。可動ベースの幅が複数の隣接する冷却槽に亘る幅を有する場合、一対の横方向レールの長さを、複数の隣接する冷却槽に亘る幅とできるので、上記のような一対の横方向レールを連結するための連結手段は不要である。

【００４８】

上記の一実施形態において、水平面上でのタワー２１の移動を人力で行う例を説明したが、縦方向レール２４上で可動ベース２５を走行させるための別の駆動源と、横方向レール２６上で固定ベース２１１を含むタワー２１を走行させるためのもう１つ別の駆動源とを、吊り上げ機構に追加することにより、コントローラ（図示せず）を操作してタワー２１の移動を行うようにしてもよい。これら別の駆動源として、例えばサーボモータ等の電動式の駆動源を使用してよい。

【００４９】

電動式の駆動源を付加して水平面上でのタワー２１の移動を行えるようにする場合、上記の一実施形態におけるタワー２１の移動を規制するストッパは、図示のような、タワー２１の移動を物理的に阻止するための機械式のストッパ２７から、ソフトウェアによる移動規制機構に代替してよい。従って、本明細書においてストッパとは、機械式のストッパとソフトウェアによる移動規制機構の両方を含むものとする。

【００５０】

上記の一実施形態において、電子機器１００として、複数のプロセッサボードをボード１２０の両面に配置する例を説明したが、プロセッサはＣＰＵ又はＧＰＵのいずれか又は両方を含んでよく、また、電子機器１００は、高速メモリ、チップセット、ネットワークユニット、ＰＣＩ　Ｅｘｐｒｅｓｓバスや、バススイッチユニット、ＳＳＤ、パワーユニット（交流－直流変換器、直流－直流電圧変換器等）を含んでよい。また、電子機器１００は、ブレードサーバを含むサーバ、ルータ、ＳＳＤ等の記憶装置等の電子機器であってもよい。ただし、既に述べたように、従来の電子機器の一般的な幅よりも小さい幅（例えば、約１／２、１／３、１／４の幅）の、縦長の電子機器でよいことは勿論である。

【００５１】

以上、要するに、本発明に係る液浸冷却装置によれば、冷却槽の設置面の周囲に足場が不要でありながら、冷却槽内に高密度に収納されている電子機器を安全に吊り上げ又は吊り下げることができる。加えて、複数の液浸冷却装置を密に配置することによっても、隣り合う液浸冷却装置の吊り上げ機構の動作範囲が互いに影響を受けないようにすることができる。

【産業上の利用可能性】

【００５２】

本発明は、冷却液に浸漬して電子機器を効率よく冷却する、液浸冷却装置に広く適用することができる。

【符号の説明】

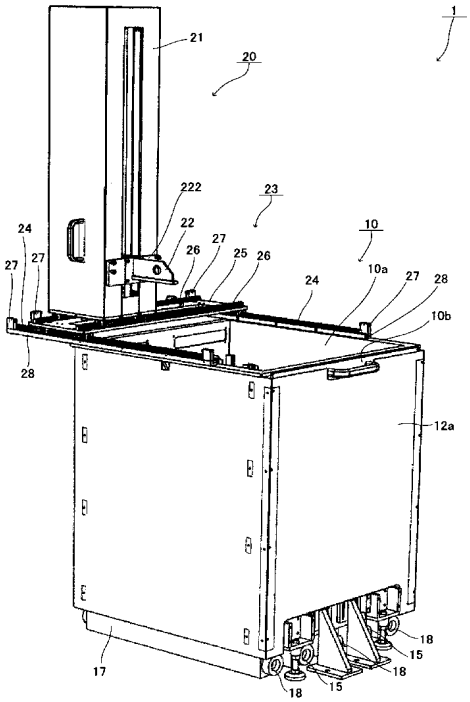
【００５３】

１　　液浸冷却装置
１０　　冷却槽
１０ａ　　開放空間
１０ｂ　　天板
１１　　底壁
１２　　側壁
１２ａ　　ケーシング
１００　　電子機器
１２０　　ボード
１３０　　ボードリテーナ
１４０　　スペーサ
１３ａ、１３ｂ、１３ｃ、１３ｄ、１３ｅ　　内部隔壁
１４ａ、１４ｂ、１４ｃ、１４ｄ　　収納部

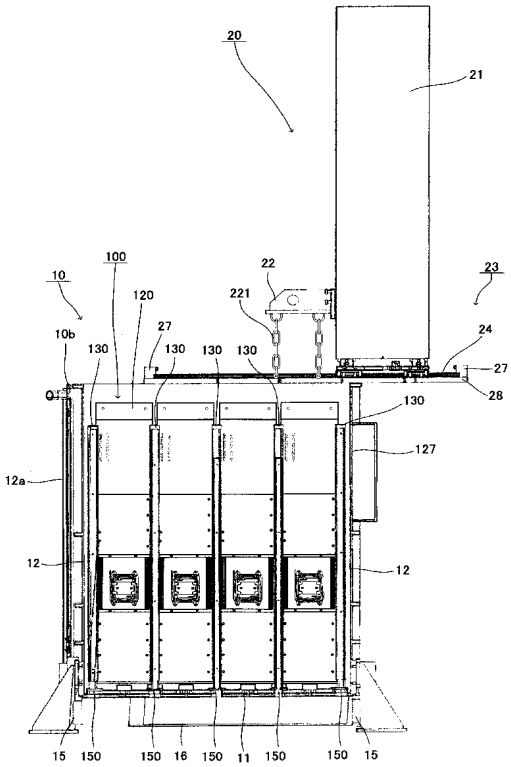
１５　入口
１５０　底部開口
１６　流入ヘッダ
１１６　流入開口
１６０　流入管
１７　流出ヘッダ
１１７、１２７　流出開口
１７０　流出管
１８　出口
２０　吊り上げ機構
２１　タワー
２１１　固定ベース
２１２　ハウジング
２１３　駆動源
２１４　減速機
２１５　ギア
２１６　タイミングプーリ
２１７　タイミングベルト
２１８　ガイド
２１９　ガイドローラ
２２０　ベルトホルダ
２２　アーム
２２１　吊り金具
２２２　ブラケット
２２３　ベアリングホルダ
２３　スライド機構
２４　縦方向レール（Ｙ方向）
２５　可動ベース
２５１　ガイドローラ
２６　横方向レール（Ｘ方向）
２７　ストッパ
２８　サポート

【要約】
開放空間１０ａを有する冷却槽１０内に複数の内部隔壁１３ａ～１３ｄを設けることにより、配列された複数の収納部１４ａ～１４ｄが形成され、各収納部に少なくとも１つの電子機器１００が収納される。吊り上げ機構２０は、アーム２２を上昇及び下降させるためのガイド及び駆動源を備えたタワー２１と、冷却槽１０に取り付けられたスライド機構２３と、タワー２１が冷却槽１０の幅方向で移動する範囲が、少なくとも開放空間１０ａの幅を実質的に超えないように、タワー２１の移動を規制するストッパ２７とを含む。スライド機構２３は、タワー２１を、冷却槽１０に対して、開放空間上に位置する水平面上で移動可能に支持する。液浸冷却装置１は、冷却槽１０の設置面の周囲に足場を必要とせず、冷却槽１０内に高密度に収納されている電子機器１００を安全に吊り上げ又は吊り下げることができる。

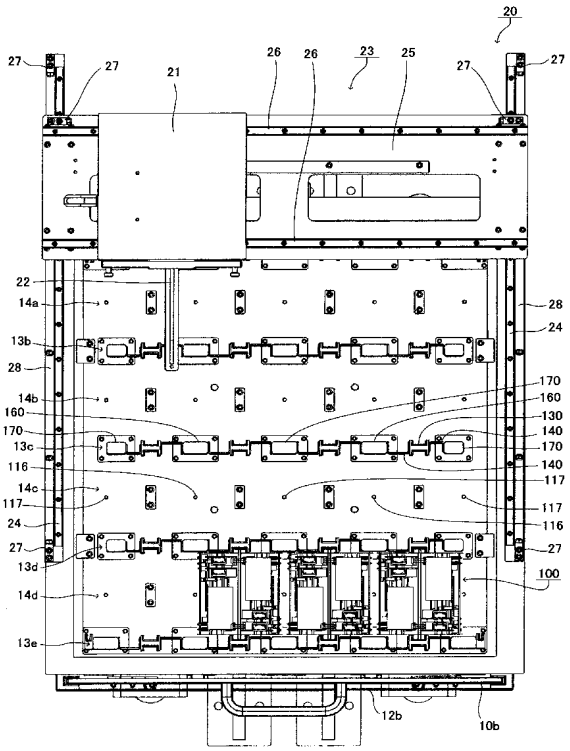
【図１】


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222
23
22
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24
27
26
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10a
28
10b
12a
17
18
15

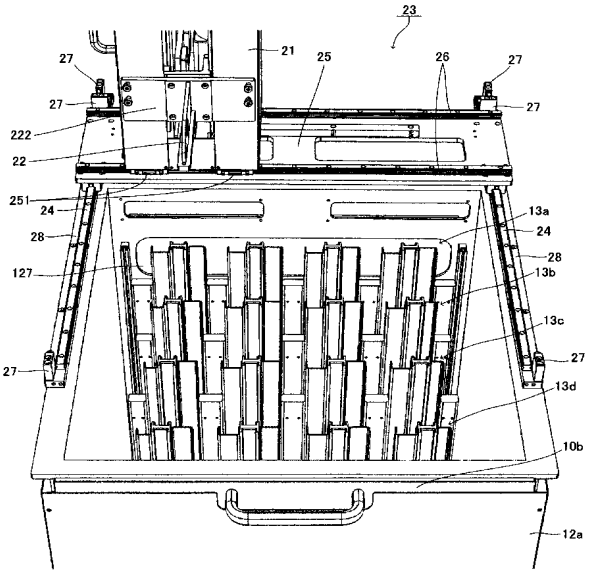
【図２】


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100
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221
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10b
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127
12a
12
15
150
16
11

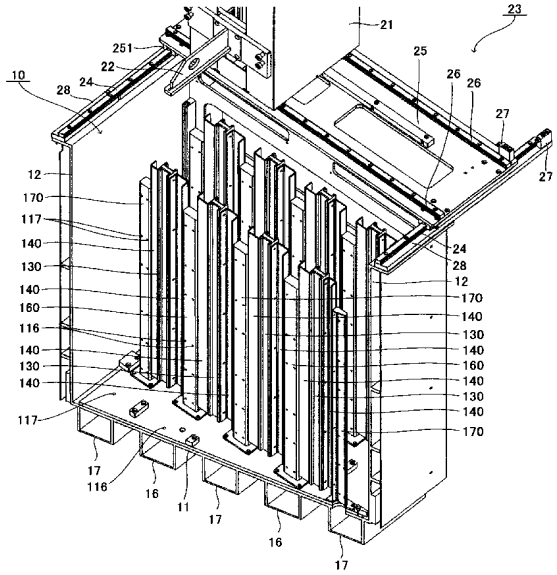
【図３】


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14a
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24
13b
14b
160
170
13c
116
14c
117
13d
14d
13e
12b
10b
100

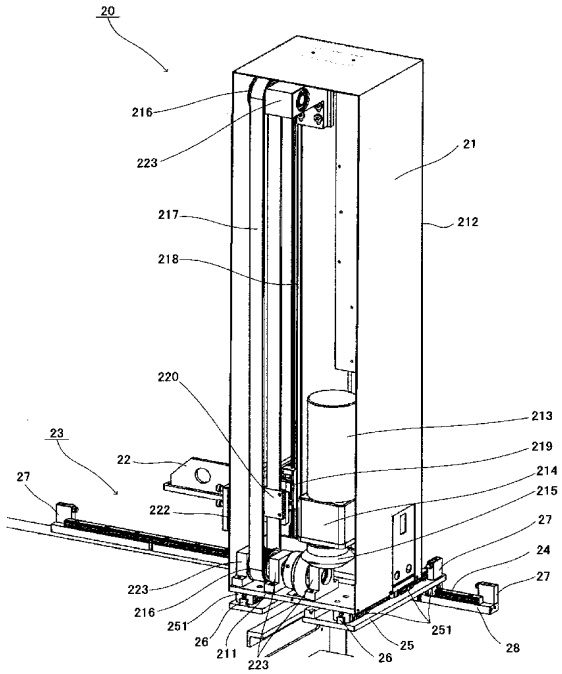
【図４】


23
21
25
26
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222
22
251
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127
13a
13b
13c
13d
10b
12a

【図５】


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251
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【図６】


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222
223
216
251
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211
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251
28

フロントページの続き

(56)参考文献　特開２００８－２５８５８（ＪＰ，Ａ）
特開平１１－７２５９１（ＪＰ，Ａ）

(58)調査した分野(Int.Cl.，ＤＢ名)
Ｇ０６Ｆ　　１／２０
Ｈ０１Ｌ　２３／４４
Ｈ０５Ｋ　　７／２０

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 460 of 656; IPR2025-00196

PUB-NO: JP005956100B1
DOCUMENT-IDENTIFIER: JP 5956100 B1
TITLE: ??????
PUBN-DATE: July 20, 2016
PATENT-FAMILY-ID: 56418692

APPL-NO: JP 2016507719 A
APPL-DATE: July 2, 2015

PRIORITY-DATA:

PRIORITY-NO	PRIORITY-APPL-DATE
JP 2015069205 W	20150702

CPC-CURRENT:

TYPE	CPC/DATE
CPCI	G06F1/20 20130101
CPCI	H01L23/44 20130101
CPCI	H05K7/20 20130101

INT-CL-CURRENT:

TYPE	IPC/DATE
IPCP	G06F1/20 20060101
IPCS	H05K7/20 20060101
IPCS	H01L23/44 20060101

REF-CITED:
PHASE-COUNTRY/NUMBER/KIND/DATE-NPL-INFO
JP H1172591 A 19990316
JP 2008025858 A 20080207

ABSTRACT:

By disposing a plurality of interior partitions 13a-13d within a cooling tank 10 which comprises an open space 10a, a plurality of arranged housing parts 14a-14d is formed, and at least one electronic device 100 is housed in each of the housing parts. A lifting mechanism 20 comprises: a tower 21, further comprising a guide and a motive power source which are for raising and lowering an arm 22; a slide mechanism 23 which is attached to the cooling tank 10; and stoppers 27 which restrict the movement of the tower 21 such that the range in

which the tower 21 moves in the width direction of the cooling tank 10 does not practically exceed at least the width of the open space 10a. The slide mechanism 23 supports the tower 21 to be movable with respect to the cooling tank 10 in a horizontal plane located above the open space. The liquid immersion cooling device 1 does not require a stage in the periphery of the installation surface of the cooling tank 10, and it is possible to safely raise or lower the electronic devices 100 which are housed at a high density in the cooling tank 10.

Doc Code: ECOMM.AUTH/ECOMM.WTDW
Doc Description: Internet Communications Authorized/Internet Communications Authorization Withdrawn

PTO/SB/439 (11-15)

AUTHORIZATION FOR INTERNET COMMUNICATIONS IN A PATENT APPLICATION OR REQUEST TO WITHDRAW AUTHORIZATION FOR INTERNET COMMUNICATIONS		
	Application No.	14/355,533
	Filing Date	30 April 2014
	First Named Inventor	Boyd, Christopher L.
	Art Unit	3744
	Examiner Name	Russell, D. L.
	Practitioner Docket No.	JMG001

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I. To authorize permission for Internet Communications.

☑ Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. I understand that a copy of these communications will be made of record in the application file. (MPEP 502.03)

II. To withdraw authorization for Internet Communications.

☐ The authorization given on _____, to the USPTO to communicate with the undersigned and any practitioner in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via Internet communications such as video conferencing, instant messaging, or electronic mail is hereby withdrawn. I understand that the withdrawal is effective when approved rather than when received.

I am the

☐ applicant.

☑ attorney or agent of record. Registration number 27,362.

☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/Jeffrey Van Myers/ — Signature

22 July 2017 — Date

Jeffrey Van Myers — Typed or printed name

512.858.7453 — Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Juristic entities must be represented by a patent practitioner (see 37 CFR 1.31, which is applicable to any paper filed on or after September 16, 2012, that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below*.

☑ * Total of 1 forms are submitted.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	29862469
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	22-JUL-2017
Filing Date:	30-APR-2014
Time Stamp:	15:10:00
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Internet Communications Authorized	JMG001_Email_170722.pdf	83831 3059695431d2939ca64a1af8edd4006bfc72f71c	no	2

Warnings:

Information:	
Total Files Size (in bytes):	83831

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Christopher L. Boyd, *et al.*	24 August 2017
Serial No.: 14/355,533	
Filed: 30 April 2014	Art Unit: 3744
For: Appliance Immersion Cooling System	Examiner: D. Russell

Preliminary Amendment

HONORABLE COMMISSIONER OF PATENTS AND TRADEMARKS,

SIR:

In the Office Action mailed 17 May 2012 (Office Action), the Examiner finally rejected claims 1-10 in the subject Application. In response, Applicants submit the following amendments and remarks:

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Claims

1. (Presently amended) An appliance immersion cooling system comprising:

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:

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;

a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted smoothly to receive the dielectric fluid as it flows over the weir;

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;

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

a control facility adapted 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.

2. (Previously amended) The system of claim 1 wherein the tank and primary circulation facility comprise a highly-integrated module.

3. (Original) The system of claim 1 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

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4. (Original) The system of claim 1 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities so to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

5. (Original) The system of claim 1 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

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6. (Presently amended) A tank module adapted for use in an appliance immersion cooling system, the tank module comprising:

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:

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;

a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted smoothly to receive the dielectric fluid as it flows over the weir;

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

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.

7. (Previously amended) The module of claim 6 wherein the tank and primary circulation facility comprise a highly-integrated module.

8. (Original) The module of claim 6 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

9. (Original) The module of claim 6 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities so to maintain the temperature of the dielectric

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fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

10. (Original) The module of claim 6 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

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11. (New) A tank module (10) adapted for use in an appliance immersion cooling system, the tank module comprising:

a tank (12) adapted to immerse in a dielectric fluid a plurality of electrical appliances (16), each in a respective appliance slot (18) distributed vertically along, and extending transverse to, a long wall of the tank (10), the tank (10) comprising:

a weir 22, integrated horizontally into the long wall of the tank (10) adjacent all appliance slots (18), adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (18);

a primary circulation facility (28) adapted to circulate the dielectric fluid through the tank (10), comprising:

a plenum (36), positioned adjacent the bottom of the tank (10), adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (18); and

a control facility (58) adapted to control the operation of the primary fluid circulation facility (28) as a function of the temperature of the dielectric fluid in the tank (10).

12. (New) The tank module of claim 11 wherein the tank further comprises:
an interconnect panel facility (24) adapted to mount appliance support equipment.

13. (New) The module of claim 11 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities (28a, 28b), each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities so to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

14. (New) The module of claim 11 wherein the control facility further comprises a communication facility (62, 64) adapted to facilitate monitoring and control of the control facility from a remote location.

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15. (New) An appliance immersion cooling system comprising a tank module according to any one of the preceding claims 11 through 14.

16. (New) An appliance immersion cooling system according to claim 15, further comprising:

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.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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Remarks

1. In the Office Action, the Examiner finally rejected claims 1-10 under 35 USC §103(a) as being obvious over US Application Serial No. 2011/0132579, Best, *et al.* ("Best"), in view of US Application Serial No. 2006/0126292, Pfannl, *et al.* ("*Pfannl*"). In this rejection, the Examiner has suggested that, in Pfannl, the openings 122 into the outlet plenum 112, collectively, perform substantially the same function as Applicants' weir. Applicants respectfully disagree. As will be clear to those skilled in this art, the fluid flow dynamics of a liquid is substantially different from the fluid flow dynamics of a gas, especially in an open system such as Applicants' immersion tank system. In Pfannl, should the upper plenum 112 be opened to atmospheric pressure, the cooling gas introduced into the lower plenum 110 will no longer flow substantially evenly through all of the slots but will flow primarily along the most direct path between the port 110a and the nearest apertures 122. Thus, in Pfannl, the controlled flow is primarily a result of the upper plenum 112 being closed and not as a result of the cooling gas flowing over "the bottom wall of 112" as asserted by the Examiner. The physics are simply not the same.

2. In Applicants' counter-part European Patent Application No. 13870761.7 ("EPO Application"), the EPO Examiner considered both Best and Pfannl, but concluded that claim 1 (introduced herein as new claim 11) discloses "features not disclosed in the prior art and as such would be considered new and inventive". In particular, the EPO Examiner justified this decision as follows:

> "2.2 The subject-matter of claim 1 therefore differs from this known cooling system [Best] in that the tank comprises a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot and in that the tank comprises a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot.
>
> "2.3 The technical effect of the combination of the plenum and the weir is that the dielectric fluid is distributed more evenly over the appliances. The problem can thus be formulated as how to avoid areas with stagnant hot fluid.
>
> "2.4 The claim is considered inventive for the following reason. In the prior art the supply of the cooling fluid is on one side wall of the tank and the return [i]s through a pipe on the same, or the other side of the tank. This results in most of the cooling fluid flowing the most direct path between the inlet and the outlet risking pockets of stagnant fluid off that path. The solution in the claim leads the fluid in along a plenum such that it is distributed before entering slots at each appliance. As the return is a weir along the whole length of the tank, the heated liquid can exit the tank without having to pass other appliances. This is neither disclosed nor hinted at in [Best] and it would take [a] man skilled in the art too many steps of thought to come to the claimed solution.
>
> "2.5 Although [Pfannl] describes a rack having a duct below appliances leading air to each individual appliance, it uses air as a cooling medium and thus as such it would not be apparent to [a] man skilled in the art to use the teachings from [Pfannl] to come to the claimed solution." See, "EPO Search Report" submitted herewith.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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3. In view of the above, Applicants have copied as new claims 11-16 all of the claims allowed in the EPO Application.

4. Further, in an effort to further distinguish Applicants' invention from the cited prior art, Applicants have amended claims 1 and 6 to add the dielectric fluid recovery reservoir. Support for this amendment can be found in paragraph [0029]. No such facility or structure can be found in any of the cited prior art.

5. Applicants respectfully submit that claims 1-16, as amended or added herein, patentably distinguish over the prior art of record. Accordingly, Applicants request reconsider of the claims, as amended herein, and allowance thereof.

Respectfully submitted,
Christopher L. Boyd, *et al.*

/Jeffrey Van Myers/

Jeffrey Van Myers
Attorney for Applicants
Reg. No. 27,362
Ph: 512.858.7453

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 475 of 656; IPR2025-00196

Electronic Patent Application Fee Transmittal

Application Number:	14355533
Filing Date:	30-Apr-2014
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Filer:	Jeffrey Van Myers
Attorney Docket Number:	JMG001-01

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 1st Request	2801	1	600	600
		Total in USD ($)		**600**

Electronic Acknowledgement Receipt

EFS ID:	30180293
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	24-AUG-2017
Filing Date:	30-APR-2014
Time Stamp:	20:04:15
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$600
RAM confirmation Number	082517INTEFSW20071400
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	JMG001_a2_170824.pdf	95981 92ea18d230f37b97873bb31f30a1974fdc9d2396	no	9
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30221 c82169d45d0a662c1a679e0321945a60a5d48e42	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	126202		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 14/355,533	Filing Date 04/30/2014	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **08/24/2017**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
ANTJUAN RIVERA

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

(translation)

Decision to Grant a Patent

Japanese Patent Application No. 2015-548011

Date of Allowance	:	September 5, 2017
Examiner	:	Shuichi Sakai
Title of Invention	:	APPLIANCE IMMERSION COOLING SYSTEM
Number of Claim(s)	:	10
Applicant(s)	:	MIDAS GREEN TECHNOLOGY, LLC
Agent	:	Teruo Miyazaki

Since there are no rejection reasons, this application is granted.

特許査定

GPA-2015-0043-M&S
ミダス グリーン テクノロジ 2015-548011
5

特許出願の番号	特願２０１５－５４８０１１
起案日	平成２９年　９月　５日
特許庁審査官	境　周一　　３６５４　５Ｕ００
発明の名称	機器浸漬冷却システム √
請求項の数	１０　√
特許出願人	ミダス　グリーン　テクノロジー、　リミテッド　ライアビリティー　カンパニー　√
代理人	宮崎　昭夫（外　１名）

この出願については、拒絶の理由を発見しないから、特許査定をします。

上記はファイルに記録されている事項と相違ないことを認証する。
認証日　平成29年 9月 6日　経済産業事務官　山田　忠男

注意：この書面を受け取った日から３０日以内に特許料の納付が必要です。

１．出願種別　　通常
２．参考文献　　有
３．特許法第３０条適用　　無
４．発明の名称の変更　　無

５．国際特許分類（ＩＰＣ）

Ｇ０６Ｆ	１／２０	Ａ,
Ｈ０５Ｋ	７／２０	Ｍ,
Ｇ０６Ｆ	１／２０	Ｃ,
Ｇ０６Ｆ	１／２０	Ｄ,
Ｆ２５Ｄ	９／００	Ｆ

６．菌寄託

７．出願日の遡及を認めない旨の表示

参考情報

特許出願の番号　　特願２０１５－５４８０１１

１．調査した分野（ＩＰＣ，ＤＢ名）

Ｇ０６Ｆ　　１／００－１／２０
Ｈ０５Ｋ　　７／２０
Ｈ０１Ｌ　２３／３４－２３／４６
Ｆ２５Ｄ　　１／００－９／００

２．参考特許文献

米国特許出願公開第２０１１／０１３２５７９	（ＵＳ，Ａ１）
特開２００９－０７１０６４	（ＪＰ，Ａ）
特開平０５－０５５７７２	（ＪＰ，Ａ）
実開平０４－１１６７５８	（ＪＰ，Ｕ）
特開２０００－２７７６６９	（ＪＰ，Ａ）
特開２０１２－０４４０３２	（ＪＰ，Ａ）
特表２００９－５３７９０５	（ＪＰ，Ａ）
特開２００９－０７６５６１	（ＪＰ，Ａ）
特開２０１２－０５４４９９	（ＪＰ，Ａ）
特開平０１－０７１１５６	（ＪＰ，Ａ）

３．参考図書雑誌

Electronic Acknowledgement Receipt

EFS ID:	30622052
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	11-OCT-2017
Filing Date:	30-APR-2014
Time Stamp:	12:15:14
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Supplemental Response or Supplemental Amendment	NoA_171005.pdf	67419 34961d926d622d4b1976a01df3139236647e631c	no	4

Warnings:

Information:	
Total Files Size (in bytes):	67419

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 12/05/2017

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
12/05/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

Notice of Abandonment	Application No.	Applicant(s)
	14/355,533	BOYD ET AL.
	Examiner	Art Unit
	DEVON RUSSELL	3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on *07 May 2017*.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
   (b) ☒ A proposed reply was received on *24 August 2017*, but it does not constitute a proper reply under 37 CFR 1.113 to the final rejection.
   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) if this is utility or plant application, a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. Note that RCEs are not permitted in design applications.)
   (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
   (d) ☐ No reply has been received.

2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.
   The issue fee required by 37 CFR 1.18 is $_____. The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☐ The issue fee and publication fee, if applicable, has not been received.

3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawings have been received.

4. ☐ The letter of express abandonment which is signed by the attorney or agent of record or other party authorized under 37 CFR 1.33(b). See 37 CFR 1.138(b).

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34) upon the filing of a continuing application.

6. ☐ The decision by the Patent Trial and Appeal Board rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☐ The reason(s) below:

/DEVON RUSSELL/
Primary Examiner, Art Unit 3744

Petitions to revive under 37 CFR 1.137, or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

Doc Code: PET.OP
Document Description: Petition for Review by the Office of Petitions

PTO/SB/64 (12-13)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)

Page 1 of 2

Docket Number (Optional)
JMG001

First named inventor: BOYD, Christopher L.

Application No.: 14/355,533 Art Unit: 3744

Filed: 2014-04-30 Examiner: RUSSELL, Devon L.

Title: Appliance Immersion Cooling System

Attention: Office of Petitions
Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
FAX (571) 273-8300

NOTE: If information or assistance is needed in completing this form, please contact the Office of Petitions at (571) 272-3282.

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the Office notice or action plus any extensions of time actually obtained.

APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION.

NOTE: A grantable petition requires the following items:

(1) Petition fee;
(2) Reply and/or issue fee;
(3) Terminal disclaimer with disclaimer fee – required for all utility and plant applications filed before June 8, 1995, and for all design applications; and
(4) Statement that the entire delay was unintentional.

1. **Petition fee**

☑ Small entity fee $ 850 (37 CFR 1.17(m)). Applicant asserts small entity status. See 37 CFR 1.27.

☐ Undiscounted fee $ _____ (37.CFR.1.17(m)).

2. **Reply and/or fee**

A The reply and/or fee to the above-noted Office notice or action in the form of

RCE/fee (identify the type of reply):

☑ has been filed previously on 24 August 2017.

☑ is enclosed herewith.

B The issue fee and publication fee (if applicable) of $ _____

☐ has been paid previously on _____.

☐ is enclosed herewith.

This collection of information is required by 37 CFR 1.137(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PET.OP
Document Description: Petition for Review by the Office of Petitions

PTO/SB/64 (12-13)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)

3. **Terminal disclaimer with disclaimer fee**

☐ Since this utility/plant application was filed on or after June 8, 1995, no terminal disclaimer is required.

☐ A terminal disclaimer (and disclaimer fee (37 CFR 1.20(d)) of $ _____) disclaiming the required period of time is enclosed herewith (see PTO/SB/63).

4. **STATEMENT:** The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(a) was unintentional. [NOTE: The United States Patent and Trademark Office may require additional information if there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137(a) was unintentional (MPEP 711.03(c), subsections (III)(C) and (D)).]

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

/Jeffrey Van Myers/ — Signature

8 January 2018 — Date

Jeffrey Van Myers — Typed or Printed Name

27,362 — Registration Number, if applicable

P. O. Box 130 — Address

512.858.7453 — Telephone Number

Driftwood, TX 78619 — Address

Enclosures:

☐ Fee Payment
☐ Reply
☐ Terminal Disclaimer Form
☐ Additional sheet(s) containing statements establishing unintentional delay
☐ Other: _____

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]

I hereby certify that this correspondence is being:

☐ Deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

☑ Transmitted by EFS-Web or facsimile on the date shown below to the United States Patent and Trademark Office at (571) 273-8300.

8 January 2018 — Date

/Jeffrey Van Myers/ — Signature

Jeffrey Van Myers — Typed or printed name of person signing certificate

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	14/355,533	Filing Date	2014-04-12	Docket Number (if applicable)	JMG001	Art Unit	3744
First Named Inventor	BOYD, Christopher L.			Examiner Name	RUSSELL, Devon L.		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☒ Other Preliminary Amendment filed 24 August 2017

☐ Enclosed

☐ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☒ Other This first RCE was requested, and the fee therefor was paid, 24 August 2017.

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☐ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Jeffrey Van Myers/	Date (YYYY-MM-DD)	2018-01-07
Name	Jeffrey Van Myers	Registration Number	27362

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/08a (07-09)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	14/355,533
Filing Date	30 April 2014
First Named Inventor	BOYD, Christopher L.
Art Unit	3744
Examiner Name	RUSSELL, Devon L.
Attorney Docket Number	JMG001

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 8009419	08-30-2011	Attlesey, et al.	
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		RU 2042294 C1	08-20-1995	Inst. of Thermal Physics		
		SU 1764094 A1	23-23-1992	Polyansky, et al.		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

MATHYS & SQUIRE LLP
Patent & Trade Mark Attorneys
The Shard
32 London Bridge Street
London
SE1 9SG
United Kingdom
Attn.: Christopher S. Hirsz

Date:	**27 December 2017**	*YourRef:*	**P45433RU-PCT**
		OurRef:	**2412-526779RU**
		Country:	**RUSSIA**
		ApplNo:	**2015128279**
In the name of:		*PatNo:*	

MIDAS GREEN TECHNOLOGY, LLC

Dear Sirs,

We are glad to announce that an Official Decision of Grant has been issued on **27 November 2017** in respect of the above application and received from the Patent Office of the Russian Federation.

The Examiner has come to a conclusion that a patent on the above application can be granted with the allowed claims attached hereto.

Please note that the allowed set of claims comprises the amended claims that were prepared in accordance with your letter of instructions dated 29 June, 2017 and correspond to the granted claims of EP2932349.

Please be informed that with issuance of the Decision on Grant any further amendments of the set of allowed claims become impossible in proceedings on the present application, but may be effected in a divisional application filed before a patent granted for this application is registered in the State Patent Register.

Please also be informed that the Russian Patent Office has changed the practice applied to terms of registration of the patent, which now are substantially reduced, and thus said registration normally takes place almost immediately after issuance fees are paid and no extensions or postponing of the registration date are possible. Therefore, we strongly recommend to inform us at least 7 working days before the deadline for payment of the issuance fees that you intend to file a divisional application in order to avoid charging extra costs for urgent preparing and filing the divisional application.

The Examiner cited several documents in the Decision on Grant (index (56)). We call your attention to that there is the USSR Author's Certificate SU 1764094 titled "DEVICE FOR FLUIDS HEATING OR COOLING" and the Russian patent document RU 2127951 C1 titled "DEVICE FOR COOLING COMPUTERS", having no available English translations.

Since the Russian Patent Office does not provide any cited references to the Decision on Grant but only mentions them, we have obtained first pages of said documents from open resources and attached them for your reference.

Furthermore, the Examiner has provided the Search Report in which most of the foregoing cited documents are stated under A category as documents defining the general state of the art and not considered to be of particular relevance.

Please, let us know whether you want us to order copies or translations of any of the cited documents or if you need any further commentary or advice regarding prosecution of the present application.

Please be informed that according to par. 8 of new Regulations on patent and other fees entered into force on October 6, 2017 the payment of Grant, Registration and Renewal fees should be effected within **two** months from the issue date, i.e. by **27 January 2018**.

The registration fee amounts to **3000** rubles (~**52** USD), our fee is 200 USD. Please bear in mind that if the Registration fee is not paid before the above date the payment of the fee is possible by

27 July 2018 but with a fine of 50% and by **27 January 2019** but with a fine of 100%.

The Grant fee amounts to **1500** rubles (~**26** USD), our fee for processing and forwarding original Letters Patent document is 100 USD (without courier expenses).

The Renewal fees payable from the third year of patent duration should be paid for the period from **13 December 2015** till **13 December 2018** in the amount of **5900** rubles (~**102** USD), our fee is **270** USD. Our fee for forwarding the official receipt is 20 USD.

Please note that since the Official fees are to be paid in Russian rubles the final sum in USD will be calculated on the basis of the exchange rate officially fixed on the date of payment.

In order to allow us to be on the safe side and make all payments in time we look forward to receiving your response in respect of payment of the above fees by **20 January 2018**.

Yours sincerely,

Elena Yudina
Patent Attorney

Encl.:
- ☒ Decision of Grant,
- ☒ Translation,
- ☒ Search report,
- ☒ Cited documents,
- ☒ Invoice.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 498 of 656; IPR2025-00196

FEDERAL SERVICE ON INTELLECTUAL PROPERTY (ROSPATENT)

Berezhkovskaya nab., 30, building. 1, Moscow, G-59, GSP-3, 125993. Telephone (8-499) 240- 60- 15. Fax (8-495) 531-63-18

No. 2420-526779RU/035 of -

Our No. 2015128279/07(043858)

For all correspondence, refer to the number of the application and inform about a receipt date of the present correspondence

as of 27.11.2017

Law Firm "Gorodissky & Partners"
B. Spasskaya Str., 25, bldg. 3
129090

DECISION
on grant a patent for invention

(21) Application No. 2015128279/07(043858) (22) Filing date of the application 13.12.2013

As a result of the substantive examination of the application for invention, it has been established that the claimed group of inventions
relates to the objects of patent rights and complies with the patentability conditions, the essence of the claimed invention is disclosed in the application materials sufficiently for implementing the invention(s), in view of this, a decision to grant a patent for the invention has been taken.

The conclusion on results of examination is attached.

Enclosure: on 6 sheet in 1 copy.

Deputy Head of the Department for the Provision of Public Services - Head of the Patent Law Department

Document has been signed with the digital
Information about the D.S.
Certificate 149A88B50002000015B4
Owner of Galkovskaya
Victoria Gennadievna
Validity term 30.06.2017 - 01.04.2030

V.G. Galkovskaya

** The examination of sufficiency of disclosure of the essence of the claimed invention is verified upon application for inventions submitted after 01.10.2014.*

REPORT ON EXAMINATION RESULTS

(21) Application No. 2015128279/07(043858) (22) Filing date of the application 13.12.2013

(24) Date from which industrial property rights may have effect 13.12.2013

(85) Date of commencement of the national phase 14.07.2015

PRIORITY IS FIXED ON DATE

(30) [x] filing date of the first application(s) in the country-member of the Paris Convention

(31) (31) Number assigned to priority application(s) priority application(s)	(33) Country code	(32) Date of filing
1. 61/737,200	14.12.2012	US
2. 61/832,211	07.06.2013	US

(86) Application № PCT/US2013/075126 of 13.12.2013

(87) PCT Publication number and date WO2014/109869 of 17.07.2014

(72) Author (s) BOYD, Christopher, L., KOEN, James, P., LAGUNA, David, Christopher, TURNER, Thomas, R., SWINDEN, Kenneth, D.,GARCIA, Mario, Conti, TRIBOU, John, Charles, US

(73) The patent holder (s) MIDAS GREEN TECHNOLOGY, LLC, US

(54) Name of the invention APPLIANCE IMMERSION COOLING SYSTEM

(see the next page)

02 1		073901

ATTENTION! In order to avoid mistakes, please check the information given in the conclusion, because they will be entered in the State Register of Inventions of the Russian Federation without modification and immediately report any errors found.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 500 of 656; IPR2025-00196

Address for correspondence with the patent owner or his representative, which will be published in the official bulletin is indicated on the front of the decision form

Address for forwarding a patent is indicated on the front of the decision form

As a result of examination of the application on the merits, conducted in accordance with Article 1386 and paragraph 1 of Article 1387 of the Civil Code of the Russian Federation, enacted by Federal Law No. 35-FZ of March 12, 2014 (hereinafter - the Code), with respect to the original claims established is compliance of the claimed group of inventions with the requirements of Article 1349 of the Code, the conditions of patentability established by Article 1350 of the Code, and the compliance of the application materials with the requirement of sufficiency of disclosure of the essence of the invention, Volume 2 of Article 1375 of the Code.

The claims of the invention are stated on the following page(s):

Form No. 01a

(21) 2015128279/07

(51) IPC
G12B 15/04 (2006.01)
G06F 1/20 (2006.01)
H05K 7/20 (2006.01)

(57)

1. A tank module adapted for use in an appliance immersion cooling system, the tank module comprising:

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:

a weir, integrated horizontally into the long wall of the tank adjacent all appliance slots, adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot;

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

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.

2. The tank module of claim 1 wherein the tank further comprises:

an interconnect panel facility adapted to mount appliance support equipment.

3. The tank module of claim 1 wherein the primary circulation facility further comprises:

at least first and second primary circulation sub-facilities, each adapted to operate independently to circulate the dielectric fluid through the tank;

wherein the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities so to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature.

4. The module of claim 1 wherein the control facility further comprises a communication facility adapted to facilitate monitoring and control of the control facility from a remote location.

5. An appliance immersion cooling system comprising a tank module according to any one of the preceding claims.

6. An appliance immersion cooling system according to claim 5, further comprising:

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.

(56) US 2011/0132579 A1, 09.06.2011;
US 2006/0126292 A1, 15.06.2006;
US 8009419 B2, 30.08.2011;
RU 2042294 C1, 20.08.1995;
SU 1764094 A1, 23.09.1992.

In publishing information on issue of the patent the specification and the drawings will be used as originally filed.

Enclosures: 1. An explanation of the procedure for payment of patent fees, per 1 liter. in 1 copy.

2. Enclosure to the official action on 1 pages in 1 copy.

3. the report on information search on 2 pages in 1 copy.

Deputy Head of the Electrical Engineering and Communication Department

Document has been signed with the digital
[redacted] Information about the D.S
Certificate
16BE846500020000127F
Owner Raskovalov
Kirill Vadimovich
Validity term 19.01.2017 - 01.04.2030

V. Raskovalov
8(495)531-65-68

Gudkova O.I. 8 (499)
240 50 16

Shall be published with fig. № 1

For application № 2015128279/07

(54) APPLIANCE IMMERSION COOLING SYSTEM

Abstract

(57) The present invention relates generally to electrical appliance cooling systems, and, in particular, to an improved appliance immersion cooling system and method of operation. The technical result consists in providing possibility of immersing circuit assemblies vertically into a tank containing the cooling fluid such that each of the various assemblies can be withdrawn independently from the tank for servicing, replacement, upgrade, etc.; preventing non-uniform flow patterns through the several appliance slots within the tank potentially resulting in uneven cooling across all slots; constricted dielectric fluid supply and return ports resulting in unnecessarily high fluid flow velocities at the respective points of connection to the tank; poor scalability; and inadequate attention to fail-soft operation. Said result is obtained by a appliance immersion tank system comprising: a generally rectangular tank adapted to immerse in a dielectric fluid a plurality of appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, the long axis of the tank; a primary circulation facility adapted to circulate the dielectric fluid through the tank; 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 a control facility adapted 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. 2 independent claims, 4 dependent claims, 13 drawings.

Federal service for intellectual property
Federal state budgetary institution
«Federal institute of industrial property»
(FIIP)

SEARCH REPORT

APPLICATION IDENTIFICATION	
Registration number	Filing date
2015128279/07(043858)	12/13/2013
PCT/US2013/075126	12/13/2013

The priority is fixed on the date of:
[ ] filing the application
[ ] filing additional materials of to the earlier application №
[ ] priority of the original application № of from which the present application has been divided up
[ ] filing of the first application № of from which the present application has been divided up
[ ] filing of the earlier application №
[X] filing of the first application(s) in the country-member of the Paris Convention

(31) Number assigned to priority application(s) (32) Date of filing priority application(s) (33) Country code

1. 61 / 737,200 14.12.2012 US
2. 61 / 832,211 07.06.2013 US

Title of the invention (the utility model): [X] - as stated; [ ] - Refined (see Notes) APPLIANCE IMMERSION COOLING SYSTEM

The Applicant: MIDAS GREEN TECHNOLOGY, LLC, US

UNITY OF THE INVENTION
[X] is fulfilled [ ] is not fulfilled. see Remarks

CLAIMS:
[X] all the claims are taken into consideration (see Remarks)
[ ] the following claims are taken into consideration:
[ ] the amended claims are taken into consideration (see Remarks)

CLASSIFICATION OF INVENTION (UTILITY MODEL) SUBJECT-MATTER
(IPC indexes and an indicator of the current version are stated)

G12B 15/04 (2006.01)
G06F 1/20 (2006.01)
H05K 7/20 (2006.01)

5. **SEARCH FIELD**
5.1 Minimum PCT documentation searched (indicated by IPC indexes)
G12B 15/00, 15/04, G06F 1/00, 1/20, H05K 7/00, 7/20, F28D 15/00, H01L 25/00, 25/04, 35/00, 35/02
5.2 Other documentation searched to the extent that such documentation is included in the search selections:
5.3 Electronic databases used during the search (name of the database and, if possible, search terms):
DWPI, Espacenet, Google Pat, J-PlatPat, PATENTSCOPE, PatSearch, RUPTO, USPTO

DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document with indication (where appropriate) of relevant passages	Relevant to claim №

(see the next page)

1	2	3
A	US 2011/0132579 A1 (GREEN REVOLUTION COOLING, INC.), 6/9/2011	1-6
A	US 2006/0126292 A1 (ANDREAS C.PFAHNL et al.), 15.06.2006	1-6
A	US 8009419 B2 (HARDCORE COMPUTER, INC.), 30.08.2011	1-6
A	RU 2042294 C1 (INSTITUTE OF THERMAL PHYSICS OF THE SO OLEG ALEKSANDROVICH AND DR.), 20.08.1995	1-6
A	SU 1764094 A1 (POLYANSKY A.V. AND DR.), 23.23.1992	1-6

* Special categories of cited documents:

«A» document defining the general state of the art and not considered to be of particular relevance

«E» earlier document but published on or after the international filing date

«L» document which throws doubts on priority claim(s) or which is cited in order to establish the publication date of another cited document or for other special reason (as specified)

«O» document referring to an oral disclosure, use, exhibition or other means

«P» document published prior to the international filing date but later than the priority date claimed

«T» later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

«X» document of particular relevance: the claimed invention does not involve a novelty or an inventive step when the document is taken alone

«Y» document of particular relevance; the claimed invention does not involve an inventive step when the document is taken in combination with one or more documents of the same category, such combination of the documents being obvious to a person skilled in the art

«&» document member of the same patent family

(7) NOTES:

AUTHENTICATION OF THE REPORT

The present report consists of 1 sheet(s)

Copies of the citations are enclosed with the report

Date of the actual completion of the search: 11/25/2017

Post and signature of authorized officer:
State Intellectual Property Examiner of the Electrical Engineering and Communications Department

Searching Authority: FIIP
Berezhkovskaya embankment, 30/1, Moscow, G-59, GSP-3, 125993
Telephone (8-499) 240- 60- 15. Fax (8-495) 5316318

ФЕДЕРАЛЬНАЯ СЛУЖБА ПО ИНТЕЛЛЕКТУАЛЬНОЙ СОБСТВЕННОСТИ
(РОСПАТЕНТ)

Бережковская наб., 30, корп. 1, Москва, Г-59, ГСП-3, 125993. Телефон (8-499) 240- 60- 15. Факс (8-495) 531- 63- 18

На № 2420-526779RU/035 от -

Наш № 2015128279/07(043858)

При переписке просим ссылаться на номер заявки и сообщить дату получения настоящей корреспонденции
от 27.11.2017

ООО "Юридическая фирма Городисский и Партнеры"
ул. Б. Спасская, 25, стр. 3
Москва
129090

Р Е Ш Е Н И Е
о выдаче патента на изобретение

(21) Заявка № 2015128279/07(043858) (22) Дата подачи заявки 13.12.2013

В результате экспертизы заявки на изобретение по существу установлено, что заявленная группа изобретений
относится к объектам патентных прав, соответствует условиям патентоспособности, сущность заявленного изобретения (изобретений) в документах заявки раскрыта с полнотой, достаточной для осуществления изобретения (изобретений)*, в связи с чем принято решение о выдаче патента на изобретение.

Заключение по результатам экспертизы прилагается.

Приложение: на 6 л. в 1 экз.

Заместитель начальника управления организации предоставления государственных услуг - начальник отдела патентного права

Документ подписан электронной подписью
Сведения о сертификате ЭП
Сертификат 149A88B50002000015B4
Владелец Галковская Виктория Геннадьевна
Срок действия с 30.08.2017 по 01.04.2030

В.Г. Галковская

*Проверка достаточности раскрытия сущности заявленного изобретения проводится по заявкам на изобретения, поданным после 01.10.2014.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 507 of 656; IPR2025-00196

ЗАКЛЮЧЕНИЕ ПО РЕЗУЛЬТАТАМ ЭКСПЕРТИЗЫ

(21) Заявка № 2015128279/07(043858) (22) Дата подачи заявки 13.12.2013

(24) Дата начала отсчета срока действия патента 13.12.2013

(85) Дата начала рассмотрения международной заявки на национальной фазе 14.07.2015

ПРИОРИТЕТ УСТАНОВЛЕН ПО ДАТЕ

(30) подачи первой(ых) заявки(ок) в государстве-участнике Парижской конвенции

	(31) Номер первой(ых) заявки(ок)	(32) Дата подачи первой(ых) заявки(ок)	(33) Код страны
1.	61/737,200	14.12.2012	US
2.	61/832,211	07.06.2013	US

(86) Заявка № PCT/US2013/075126 от 13.12.2013 (96) Заявка № EA

(87) Номер публикации и дата публикации заявки PCT WO2014/109869 от 17.07.2014

(72) Автор(ы) БОЙД Кристофер Л., КОН Джеймс П., ЛАГУНА Дэвид Кристофер, ТЕРНЕР Томас Р., СВИНДЕН Кеннет Д., ГАРСИА Марио Конти, ТРИБО Джон Чарльз, US

(73) Патентообладатель(и) МИДАС ГРИН ТЕКНОЛОДЖИ, ЭлЭлСи, US

(54) Название изобретения СИСТЕМА ОХЛАЖДЕНИЯ ПУТЕМ ПОГРУЖЕНИЯ ЭЛЕКТРИЧЕСКИХ ПРИБОРОВ В ЖИДКОСТЬ

(см. на обороте)

ВНИМАНИЕ! С целью исключения ошибок просьба проверить сведения, приведенные в заключении, т.к. они без изменения будут внесены в Государственный реестр изобретений Российской Федерации, и незамедлительно сообщить об обнаруженных ошибках.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 509 of 656; IPR2025-00196

Адрес для переписки с патентообладателем или его представителем, который будет опубликован в официальном бюллетене указан на лицевой стороне бланка решения

Адрес для направления патента указан на лицевой стороне бланка решения

В результате экспертизы заявки по существу, проведенной в соответствии со статьей 1386 и пунктом 1 статьи 1387 Гражданского кодекса Российской Федерации, введенного в действие Федеральным законом от 12 марта 2014 г. № 35-ФЗ (далее - Кодекс), в отношении первоначальной формулы изобретения установлено соответствие заявленной группы изобретений требованиям статьи 1349 Кодекса, условиям патентоспособности, установленным статьей 1350 Кодекса, и соответствие документов заявки требованию достаточности раскрытия сущности изобретения, установленному пунктом 2 статьи 1375 Кодекса.

Формула изобретения приведена на странице(ах) 3-4.

(21) 2015128279/07

(51) МПК
G12B 15/04 (2006.01)
G06F 1/20 (2006.01)
H05K 7/20 (2006.01)

(57)

1. Модуль емкости, выполненный с возможностью использования в системе охлаждения путем помещения электрических приборов в жидкость, содержащий:

емкость, выполненную с возможностью погружения в диэлектрическую жидкость множества электрических приборов, каждый из которых размещается в соответствующем интервале установки электрического прибора, распределенном по вертикали вдоль и проходящем перпендикулярно длинной стенки емкости, содержащую:

перелив, встроенный по горизонтали в длинную стенку емкости около всех интервалов установки электрических приборов, выполненный с возможностью обеспечения практически равномерного возврата диэлектрической жидкости, протекающей через каждый интервал установки электрического прибора,

первичное средство циркуляции, выполненное с возможностью циркуляции диэлектрической жидкости через емкость, содержащее:

нагнетатель, расположенный рядом с дном емкости, выполненный с возможностью практически равномерного распределения диэлектрической жидкости в направлении вверх через каждый интервал установки электрического прибора, и

средство управления, выполненное с возможностью управления работой первичного средства циркуляции жидкости в качестве функции температуры диэлектрической жидкости в емкости.

2. Модуль по п. 1, в котором емкость дополнительно содержит:

средство панели соединений, выполненное с возможностью монтажа оборудования поддержки электрического прибора.

3. Модуль по п. 1, в котором первичное средство циркуляции дополнительно содержит:

по меньшей мере, первое и второе первичные дополнительные средства циркуляции, каждое из которых является выполненным с возможностью независимой работы для циркуляции диэлектрической жидкости в емкости,

в которой средство управления является дополнительно выполненным с возможностью согласования работы первого и второго первичных дополнительных средств циркуляции для поддержки температуры диэлектрической жидкости в емкости между предварительно определенной минимальной температурой и предварительно определенной максимальной температурой.

4. Модуль по п. 1, в котором средство управления дополнительно содержит средство связи, выполненное с возможностью обеспечения отслеживания и управления средства управления из удаленного местоположения.

5. Система охлаждения путем погружения приборов в жидкость, содержащая модуль емкости по любому одному из предыдущих пунктов.

6. Система охлаждения путем погружения приборов в жидкость, содержащая модуль емкости по п. 5, дополнительно содержащая:

вторичное средство циркуляции жидкости, выполненное с возможностью отвода тепла из диэлектрической жидкости, циркулирующей в первичном средстве циркуляции, и рассеивания отведенного тепла в среде.

(56) US 2011/0132579 A1, 09.06.2011;

US 2006/0126292 A1, 15.06.2006;

US 8009419 B2, 30.08.2011;

RU 2042294 C1, 20.08.1995;

SU 1764094 A1, 23.09.1992.

При публикации сведений о выдаче патента будут использованы описание и чертежи в первоначальной редакции заявителя.

Приложения: 1. Извещение о порядке уплаты патентных пошлин на 1 л. в 1 экз.

2. Реферат, скорректированный экспертизой, на 1 л. в 1 экз.

3. Отчет об информационном поиске на 1 л. в 1 экз.

Заместитель
заведующего отделом
электротехники и связи
ФИПС

Документ подписан электронной подписью
Сведения о сертификате ЭП
Сертификат
16BE846500020000127F
Владелец Расковалов
Кирилл Вадимович
Срок действия с 19.01.2017 по 01.04.2030

К. В. Расковалов
8(495)531-65-68

Гудкова О.И.
8(499)240 50 16

Публиковать с фиг. № 1 Приложение № 2

К заявке № 2015128279/07

(54) СИСТЕМА ОХЛАЖДЕНИЯ ПУТЕМ ПОГРУЖЕНИЯ ЭЛЕКТРИЧЕСКИХ ПРИБОРОВ В ЖИДКОСТЬ

Реферат

(57) Изобретение относится к усовершенствованной системе охлаждения путем погружения электрических приборов в жидкость. Технический результат – обеспечение вертикального погружения блоков схемы в емкость, содержащую охлаждающую жидкость таким образом, чтобы каждый из различных блоков мог быть независимо извлечен, заменен, обновлен и т.д. из емкости для обслуживания, предотвращение неравномерного охлаждения через все интервалы установки, возникновения нецелесообразно высоких скоростей потока жидкости в соответствующих точках соединения с емкостью, расширение возможности масштабирования, повышение надежности работы. Достигается тем, что система с емкостью для погружения электрических приборов в жидкость содержит: в целом прямоугольную емкость, выполненную с возможностью погружения в диэлектрическую жидкость множества электрических приборов, размещенных в соответствующих интервалах установки электрического прибора, распределенных по вертикали вдоль и проходящих перпендикулярно продольной оси емкости, первичное средство циркуляции, выполненное с возможностью циркуляции диэлектрической жидкости через емкость, вторичное средство циркуляции жидкости, выполненное с возможностью отвода тепла из диэлектрической жидкости, циркулирующей в первичном средстве циркуляции, и рассеивания отведенного тепла в среде, и средство управления, выполненное с возможностью согласования работы

первичного и вторичного средств циркуляции жидкости в качестве функции температуры диэлектрической жидкости в емкости. 2 н. и 4 з.п. ф-лы, 13 ил.

Референт Гудкова О.И.

Федеральная служба по интеллектуальной собственности
Федеральное государственное бюджетное учреждение
«Федеральный институт промышленной собственности»
(ФИПС)

ОТЧЕТ О ПОИСКЕ

1. . **ИДЕНТИФИКАЦИЯ ЗАЯВКИ**

Регистрационный номер	Дата подачи
2015128279/07(043858)	13.12.2013
PCT/US2013/075126	13.12.2013

Приоритет установлен по дате:
[ ] подачи заявки
[ ] поступления дополнительных материалов от к ранее поданной заявке №
[ ] приоритета по первоначальной заявке № из которой данная заявка выделена
[ ] подачи первоначальной заявки № из которой данная заявка выделена
[ ] подачи ранее поданной заявки №

[X] подачи первой(ых) заявки(ок) в государстве-участнике Парижской конвенции

(31) Номер первой(ых) заявки(ок)	(32) Дата подачи первой(ых) заявки(ок)	(33) Код страны
1. 61/737,200	14.12.2012	US
2. 61/832,211	07.06.2013	US

Название изобретения (полезной модели): [X] - как заявлено; [ ] - уточненное (см. Примечания)
СИСТЕМА ОХЛАЖДЕНИЯ ПУТЕМ ПОГРУЖЕНИЯ ЭЛЕКТРИЧЕСКИХ ПРИБОРОВ В ЖИДКОСТЬ

Заявитель: МИДАС ГРИН ТЕКНОЛОДЖИ, ЭлЭлСи, US

2. **ЕДИНСТВО ИЗОБРЕТЕНИЯ**
[X] соблюдено [ ] не соблюдено. Пояснения: см. Примечания

3. **ФОРМУЛА ИЗОБРЕТЕНИЯ:**
[X] приняты во внимание все пункты
[ ] приняты во внимание следующие пункты: (см. Примечания)
[ ] принята во внимание измененная формула изобретения (см. Примечания)

4. **КЛАССИФИКАЦИЯ ОБЪЕКТА ИЗОБРЕТЕНИЯ (ПОЛЕЗНОЙ МОДЕЛИ)** (Указываются индексы МПК и индикатор текущей версии)

G12B 15/04 (2006.01)
G06F 1/20 (2006.01)
H05K 7/20 (2006.01)

5. **ОБЛАСТЬ ПОИСКА**
5.1 Проверенный минимум документации PCT (указывается индексами МПК)
G12B 15/00, 15/04, G06F 1/00, 1/20, H05K 7/00, 7/20, F28D 15/00, H01L 25/00, 25/04, 35/00, 35/02
5.2 Другая проверенная документация в той мере, в какой она включена в поисковые подборки:

5.3 Электронные базы данных, использованные при поиске (название базы, и если, возможно, поисковые термины):
DWPI, Espacenet, Google Pat, J-PlatPat, PATENTSCOPE, PatSearch, RUPTO, USPTO

6. **ДОКУМЕНТЫ, ОТНОСЯЩИЕСЯ К ПРЕДМЕТУ ПОИСКА**

Категория*	Наименование документа с указанием (где необходимо) частей, относящихся к предмету поиска	Относится к пункту формулы №

(см. на обороте)

1	2	3
A	US 2011/0132579 A1 (GREEN REVOLUTION COOLING, INC.), 09.06.2011	1-6
A	US 2006/0126292 A1 (ANDREAS C.PFAHNL И ДР.), 15.06.2006	1-6
A	US 8009419 B2 (HARDCORE COMPUTER, INC.), 30.08.2011	1-6
A	RU 2042294 C1 (ИНСТИТУТ ТЕПЛОФИЗИКИ СО РАН, КАБОВ ОЛЕГ АЛЕКСАНДРОВИЧ И ДР.), 20.08.1995	1-6
A	SU 1764094 A1 (ПОЛЯНСКИЙ А.В. И ДР.), 23.09.1992	1-6

*Особые категории ссылочных документов:

«A» документ, определяющий общий уровень техники и не считающийся особо релевантным

«E» более ранний документ, но опубликованный на дату международной подачи или после нее

«L» документ, подвергающий сомнению притязание(я) на приоритет, или который приводится с целью установления даты публикации другого ссылочного документа, а также в других целях (как указано)

«O» документ, относящийся к устному раскрытию, использованию, экспонированию и т.д.

«P» документ, опубликованный до даты международной подачи, но после даты испрашиваемого приоритета

«T» более поздний документ, опубликованный после даты международной подачи или даты приоритета и не порочащий заявку, но приведенный для понимания принципа или теории, на которых основывается изобретение

«X» документ, имеющий наиболее близкое отношение к предмету поиска: заявленное изобретение не обладает новизной или изобретательским уровнем в сравнении с документом, взятым в отдельности

«Y» документ, имеющий наиболее близкое отношение к предмету поиска; заявленное изобретение не обладает изобретательским уровнем, когда документ взят в сочетании с одним или несколькими документами той же категории, такая комбинация документов очевидна для специалиста

«&» документ, являющийся патентом-аналогом

7. **ПРИМЕЧАНИЯ:**

8. **УДОСТОВЕРЕНИЕ ОТЧЕТА**

Настоящий отчет состоит из 1 л.	К отчету приложены копии ссылок на л. в экз.
Дата действительного завершения поиска: 25.11.2017	Должность и подпись уполномоченного лица:
Поисковый орган: **ФИПС** **Бережковская наб., 30, корп. 1, Москва, Г-59, ГСП-3, 125993** **Телефон (8-499) 240- 60- 15. Факс (8-495) 531- 63- 18;** **e-mail: fips@rupto.ru**	Государственный эксперт по интеллектуальной собственности 1 кат. отдела электротехники и связи О.И.Гудкова

Electronic Patent Application Fee Transmittal

Application Number:	14355533
Filing Date:	30-Apr-2014
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Filer:	Jeffrey Van Myers
Attorney Docket Number:	JMG001-01

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PET. REVIVE ABANDON APP, DELAY PYMT-RESP	2453	1	850	850
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**850**

Electronic Acknowledgement Receipt

EFS ID:	31427210
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	07-JAN-2018
Filing Date:	30-APR-2014
Time Stamp:	14:29:43
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$850
RAM confirmation Number	010818INTEFSW14311900
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	JMG001_P2Revive_180108.pdf	260255 a7f4d96cf93f8aef0756c31e78e124cad73af925	no	3
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	JMG001_RCE_180107.pdf	1349760 d9082e681a803092da0f702f9fb29d217796a6b4	no	3
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	JMG001_IDS1_180108.pdf	249433 9658f30442524bc9ee2a8eb9bfcf10625584beec	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Miscellaneous Incoming Letter	Notice_of_Allowance.pdf	152699 8b51a34224de5c17dca6dfbfe01c23808618e374	no	2
Warnings:					
Information:					
5	Miscellaneous Incoming Letter	Translation_of_the_Decision_on_Grant.pdf	179646 c0ba1dbe03d74306893e3bd8897ca3a4682bc6130	no	6
Warnings:					
Information:					
6	Miscellaneous Incoming Letter	Translation_of_the_Search_Report.pdf	144837 747dd91c0a633703405f3afd27418dd0765558c9	no	2
Warnings:					

Information:					
7	Miscellaneous Incoming Letter	Decision_on_Grant.pdf	471255 0d5aadeba9aaebd33e9d8ec9ff2d8591772a3386	no	9
Warnings:					
Information:					
8	Miscellaneous Incoming Letter	Search_Report.pdf	279434 54fc119fc818536e081a236b0b403dfd1f70f389	no	2
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	30462 e1b1759463e211b8621cc67321075a50459e0b09	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	3117781		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IMPI
INSTITUTO MEXICANO DE LA PROPIEDAD INDUSTRIAL

6

Certificado de acuse de recibo registro(s): MX/2017/085143

DIRECCION DIVISIONAL DE PATENTES
SUBDIRECCION DIVISIONAL DE EXAMEN DE FONDO DE PATENTES AREAS MECANICA, ELECTRICA Y DE REGISTROS DE DISEÑOS INDUSTRIALES Y MODELOS DE UTILIDAD
COORDINACION DEPARTAMENTAL DE EXAMEN DE FONDO AREA ELECTRICA
Expediente de Patente PCT fase nacional Capitulo I **MX/a/2015/007601**

Asunto: Procede el otorgamiento

Ciudad de México, a 14 de diciembre de 2017.

Hugo H. RODRÍGUEZ MEJÍA
Apoderado de
MIDAS GREEN TECHNOLOGY, LLC
Paseo Camelias No. 3-102
Col. Club de Golf Tabachines
62498, Cuernavaca, Morelos, México

No. Folio: **100337**

novopatent
ENE. 18 2018
RECIBIDO
VENCIMIENTO: 18-MAR-2018

REF: Su solicitud No. MX/a/2015/007601 de Patente PCT presentada el 13 de diciembre de 2013

En relación con la solicitud arriba indicada, comunico a usted que una vez satisfecho lo dispuesto en los arts. 38, 50 y 52 de la Ley de la Propiedad Industrial (LPI), se ha efectuado el examen de fondo previsto por el artículo 53 de la citada Ley y se cumplen los requisitos establecidos por los artículos 16 y demás relativos de dicha Ley y su Reglamento, por lo que es procedente el otorgamiento de la Patente respectiva. En consecuencia, de acuerdo con el artículo 57 de la LPI, se le requiere para que efectúe el pago por la expedición del título y las anualidades correspondientes a este año calendario y las de los cuatro siguientes, efectuándose por quinquenios y por año calendario completo, pudiendo pagar dos o más quinquenios en forma anticipada, de conformidad con el tercero y cuarto párrafos del artículo segundo de las Disposiciones Generales de la tarifa vigente y exhiba el comprobante de pago correspondiente a fin de expedirle el Título de Patente.

Asimismo, deberá entregar tres copias en papel couché de la(s) figura no. 1 con medidas 7.0 x 11 cm., en caso de un solo dibujo ó de 11.0 x 14.0 cm., para dos o más dibujos, para efectos de publicación a que se refieren los Artículos 57 y 60 de la LPI, 46 de su Reglamento y 10 del Acuerdo que establece las reglas para la presentación de solicitudes ante el Instituto Mexicano de la Propiedad Industrial.

Para cumplir con lo anterior se le concede un plazo de dos meses contados a partir del día siguiente a la fecha en que se le notifique el presente oficio, mismo que podrá extenderse por un plazo adicional de dos meses que señala el art. 58 de la LPI sin que medie escrito de por medio y comprobando el pago del art. 31 de la tarifa vigente, apercibido que de no hacerlo dentro del plazo inicial o en el adicional antes precisados, se considerará abandonada su solicitud de patente y perdida la fecha de presentación de acuerdo con lo dispuesto en los preceptos legales invocados.

El suscrito firma el presente oficio con fundamento en los artículos 6º fracciones III y XI y 7º bis 2 de la Ley de la Propiedad Industrial (Diario Oficial de la Federación (D.O.F.) 27/06/1991, reformada el 02/08/1994, 25/10/1996, 26/12/1997, 17/05/1999, 26/01/2004, 16/06/2005, 25/01/2006, 06/05/2009, 06/01/2010, 18/06/2010, 28/06/2010, 27/01/2012 y 09/04/2012); artículos 1º, 3º fracción V inciso a) sub inciso iii) segundo guión, 4º y 12º fracciones I, II, III, IV y VI del Reglamento del Instituto Mexicano de la Propiedad Industrial (D.O.F. 14/12/1999, reformado el 01/07/2002, 15/07/2004, 28/07/2004 y 7/09/2007); artículos 1º, 3º, 5º fracción V inciso a) sub inciso iii) segundo guión, 16 fracciones I, II, III, IV y VI y 30 del Estatuto Orgánico del Instituto Mexicano de la Propiedad Industrial (D.O.F.

MX/2017/100337

Petitioner Green Revolution Cooling, Inc. Ex-1002
Page 523 of 656; IPR2025-00196

IMPI
INSTITUTO MEXICANO DE LA PROPIEDAD INDUSTRIAL

27/12/1999, reformado el 10/10/2002, 29/07/2004, 04/08/2004 y 13/09/2007); 1°, 3° y 5° inciso c), d), e) e i) y penúltimo párrafo del Acuerdo que delega facultades en los Directores Generales Adjuntos, Coordinador, Directores Divisionales, Titulares de las Oficinas Regionales, Subdirectores Divisionales, Coordinadores Departamentales y otros subalternos del Instituto Mexicano de la Propiedad Industrial. (D.O.F. 15/12/1999, reformado el 04/02/2000, 29/07/2004, 04/08/2004 y 13/09/2007).

Asimismo, el presente oficio se signa con firma electrónica avanzada (FIEL), con fundamento en los artículos 7° BIS 2 de la Ley de la Propiedad Industrial; 3° de su Reglamento, y 1° fracción III, 2° fracción V, 26 BIS y 26 TER del Acuerdo por el que se establecen los lineamientos para el uso del Portal de Pagos y Servicios Electrónicos (PASE) del Instituto Mexicano de la Propiedad Industrial, en los trámites que se indican.

A T E N T A M E N T E
COORDINADORA DEPARTAMENTAL DE EXAMEN DE FONDO ÁREA ELÉCTRICA
MARINA OLIMPIA CASTRO ALVEAR
MOCA/CHR/2017

Cadena Original
MARINA OLIMPIA CASTRO ALVEAR|00001000000306975391|Servicio de Administración Tributaria|1300|ELE|MX/2017/100337|MX/a/2015/007601|Cita a pago LPI|1606|CHR|Pág(s) 2|0uO92KlO9gL2AEirhq+PIRZXe5U=

Sello Digital
ex9d1ja+2iKhsHltetAX8Qg5KHHWfitvAisfYTydMFiVvDhvqlz2jBQ/2MLfkeJlVAquJ/4lKrTenMTa pDKEKMaV7oTIUwqFmzCFZWV4Z7VTksJmJ0sQQ6OuSdzLXXfgyLd9gGLnAsKjlE4ZMjKcb03qqea3Cp 012iyEtvru8=

Arenal No. 550, Col. Pueblo de Santa María Tepepan, Del. Xochimilco, 16020, Ciudad de México
(55) 53340700 - www.gob.mx/impi

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 524 of 656; IPR2025-00196

Electronic Acknowledgement Receipt

EFS ID:	31561655
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	22-JAN-2018
Filing Date:	30-APR-2014
Time Stamp:	10:54:23
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	NoticeOfAllowance.pdf	973534 29d1404db8220263f5cbefda15b3a3003ccdf110	no	2

Warnings:

Information:	
Total Files Size (in bytes):	973534

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

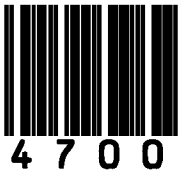
National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Office of Petitions: Routing Sheet



Application No. 14355533

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

- [X] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 05/09/2018

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
05/09/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of	:	
BOYD, CHRISTOPHER L., et al.	:	
Application No.: 14/355,533	:	DECISION ON PETITION
Filed: April 30, 2014	:	
Attorney Docket No.: JMG001-01	:	

This is a decision on the petition filed January 07, 2018, under the unintentional provisions of 37 CFR 1.137(a), to revive the above-identified application.

The petition is **GRANTED.**

The application became abandoned for failure to timely file a reply within the meaning of 37 CFR 1.113 to the Final Office Action mailed May 17, 2017. The proposed reply required for consideration of a petition to revive must be a Notice of Appeal (and appeal fee required by 37 CFR 41.20(b)(2), an amendment that prima facie places the application in condition for allowance, a Request for Continued Examination and submission (37 CFR 1.114), or the filing of a continuing application under 37 CFR 1.53(b). See MPEP 711.03(c)(III)(A)(2). No extension of time pursuant to the provisions of 37 CFR 1.136(a) were obtained. Accordingly, the date of abandonment of this application is August 18, 2017.

The petition satisfies the requirements of 37 CFR 1.137(a) in that petitioner has supplied (1) the reply in the form of a Request for Continued Examination (RCE) and fee of $600 the submission required by 37 CFR 1.114, submitted on August 24, 2017; (2) the petition fee of $850 and (3) a proper statement of unintentional delay.

Telephone inquiries concerning this decision should be directed to Dale Hall at (571) 272-3586.

This application is being referred to Technology Center AU 3744, for processing of the RCE and for appropriate action by the Examiner in the normal course of business on the amendment submitted in accordance with 37 CFR 1.114.

/Irvin Dingle/
Irvin Dingle
Lead Paralegal Specialist
Office of Petitions

Office of Petitions: Decision Count Sheet

Mailing Month: 5

Application No.: 14355533

14355533

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: Hall, Dale

Count (1) - Palm Credit 14355533

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

GRANT

Decision Type: 502 - 37 CFR 1.137(b) - REVIVAL BASED ON UNINTENTI

502

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: 5/1/2018

Office of Petitions Internal Document - Ver. 5.0

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 06/11/2018

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

NOTIFICATION DATE	DELIVERY MODE
06/11/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvm@jvmyers.com
jp@jvmyers.com
aap@jvmyers.com

Office Action Summary	Application No. 14/355,533	Applicant(s) BOYD ET AL.	
	Examiner DEVON RUSSELL	Art Unit 3744	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/9/18*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-16* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-16* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Claim Amendments

1. The claims dated 8/24/17 are entered. Claims 1 and 6 are amended. Claims 11-16 are newly entered. Claims 1-16 are pending and addressed below

Claim Rejections - 35 USC § 112

2. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-10 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

The metes and bounds of "adapted smoothly", in claims 1 and 6, are not known. It is not clear what it means to adapt an item smoothly. Furthermore, if the intention was to read smoothly as modifying a different item of the claim, such as the following discussion of receiving, it is not clear what it would mean to receive the fluid smoothly as opposed to not smoothly. No guidance was located in the specification.

Claims 2-5 and 7-10 are also rejected for depending from claims 1 and 6.

Claim Rejections - 35 USC § 103

4. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-16 are rejected under pre-AIA 35 U.S.C. 103(a) as obvious over Best (US 2011/0132579) in view of JP 5956100 B1 ('100).

Regarding claims 1 and 6, Best teaches an appliance immersion cooling system comprising: a tank (e.g. 510, 610, 710, 810) adapted to immerse (622, 722, 822) in a dielectric fluid (Para. [0025]) a plurality of electrical appliances (120), each in a respective appliance slot (Figs. 4, 6, 11) distributed vertically along, and extending transverse to, a long wall of the tank (L; e.g. Figs. 3-4), the tank comprising:

an outlet (e.g. 450, 550, heated liquid coolant outlet in Fig. 14, etc.) having an overflow lip (the bottom lip of the opening, interpreted as in the applicant's specification wherein the 'lip' is only the bottom surface of the opening 22), integrated horizontally into the long wall of the tank adjacent all appliance slots (see the long wall in each figure in which the weir is located), adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (Para. [0102]; the "common manifold area" defined by the tops of the slots and the devices 120, 820);

a primary circulation facility adapted to circulate the dielectric fluid through the tank (see 440/450, 540/550, etc.), comprising: a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (Para. [0086]; Figs. 5-6; H_L); 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 (150; 250; 350); and a control facility adapted 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 (380, 370; Fig. 2, "temp data").

Best does not teach the weir and reservoir arrangement.

‘100 teaches an appliance immersion cooling system (see Figs.) with a weir (127) integrated horizontally into the long wall of the tank (see Fig. 4) adjacent all appliance slots (14) having an overflow lip (bottom lip of 127) adapted to facilitate substantially uniform recover of the dielectric fluid flowing through each appliance slot (Para. 0034 and 0036); and 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 (see reservoir in Fig. 2 attached directly behind and below the weir 127).

It would have been obvious to one of ordinary skill in the art at the time of the invention to form the outlet of Best as the weir and reservoir, as taught by ‘100, in order to accommodate extra fluid displacement due to the insertion of additional electronic device and/or to allow for uniform removal of heated fluid from all appliance locations.

Best further teaches that: the tank and primary circulation facility comprise a highly integrated module (the devices are all inherently physically connected to one another and located in the same facility; see also Figs. 1B or 11), as per claims 2 and 7; interconnect panel facilities adapted to mount appliance support equipment (840), as per claims 3 and 8; first and second primary circulation sub-facilities (880 on the left/right of tank; e.g. Fig. 14), each adapted to operate independently to circulate the dielectric fluid through the tank (see Fig. 14), the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities to maintain the temperature of the dielectric fluid in

the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature (Para. [0082]), as per claims 4 and 9; and, the control facility (380) further comprises a communication facility (portion of controller which communicates with other equipment; Para. [0082] which performs the communications) adapted to facilitate monitoring and control of the control facility from a remote location (Para. [0081]-[0082]), as per claims 5 and 10.

Regarding claim 11, Best teaches a tank module adapted for use in an appliance immersion cooling system, the tank module comprising: a tank (e.g. 510, 610, 710, 810) adapted to immerse (622, 722, 822) in a dielectric fluid (Para. [0025]) a plurality of electrical appliances (120), each in a respective appliance slot (Figs. 4, 6, 11) distributed vertically along, and extending transverse to, a long wall of the tank (L; e.g. Figs. 3-4), the tank comprising:

an outlet (e.g. 450, 550, heated liquid coolant outlet in Fig. 14, etc.), adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot (Para. [0102]; the “common manifold area" defined by the tops of the slots and the devices 120, 820);

a primary circulation facility adapted to circulate the dielectric fluid through the tank (see 440/450, 540/550, etc.), comprising:

a plenum, positioned adjacent the bottom of the tank, adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot (Para. [0086]; Figs. 5-6; H_L);

and a control facility adapted to coordinate the operation of the primary fluid circulation facility as a function of the temperature of the dielectric fluid in the tank (380, 370; Fig. 2, “temp data”).

Best does not teach the weir and reservoir arrangement.

‘100 teaches an appliance immersion cooling system (see Figs.) with a weir (127) integrated horizontally into the long wall of the tank (see Fig. 4) adjacent all appliance slots (14) having an overflow lip (bottom lip of 127) adapted to facilitate substantially uniform recover of the dielectric fluid flowing through each appliance slot (Para. 0034 and 0036); and 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 (see reservoir in Fig. 2 attached directly behind and below the weir 127).

It would have been obvious to one of ordinary skill in the art at the time of the invention to form the outlet of Best as the weir and reservoir, as taught by ‘100, in order to accommodate extra fluid displacement due to the insertion of additional electronic device and/or to allow for uniform removal of heated fluid from all appliance locations.

Regarding claim 12, Best further teaches an interconnect panel facility (mounting support structures for 844; see Fig. 11) adapted to mount appliance support equipment (844).

Best further teaches that: first and second primary circulation sub-facilities (880 on the left/right of tank; e.g. Fig. 14), each adapted to operate independently to circulate

the dielectric fluid through the tank (see Fig. 14), the control facility is further adapted to coordinate the operation of the first and second primary circulation sub-facilities and the secondary fluid circulation facilities to maintain the temperature of the dielectric fluid in the tank substantially between a predetermined minimum temperature and a predetermined maximum temperature (Para. [0082]), as per claim 13; and, the control facility (380) further comprises a communication facility (portion of controller which communicates with other equipment; Para. [0082] which performs the communications) adapted to facilitate monitoring and control of the control facility from a remote location (Para. [0081]-[0082]), as per claim 14; the tank is part of an appliance immersion cooling system (see Figs.), per claim 15; and a secondary fluid circulation facility (250, 290; 352, 354) is adapted to extract heat (in 280) from the dielectric fluid circulating in the primary circulation facility and to dissipate to the environment the heat so extracted (Para. [0072]), per claim 16.

Response to Arguments

7. Applicant's arguments with respect to claims 1-16 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

The applicant simply argues that the EPO examiner did not agree with the application of Best in view of Pfannl. The examiner disagrees that the claims presented differentiate over Best in the manner indicated by the EPO examiner. The EPO

examiner appears to read into the claim language additional unclaimed features from the specification, which is not proper in the U.S.

Notwithstanding all of the above, the claims are currently rejected under different art as necessitated by the amendments to claims 1 and 6 and therefore the remarks are not persuasive.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVON RUSSELL whose telephone number is (571)270-1858. The examiner can normally be reached on M-Th, 9-4.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor is Ned Landrum. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DEVON RUSSELL/
Primary Examiner, Art Unit 3744

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/01/2016	05/11/2017	06/05/2018						
3	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11			✓						
	12			✓						
	13			✓						
	14			✓						
	15			✓						
	16			✓						

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

44070 7590 09/14/2018

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 09/14/2018

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

TITLE OF INVENTION: Appliance Immersion Cooling System

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0	$0	$500	12/14/2018

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 543 of 656; IPR2025-00196

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

44070 7590 09/14/2018
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

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nonprovisional	SMALL	$500	$0	$0	$500	12/14/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
RUSSELL, DEVON L	3744	165-287000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Petitioner Green Revolution Cooling, Inc., Ex-1002
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 09/14/2018

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER	
RUSSELL, DEVON L	

ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 09/14/2018

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice Requiring Inventor's Oath or Declaration	Application No. 14/355,533	Applicant(s) Christopher L. Boyd	
	Examiner RUSSELL, DEVON L	Art Unit 3744	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) MUST be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

A properly executed inventor's oath to declaration has not been received for the following inventor(s):

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

INFORMAL ACTION PROBLEMS

- Properly executed inventor's oath or declaration for the following inventor(s) has not been submitted: **Thomas R. Turner**, **Kenneth D. Swinden**, and **John Charles Tribou**

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/355,533	Applicant(s) BOYD ET AL.	
	Examiner DEVON RUSSELL	Art Unit 3744	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *5/9/18*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-16*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 1/7/18
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/DEVON RUSSELL/
Primary Examiner, Art Unit 3744

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Jeffrey Myers on 8/10/18 via voicemail.

2. The application has been amended as follows:

In claims 1 and 6 delete the word "smoothly".

3. The following is an examiner's statement of reasons for allowance:

As pointed out in an interview with the applicant, the previously applied reference JP 5956100 does not qualify as prior art as it was published after the effective filing date of this application.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVON RUSSELL whose telephone number is (571)270-1858. The examiner can normally be reached on M-Th, 9-4.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ned Landrum can be reached on 571.272.5567. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DEVON RUSSELL/
Primary Examiner, Art Unit 3744

PTO/SB/08a (07-09)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	14/355,533
Filing Date	30 April 2014
First Named Inventor	BOYD, Christopher L.
Art Unit	3744
Examiner Name	RUSSELL, Devon L.
Attorney Docket Number	JMG001

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 8009419	08-30-2011	Attlesey, et al.	
		US-			
		US-			
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		RU 2042294 C1	08-20-1995	Inst. of Thermal Physics		
		SU 1764094 A1	23-23-1992	Polyansky, et al.		

Examiner Signature	/DEVON RUSSELL/	Date Considered	08/13/2018

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.L.R./

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	Art Unit
	DEVON RUSSELL	3744

CPC- SEARCHED		
Symbol	Date	Examiner
H05K7/20236	11/1/16	DR
H01L23/42, 44;	5/10/17	DR
H05K7/20272	8/13/18	DR

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
361	699	5/10/17	DR

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
see EAST history	11/1/16	DR
updated classified search	8/13/18	DR

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H05K	7/20236, 20272	8/13/18	DR
361	699	8/13/18	DR
H01L	23/42, 44	8/13/18	DR

	/DEVON RUSSELL/ Primary Examiner.Art Unit 3744

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/01/2016	05/11/2017	06/05/2018	08/13/2018					
3	1	✓	✓	✓	=					
	2	✓	✓	✓	=					
	3	✓	✓	✓	=					
	4	✓	✓	✓	=					
	5	✓	✓	✓	=					
	6	✓	✓	✓	=					
	7	✓	✓	✓	=					
	8	✓	✓	✓	=					
	9	✓	✓	✓	=					
	10	✓	✓	✓	=					
	11			✓	=					
	12			✓	=					
	13			✓	=					
	14			✓	=					
	15			✓	=					
	16			✓	=					

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

CPC						
Symbol					**Type**	**Version**
H05K		7	/	20236	F	2013-01-01
H01L		23	/	44	I	2013-01-01
H05K		7	/	20272	I	2013-01-01
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CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	16	
/DEVON RUSSELL/ Primary Examiner.Art Unit 3744	08/13/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		H	0	1	L	23 / 44 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	16	
/DEVON RUSSELL/ Primary Examiner.Art Unit 3744	08/13/2018	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14355533	BOYD ET AL.
	Examiner	**Art Unit**
	DEVON RUSSELL	3744

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1														
2	2														
3	3														
4	4														
5	5														
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12	12														
13	13														
14	14														
15	15														
16	16														

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 16	
/DEVON RUSSELL/ Primary Examiner.Art Unit 3744 (Primary Examiner)	08/13/2018 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Continuation of Box No. VIII (i) to (v) DECLARATION

If the space is insufficient in any of Boxes Nos. VIII (i) to (v) to furnish all the information, including in the case where more than two inventors are to be named in Box No. VIII (iv), in such case, write "Continuation of Box No. VIII ..." (indicate the item number of the box) and furnish the information in the same manner as required for the purposes of the Box in which the space was insufficient. If additional space is required in respect of two or more declarations, a separate continuation box must be used for each such declaration. If this Box is not used, this sheet should not be included in the request.

Name: Thomas R. Turner
Residence: Georgetown, TX, USA
Mailing Address: 4210 Malaga Dr., Georgetown, TX 78628, USA

Signature: _____ Date: _____

Name: Kenneth D. Swinden
Residence: Hutto, TX, USA
Mailing Address: 132 Mustang Creek North Loop, Hutto, TX 78634, USA

Signature: _____ Date: _____

Name: Mario Conti Garcia
Residence: Austin, T, USA
Mailing Address: 9624 Woody Ridge View, Austin, TX 78730, USA

Signature: _____ Date: Dec 19 2013

Name: John Charles Tribou
Residence: Austin, TX, USA
Mailing Address: 9109 Middlebie Dr., Austin, TX 78750, USA

Signature: _____ Date: Dec 19, 2013

Continuation of Box No. VIII (i) to (v) DECLARATION

*If the space is insufficient in any of Boxes Nos. VIII (i) to (v) to furnish all the information, including in the case where **more than two inventors are to be named** in Box No. VIII (iv), in such case, write "Continuation of Box No. VIII ..." (indicate the item number of the Box) and furnish the information in the same manner as required for the purposes of the Box in which the space was insufficient. If additional space is needed in respect of two or more declarations, a separate continuation box must be used for each such declaration. If this Box is not used, this sheet should not be included in the request.*

Name: Thomas R. Turner
Residence: Georgetown, TX, USA
Mailing Address: 4210 Malaga Dr., Georgetown, TX 78628, USA

Signature: _____ Date: 9/17/2018

Name: Kenneth D. Swinden
Residence: Hutto, TX, USA
Mailing Address: 132 Mustang Creek North Loop, Hutto, TX 78634, USA

Signature: _____ Date: _____

Name: Mario Conti Garcia
Residence: Austin, T, USA
Mailing Address: 9624 Woody Ridge View, Austin, TX 78730, USA

Signature: _____ Date: Dec, 19 2013

Name: John Charles Tribou
Residence: Austin, TX, USA
Mailing Address: 9109 Middlebie Dr., Austin, TX 78750, USA

Signature: _____ Date: _____

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 559 of 656; IPR2025-00196

Continuation of Box No. VIII (i) to (v) — DECLARATION

I/We [illegible] Box No. VIII (i) to (v) — continuation of Box No. VIII — continue the item number of the Box and furnish the information or the name and address, number of the patent application, date of filing, name of the Contracting State, priority date, name of the applicant for the purposes of the Box in which the space was insufficient. Additional space is included at the end of the sheet. If an additional sheet or sheets is used, the total number of sheets so included should be indicated in the box.

Name: Thomas R. Turner
Residence: Georgetown, TX, USA
Mailing Address: 4210 Malaga Dr., Georgetown, TX 78628, USA

Signature: _____ Date: _____

Name: Kenneth D. Swinden
Residence: Hutto, TX, USA
Mailing Address: 132 Mustang Creek North Loop, Hutto, TX 78634, USA

Signature: [signature] Date: 9-18-2018

Name: Mario Conti Garcia
Residence: Austin, T, USA
Mailing Address: 9024 Woody Ridge View, Austin, TX 78730, USA

Signature: [signature] Date: [illegible] 2018

Name: John Charles Tribou
Residence: Austin, TX, USA
Mailing Address: 9100 Middlebie Dr., Austin, TX 78750, USA

Signature: _____ Date: _____

Electronic Acknowledgement Receipt

EFS ID:	33762649
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	19-SEP-2018
Filing Date:	30-APR-2014
Time Stamp:	10:58:26
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	JMG001_PCT_Request_Tribou.pdf	139404 8ac8bc514adc5e3f39aa6862c00af27ea2906d3c	no	1

Warnings:

Information:					
2	Oath or Declaration filed	JMG001_PCT_Request_Turner.pdf	21443 94ec23a8c0faed33442571eb160bc2fcb34c9cd5	no	1
Warnings:					
Information:					
3	Oath or Declaration filed	JMG001_PCT_Request_Swinden.pdf	355180 af8ef42a00d112b486ef2a3ad3347b70c46dbed5	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	516027	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

7590 01/02/2019

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER	
RUSSELL, DEVON L	

ART UNIT	PAPER NUMBER
3763	

NOTIFICATION DATE	DELIVERY MODE
01/02/2019	ELECTRONIC

Notice of Abandonment

This application is abandoned in view of:

1. ☐ The applicant's failure to timely file a proper reply to the Office letter mailed on _____.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission date _____), which is after the expiration of the period for reply (including a total extension of ____ month(s)) which expired on _____.
   (b) ☐ No reply has been received.
2. ☑ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission date _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.
   The issue fee required by 37 CFR 1.18 is $_____.
   The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☑ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawing have been received.
4. ☐ Applicant's failure to timely file the inventor's oath or declaration no later than the date on which the issue fee was paid as required by the Notice Requiring Inventor's Oath or Declaration (PTO-2306).
   (a) ☐ An inventor's oath or declaration was received on _____ (with a Certificate of Mailing or Transmission date _____), which is after the date on which the issue fee was paid.
   (b) ☐ While an oath or declaration (or substitute statement) for one or more inventors was received, an oath or declaration (or substitute statement) for at least one other inventor has not been received.
   (c) ☐ No inventor's oath or declaration has been received.
5. ☐ Drawings received on _____ were disapproved by examiner. See examiner's response dated _____.
6. ☐ Corrected drawings were received on _____ , which is after the expiration of the one-month period for reply set in examiner's response dated _____.
7. ☐ No corrected drawings have been received in reply to one-month period set in examiner's response dated _____.
8. ☐ The reason(s) below:

Petitions to revive under 37 CFR 1.137(a) or request to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

/Brandi Thomas/ for

(571)-272-4200 or 1(888)-786-0101
Patent Publication Branch
Office of Data Management

FORM PTO-ABN0 (Rev. 03/17)

Doc Code: PET.OP
Document Description: Petition for Review by the Office of Petitions

PTO/SB/64 (01-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)

Docket Number (Optional): JMG001-01

First named inventor: BOYD, Christopher L.

Application No.: 14/355,533 Art Unit: 3744

Filed: 30 April 2014 Examiner: D. Russell

Title: Appliance Immersion Cooling System

Attention: Office of Petitions
Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
FAX (571) 273-8300

NOTE: If information or assistance is needed in completing this form, please contact the Office of Petitions at (571) 272-3282.

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the Office notice or action plus any extensions of time actually obtained.

APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION.

NOTE: A grantable petition requires the following items:

(1) Petition fee;
(2) Reply and/or issue fee;
(3) Terminal disclaimer with disclaimer fee – required for all utility and plant applications filed before June 8, 1995, and for all design applications; and
(4) Statement that the entire delay was unintentional.

1. **Petition fee**

☒ Small entity fee $ 1000 (37 CFR 1.17(m)). Applicant asserts small entity status. See 37 CFR 1.27.

☐ Micro entity fee $ _____ (37 CFR 1.17(m)). Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

☐ Undiscounted fee $ _____ (37 CFR 1.17(m)).

2. **Reply and/or fee**

A The reply and/or fee to the above-noted Office notice or action in the form of

Payment of Issue Fee (identify the type of reply):

☐ has been filed previously on _____.

☒ is enclosed herewith.

B The issue fee and publication fee (if applicable) of $ 500

☐ has been paid previously on _____.

☒ is enclosed herewith.

This collection of information is required by 37 CFR 1.137(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PET.OP
Document Description: Petition for Review by the Office of Petitions

PTO/SB/64 (01-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)

3. **Terminal disclaimer with disclaimer fee**

☒ Since this utility/plant application was filed on or after June 8, 1995, no terminal disclaimer is required.

☐ A terminal disclaimer (and disclaimer fee (37 CFR 1.20(d)) of $ _____) disclaiming the required period of time is enclosed herewith (see PTO/SB/63).

4. **STATEMENT:** The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(a) was unintentional. [NOTE: The United States Patent and Trademark Office may require additional information if there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137(a) was unintentional (MPEP 711.03(c), subsections (III)(C) and (D)).]

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

/Jeffrey Van Myers/	8 January 2019
Signature	Date
Jeffrey Van Myers	27,362
Typed or Printed Name	Registration Number, if applicable
P. O.Box 13o	512.858.7453
Address	Telephone Number
Driftwood, TX 78619	
Address	

Enclosures:

☒ Fee Payment

☐ Reply

☐ Terminal Disclaimer Form

☐ Additional sheet(s) containing statements establishing unintentional delay

☐ Other: _____

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]

I hereby certify that this correspondence is being:

☐ Deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.

☒ Transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (571) 273-8300.

8 January 2019	/Jeffrey Van Myers/
Date	Signature
	Jeffrey Van Myers
	Typed or printed name of person signing certificate

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	14355533
Filing Date:	30-Apr-2014
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Filer:	Jeffrey Van Myers
Attorney Docket Number:	JMG001-01

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
PET. REVIVE ABANDON APP, DELAY PYMT-RESP	2453	1	1000	1000
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1000**

Electronic Acknowledgement Receipt

EFS ID:	34808940
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	09-JAN-2019
Filing Date:	30-APR-2014
Time Stamp:	16:37:24
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$1000
RAM confirmation Number	011019INTEFSW16374700
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition for review by the Office of Petitions	JMG001_P2Revive_190108.pdf	218524 bb942000e5ebfe02fd677341c5790df0c85ff715	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30165 a8f42596f4acfc0c6bae598e5ca45090cc9454eb	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	248689		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

44070 7590 09/14/2018
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

TITLE OF INVENTION: Appliance Immersion Cooling System

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0	$0	$500	12/14/2018

EXAMINER	ART UNIT	CLASS-SUBCLASS
RUSSELL, DEVON L	3744	165-287000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Jeffrey Van Myers
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Midas Green Technologies, LLC

(B) RESIDENCE: (CITY and STATE OR COUNTRY): 1905 E 6th St., Ste. 150 Austin, TX 78702

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
  NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
  NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ☐ Applicant changing to regular undiscounted fee status.
  NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Jeffrey Van Myers/ Date 9 January 2019

Typed or printed name Jeffrey Van Myers Registration No. 27362

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 571 of 656; IPR2025-00196

Electronic Patent Application Fee Transmittal

Application Number:	14355533
Filing Date:	30-Apr-2014
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Filer:	Jeffrey Van Myers
Attorney Docket Number:	JMG001-01

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**500**

Electronic Acknowledgement Receipt

EFS ID:	34809283
Application Number:	14355533
International Application Number:	
Confirmation Number:	3995
Title of Invention:	Appliance Immersion Cooling System
First Named Inventor/Applicant Name:	Christopher L. Boyd
Customer Number:	44070
Filer:	Jeffrey Van Myers
Filer Authorized By:	
Attorney Docket Number:	JMG001-01
Receipt Date:	09-JAN-2019
Filing Date:	30-APR-2014
Time Stamp:	16:50:55
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	EFT
Payment was successfully received in RAM	$500
RAM confirmation Number	011019INTEFSW16511200
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	JMG001_Issue_Fee_190109.pdf	85292 533dbf21170843e9866ef62be08f410c4bd7aa7e	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	29828 92476678ccc30363e4c3725e4c162abf62b79221	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	115120		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01	3995

44070 7590 08/01/2019

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

EXAMINER
RUSSELL, DEVON L

ART UNIT	PAPER NUMBER
3763	

NOTIFICATION DATE	DELIVERY MODE
08/01/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

aap@jvmyers.com
jp@jvmyers.com
jvm@jvmyers.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Application of	:	
Boyd et al.	:	
Application No. 14/355,533	:	DECISION ON PETITION
Filed: April 30, 2014	:	
Attorney Docket No.: JMG001-01	:	

This is a decision on the petition under 37 C.F.R. § 1.137(a), filed January 9, 2019, to revive the above-identified application.

The petition under 37 CFR 1.137(a) is **GRANTED.**

This application became abandoned for failure to timely pay the issue fee on or before December 14, 2018, as required by the Notice of Allowance and Fee(s) Due, mailed September 14, 2018. Accordingly, the date of abandonment of this application is December 15, 2018. A Notice of Abandonment was mailed January 2, 2019.

The petition satisfies the requirements of 37 CFR 1.137(a) in that petitioner has supplied (1) the reply in the form the Issue Fee Transmittal with payment of the issue fee of $500.00, (2) the petition fee of $1000.00 and (3) a proper statement of unintentional delay.

Telephone inquiries concerning this decision should be directed to Joy Dobbs at (571) 272-3001. Telephone inquiries related to processing as a patent should be directed to (571) 272-4200.

This application is being referred to the Office of Data Management for processing into a patent.

/LIANA S WALSH/
Lead Paralegal Specialist, OPET

PTO/SB/08a (07-09)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	14/355,533
Filing Date	30 April 2014
First Named Inventor	BOYD, Christopher L.
Art Unit	3744
Examiner Name	RUSSELL, Devon L.
Attorney Docket Number	JMG001

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 8009419	08-30-2011	Attlesey, et al.	
		US-			
		US-			
		US-			
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		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]
		RU 2042294 C1	08-20-1995	Inst. of Thermal Physics		
		SU 1764094 A1 09-1992	~~23-23-1992~~	Polyansky, et al.		

Change(s) applied to document, /D.D./ 9/20/2018

Examiner Signature	/DEVON RUSSELL/	Date Considered	08/13/2018

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /D.D./

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/355,533	09/03/2019	10405457	JMG001-01	3995

44070 7590 08/14/2019

J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 680 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Christopher L. Boyd, Austin, TX;
James P. Koen, Round Rock, TX;
David Christopher Laguna, Austin, TX;
Thomas R. Turner, Georgetown, TX;
Kenneth D. Swinden, Hutto, TX;
Mario Conti Garcia, Austin, TX;
John Charles Tribou, Austin, TX;

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Trials@uspto.gov
571.272.7822

Paper 16
Date: January 6, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

IMMERSION SYSTEMS LLC,
Petitioner,

v.

MIDAS GREEN TECHNOLOGIES, LLC,
Patent Owner.

IPR2021-01176
Patent 10,405,457 B2

Before FREDERICK C. LANEY, RYAN H. FLAX,
and ALYSSA A. FINAMORE, *Administrative Patent Judges*.

FLAX, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

Immersion Systems LLC ("Petitioner") filed a Petition for *inter partes* review challenging claims 1, 5, 6, 10, 11, and 14 of U.S. Patent 10,405,457 B2 (Ex. 1001, "the '457 patent"). Paper 2 ("Pet."). Midas Green Technologies, LLC ("Patent Owner") filed a Preliminary Response. Paper 10 ("Prelim. Resp."). Petitioner filed an authorized Preliminary Reply, and Patent Owner filed an authorized Preliminary Sur-Reply. Paper 11 ("Prelim. Reply"); Paper 12 ("Prelim. Sur-Reply").

Under 37 C.F.R. § 42.4(a), we have authority to determine whether to institute trial in an *inter partes* review. We may institute an *inter partes* review if the information presented in the petition filed under 35 U.S.C. § 311, and any preliminary response filed under § 313, shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. § 314.

However, we have discretion to deny a petition even when a petitioner satisfies the "reasonable likelihood" threshold standard for instituting trial. *See, e.g.*, *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion."). Based on the current record and for the reasons explained below, we exercise our discretion under 35 U.S.C. § 314(a) to deny institution of an *inter partes* review.

I. INTRODUCTION

A. REAL PARTIES-IN-INTEREST

Petitioner and Patent Owner each, respectively, identifies itself as a real party-in-interest. Pet. 66; Paper 4, 1.

B. RELATED MATTERS

Petitioner and Patent Owner each identifies "U.S. District Court for the Northern District of Texas, Case 20-cv-00555" (the "related district court litigation") as a related matter. Pet. 67; Prelim. Resp. 5; Paper 4, 2.

C. THE '457 PATENT

The '457 patent issued on September 3, 2019, from U.S. Application 14/355,533, which was filed on December 13, 2013 (as PCT/US2013/075126). Ex. 1001, codes (45), (21), (22), (86). On its face, the '457 patent claims priority to U.S. Provisional 61/737,200, filed on December 14, 2012, and U.S. Provisional 61/832,211, filed on June 7, 2013. *Id.* at code (60), 1:7–16.[1]

The '457 patent concludes with 16 claims, of which claims 1, 6, and 11 are independent claims. Ex. 1001, 9:33–12:20. Claim 1 is illustrative and reproduced below:

> 1. An appliance immersion cooling system comprising:
>
> 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:
>
> 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;
>
> a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and

[1] There is a dispute as to whether the '457 patent is entitled to priority to these provisional applications. *See* Pet. 4–6; Prelim. Resp. 20–24. We, however, need not resolve this dispute, in part, because we exercise our discretion under 35 U.S.C. § 314(a) to deny institution here.

adapted to receive the dielectric fluid as it flows over the weir;

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;

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

a control facility adapted 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.

Ex. 1001, 9:33–59. Independent claims 6 and 11 are similar to claim 1, but do not recite the "secondary fluid circulation facility," as in claim 1.

The '457 patent's Abstract indicates its invention is directed to:

A[n] appliance immersion tank system comprising: a generally rectangular tank adapted to immerse in a dielectric fluid a plurality of appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, the long axis of the tank; a primary circulation facility adapted to circulate the dielectric fluid through the tank; 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 a control facility adapted 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. A plenum, positioned adjacent the bottom of the tank, is adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot. A weir, integrated horizontally into a long wall of the tank, is adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot. All active and most passive components of both

> the primary and secondary fluid circulation facilities, and the control facility are fully redundant, and are adapted automatically to operate in a fail-soft mode.

Id. at Abstract.

The '457 patent illustrates an apparatus or system as claimed and as described in its Abstract at its Figures 1 and 2, which we reproduced side-by-side below, annotated to highlight claimed features:

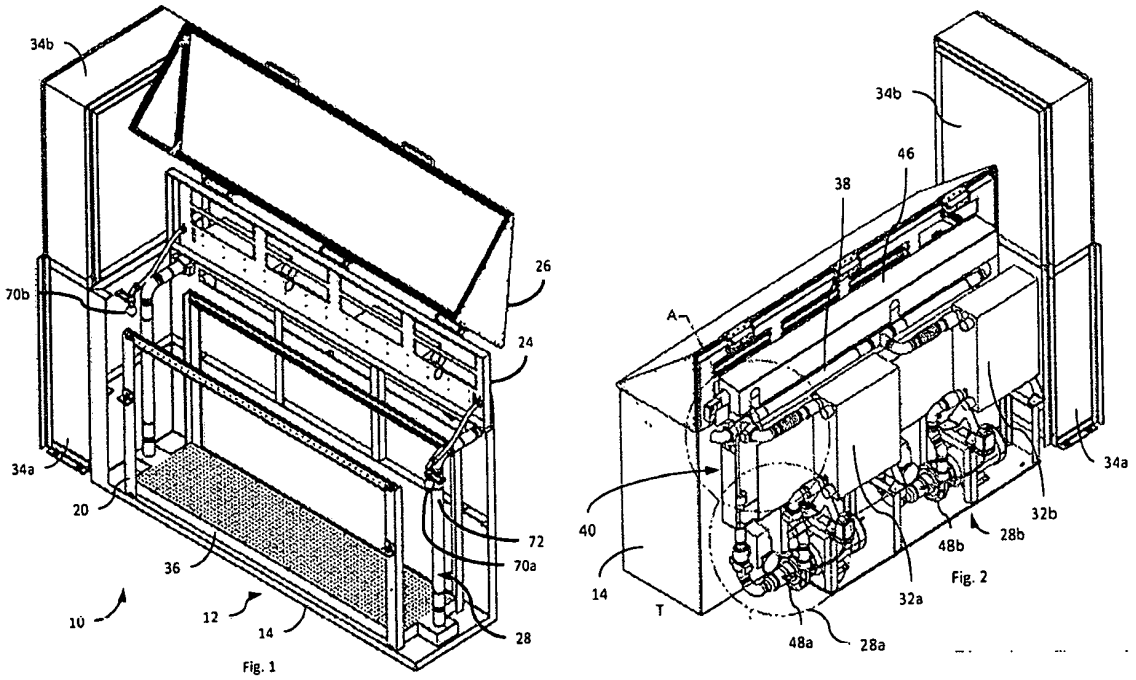


Figure 1, above-left, "illustrates, in partial cut-away form, a front perspective of a tank module or an appliance immersion cooling system constructed in accordance with [the] invention," and Figure 2, above-right, "illustrates a rear perspective of the tank module shown in FIG. 1." *Id.* at 2:59–63. The figures show tank module 10 having tank 12 with long axis 14, appliance rack facility 20, weir 22 (not labeled, but highlighted in yellow in Figure 1), cover 26, primary circulation facility 28, secondary fluid

circulation facility 30 (not labeled), heat exchangers 32a, 32b, plenum facility 36, fluid recovery facility 40, and reservoir 42 (not labeled, but highlighted in yellow in Figure 2). *Id.* at 3:36–4:49; *see also id.* at Figs. 3–6.

D. SUMMARY OF ASSERTED GROUNDS FOR UNPATENTABILITY

Petitioner asserts the following grounds for the unpatentability of claims 1, 5, 6, 10, 11, and 14 of the '457 patent:

Ground	Claims Challenged	35 U.S.C. §[2]	Reference(s)/Basis
1	1, 5, 6, 10, 11, 14	103	Best,[3] Krajewski,[4] Cray[5]
2	1, 5, 6, 10, 11, 14	103	Best, Oktay[6]
3	1, 5, 6, 10, 11, 14	103	Best, Gryzhin[7]
4	11, 14	103	Best

See Pet. 2.

In support of the grounds for unpatentability, Petitioner submits, *inter alia*, the Declaration of Issam Mudawar, Ph.D. (Ex. 1020).

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[2] The '457 patent has an actual filing date of December 13, 2013, which is after the AIA revisions to 35 U.S.C. § 103 took effect on March 16, 2013, but, on its face, the '457 patent asserts priority to a provisional application filed on December 14, 2012, which is before the AIA revisions took effect. 35 U.S.C. § 100 (note). Therefore, whether pre-AIA or AIA § 103 applies is in dispute. Our decision, however, is not impacted by which version of the statute applies.

[3] US 10,123,463 B2, issued Nov. 6, 2018 (filed Aug. 10, 2009) (Ex. 1006; "Best").

[4] US 5,167,511, issued Dec. 1, 1992 (Ex. 1007, "Krajewski").

[5] US 4,590,538, issued May 20, 1986 (Ex. 1008, "Cray").

[6] US 3,406,244, issued Oct. 15, 1968 (Ex. 1009, "Oktay").

[7] RU 2 500 013 C1, published Nov. 27, 2013 (filed Mar. 19, 2012) (Ex. 1011, Ex. 1012 (English translation), "Gryzhin").

II. DISCUSSION

A. LEVEL OF ORDINARY SKILL IN THE ART

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

Petitioner states:

> A POSITA as of December 13, 2013 would have had a [*sic*] either a (a) Bachelor's degree in mechanical engineering, or an equivalent degree, with five years of liquid cooling systems experience including responsibility for designing such systems, or (b) Master's Degree in mechanical engineering, or an equivalent degree, including liquid cooling systems research and system design. Ex-1020, ¶75. A POSITA would also have had, through education or experience, familiarity and experience in particular with immersion cooling systems. Additional education could compensate for less practical experience and vice versa. *Id.*

Pet. 10. Other than arguing that the date for defining the ordinarily skilled artisan should be earlier than that used by Petitioner because the '457 patent is entitled to priority to provisional applications, Patent Owner "does not offer a competing definition for POSITA." Prelim. Resp. 25.

For the purposes of this Decision, we accept, as has Patent Owner, Petitioner's definition of the ordinarily skilled artisan. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) ("[T]he prior art itself [may] reflect[] an appropriate level" as evidence of the ordinary level of skill in the art. (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))).

B. CLAIM CONSTRUCTION

"[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'" *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Neither party asserts that any claim term should be expressly construed, and we do not expressly construe any claim language. Pet. 10–11; Prelim. Resp. 25–29; *see also* Ex. 2006 (district court claim construction order declining to expressly construe and claim language).

C. APPLICABLE LEGAL STANDARDS

"In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

Regarding obviousness, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), reaffirmed the framework for determining obviousness set forth in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). The *KSR* Court summarized the four factual inquiries set forth in *Graham* (383 U.S. at 17–18) that are applied in determining whether a claim is unpatentable as obvious under 35 U.S.C. § 103(a) as follows:

(1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the

level of ordinary skill in the art;[8] and (4) considering objective evidence indicating obviousness or non-obviousness.[9] *KSR*, 550 U.S. at 406.

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 416. "[W]hen the question is whether a patent claiming the combination of elements of prior art is obvious," the answer depends on "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 417.

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; 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, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit

and "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.* at 418.

With these standards in mind, and in view of the definition of the ordinarily skilled artisan, we address Petitioner's challenges and the preliminary record below as applicable to our discretion to deny institution under 35 U.S.C. § 314(a).

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[8] *See supra* Section II.A.

[9] At this stage of the proceeding, there is no evidence pertaining to objective indicia of non-obviousness. *See* Prelim. Resp.

D. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 314(a)

1. Background and Legal Standards

Under § 314(a), the Director possesses "broad discretion" in deciding whether to institute an *inter partes* review. *See* 35 U.S.C. § 314(a); *Saint Regis Mohawk Tribe v. Mylan Pharm. Inc.*, 896 F.3d 1322, 1327 (Fed. Cir. 2018). The Board decides whether to institute an *inter partes* review on the Director's behalf. 37 C.F.R. § 42.4(a) (2021).

Patent Owner argues that we should exercise discretion under § 314(a) to deny institution of an *inter partes* review. *See* Prelim. Resp. 14–20; Prelim. Sur-Reply. Petitioner argues that we should decline to exercise our discretion under § 314(a) to deny institution. *See* Pet. 66; Prelim. Reply. For the reasons explained below, under the circumstances here, we exercise our discretion under § 314(a) to deny institution.

When deciding whether to exercise discretion under § 314(a) to deny institution, the Board has considered the status of litigation involving the parties in light of the AIA's objective "to provide an effective and efficient alternative to district court litigation." *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 12, 19–20 (PTAB Sept. 12, 2018) (precedential) (quoting *Gen. Plastic Indus. Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16–17 (PTAB Sept. 6, 2017) (precedential as to § II.B.4.i)).

In *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"), the Board set forth the following nonexclusive factors to consider when determining whether to exercise discretion under § 314(a) to deny institution due to the advanced state of parallel litigation:

> (1) whether the court granted a stay or evidence exists that one may be granted if the Board institutes a trial;
>
> (2) the proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> (3) the investment in the parallel litigation by the court and the parties;
>
> (4) the overlap in the issues raised by the petition and the issues in the parallel litigation;
>
> (5) whether the petitioner and the defendant in the parallel litigation are the same party; and
>
> (6) other circumstances that impact the Board's exercise of discretion, including the merits.

These factors, considered below, "relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding." *Id.* at 6. Further, *Fintiv* instructs that the Board should take "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.* (citing PTAB Consolidated Trial Practice Guide at 58 (Nov. 2019)[10]).

As identified above in this Decision at Section I.B, the related, parallel proceeding at issue here is *Midas Green Technologies, LLC v. Immersion Systems LLC*, No. 4:20-cv-00555-O in the U.S. District Court for the Northern District of Texas. *See, e.g.*, Ex. 1003 (original complaint dated May 29, 2020); Ex. 1004 (affidavit of service indicating service was executed on Immersion Systems LLC on June 23, 2020).

[10] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

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2. Analysis Under Section 314(a)

Factor 1: Whether a Stay has Been or is Likely to be Granted

The parties do not dispute that there is currently no stay in the related district court litigation, either requested or granted. Pet. 66; Prelim. Resp. 16; Prelim. Reply; Prelim. Sur-Reply. Petitioner indicates that, if trial is instituted here, it will request a stay in the related district court litigation. Prelim. Reply, 1; *see also* Ex. 1021, 1–2. Petitioner's assertion aside, we will not speculate as to whether the related district court litigation will be stayed, as the evidence is inconclusive concerning this factor.

Accordingly, we weigh this factor as neutral as to whether to exercise our discretion to deny institution.

Factor 2: Proximity of the Court's Trial Date to the Board's Final Written Decision

The statutory deadline for the issuance of a final written decision in this proceeding will be one year from the date of institution, if trial is instituted. 35 U.S.C. § 316(a)(11). Based upon the preliminary filings in this proceeding, the due date for our decision on institution is approximately January 14, 2022, meaning a final written decision would be due in January 2023. 35 U.S.C. § 314(b)(1).

The record includes a scheduling order from the related district court litigation, which sets a jury trial date of October 11, 2022. Ex. 2001, 3; *see also* Prelim. Resp. 16–17. Moreover, this same scheduling order goes on to state that "[t]he parties are advised that future requests to extend deadlines or modify the Scheduling Order will be disfavored and will not be granted by the Court absent good cause." Ex. 2001, 3; *see also* Prelim. Resp. 16. Patent Owner also notes that the district court "later referenced this same instruction in denying a subsequent motion to modify the schedule." Prelim.

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Resp. 16 (citing *Midas Green Technologies, LLC v. Immersion Systems LLC*, Civ. No. 4-20-cv-00555, Dkt. 73 (N.D. Tex. Aug. 18, 2021)).

Thus, a jury trial is scheduled to occur in the related district court litigation approximately three months prior to when a final written decision would be statutorily due in this *inter partes* review, and the district court has indicated that any changes to the schedule, including the trial date, are disfavored.

We find these facts weigh in favor of exercising discretion to deny institution under this factor.

Factor 3: Investment in the Parallel Litigation

If, at the time of the institution decision, the district court has issued substantive orders related to the challenged patent, such as a claim construction order, this fact weighs in favor of discretionary denial. *See Fintiv* at 9–10. On the other hand, if the district court has not issued such orders, this fact weighs against discretionary denial. *Id.* at 10.

The evidence of record indicates that the related district court litigation has progressed as far as the entry of a claim construction order. Ex. 2006 (Order dated Nov. 22, 2021). In addition, Patent Owner states that there has also been "significant discovery" by way of written discovery, document production, and a fact-witness deposition (with others scheduled if not having already occurred). Prelim. Resp. 17–18. Petitioner, on the other hand, indicates that, as of the Petition (and Preliminary Reply), "[t]he parties have invested little in the related litigation." Pet. 66; Prelim. Reply 1 (addressing resources invested on invalidity issues).

We find the fact that a claim construction order has been entered, coupled with several other events, such as discovery, in the related district

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court litigation is not insignificant. Although it appears that much is left to occur in the related district court litigation, the evidenced expended effort is nevertheless not insubstantial. Moreover, it appears that efforts and investment are continuing and ongoing and several of the events listed in the district court's scheduling order have due dates based on the entry date of the claim construction order, which has been entered. *See* Ex. 2001 (e.g., final infringement contentions were due 30 days from the court's claim construction ruling, that is, on December 30, 2021).

Further, *Fintiv* provides guidance on how the timing of various events can impact Factor 3:

> As a matter of petition timing, notwithstanding that a defendant has one year to file a petition, it may impose unfair costs to a patent owner if the petitioner, faced with the prospect of a looming trial date, waits until the district court trial has progressed significantly before filing a petition at the Office.

Fintiv at 11 (footnote omitted). However, "it is often reasonable for a petitioner to wait to file its petition until it learns which claims are being asserted against it in the parallel proceeding." *Id.* Accordingly, a petitioner should act expeditiously once the patent owner has identified the claims being asserted against it so that the petitioner can file a petition challenging all asserted claims—if it chooses to do so.

Here, although satisfying the one-year grace period afforded by 35 U.S.C. § 315(b) for filing a petition (based on the service date of a district court complaint), the evidence of record shows that Petitioner met the deadline by mere hours, filing its Petition in this proceeding on the last possible day. *See* Ex. 1004 (service executed on Petitioner June 23, 2020); Pet. (filed June 23, 2021). Although the district court's scheduling order indicates that final infringement contentions were not due until December

30, 2021, Petitioner was not without notice of which claims were at issue in the litigation because Patent Owner's first amended complaint in the district court proceeding (indicates filing on November 24, 2020) identifies at least claims 1, 6, and 11 of the '457 patent as asserted against Petitioner, and Patent Owner asserts that preliminary infringement contentions were submitted on November 20, 2020. Ex. 1005, 8–9; Ex. 2001, 2; Prelim. Resp. 17; Ex. 2002 n.1 (identifying claims 1, 5, 6, 10, 11, and 14 of the '457 patent as asserted against Petitioner). And, Petitioner (there, defendant) filed or served detailed preliminary invalidity contentions in the district court proceeding addressing the same claims at issue here. Ex. 2002 (dated Jan. 11, 2021; asserting that claims 1, 5, 6, 10, 11, and 14 of the '457 patent are invalid). These facts do not evidence Petitioner's diligence here.

We find the facts weigh in favor of exercising discretion to deny institution under this factor.

Factor 4: Overlap in Issues Raised by the Petition and in the Parallel Litigation

"[I]f the petition includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding, this fact has favored denial." *Fintiv* at 12. "Conversely, if the petition includes materially different grounds, arguments, and/or evidence than those presented in the district court, this fact has tended to weigh against exercising discretion to deny institution under *NHK*." *Id.* at 12–13.

As noted above, for example at Section I.D, the Petition asserts that the '457 patent's claims 1, 5, 6, 10, 11, and 14 are unpatentable over the prior art combinations of Best-Krajewski/Cray, Best-Oktay, Best-Gryzhin, and Best individually. *See* Pet. 2. Petitioner's (there, defendant's) initial invalidity contentions in the related district court proceeding assert the

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invalidity of claims 1, 5, 6, 10, 11, and 14 over the Best-Krajewski combination several times, and supplemental preliminary invalidity and unenforceability contentions assert the invalidity of "[a]ll [c]laims-in-[s]uit" over the Best-Oktay and Best-Gryzin combinations. *See, e.g.*, Ex. 2002, at, *inter alia*, 2 n.1, 16, 20, 26, 28, 32, 35; Ex. 2005, 7 *et seq*. Patent Owner asserts that this is "*complete* overlap in the validity issues raised in these parallel proceedings." Prelim. Resp. 18–19. We agree with Patent Owner that there is overlap here.

We also determine that Petitioner's stipulation does not affect that overlap. Petitioner states that it has

> entered a stipulation (Ex. 1021) in the related [district court litigation] which states that, if [this IPR is] instituted, Petitioner intends to request a stay of the [district court litigation] until a final determination on the petition[ ] is issued by the PTAB. The stipulation is modeled on the *Sotera* decision and extends to grounds "raised or that could have been reasonably raised."

Prelim. Reply 1 (citing *Sotera Wireless v. Masimo Corp.*, IPR2020-01019, Paper 12 at 13 (PTAB Dec. 1, 2020) (precedential as to Section II.A)). Petitioner further argues that its stipulation filed in the related district court litigation means that this *inter partes* review "will 'function as a true alternative to litigation' because the expected stay and stipulation will mitigate any concern of duplicative efforts or conflicting decisions." *Id.*

The stipulation to which Petitioner refers states:

> Immersion hereby stipulates that if the PTAB (i) allows Immersion to enter this Stipulation as part of the IPR petition, and (ii) institutes review pursuant to 35 U.S.C. §314 of IPR2021-01176 ***that results in a final written decision***, then Immersion will not pursue in these district court proceedings the specific grounds identified above in connection with the '457 Patent and claims as originally issued on the instituted

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> inter parties review petition, or on any other ground for which the PTAB institutes that was raised or could have been reasonably raised in the IPR (*i.e.*, any ground that could be raised under 35 U.S.C. §§ 102 or 103 on the basis of prior art patents or printed publications).

Ex. 1021, 3 (emphasis added).

We find this stipulation to be very different from others the Board has relied upon to assuage concerns under this factor. *See Sotera*, IPR2020-01019, Paper 12 at 18 (concerning a stipulation (Ex. 1038 in that proceeding) that required institution of an IPR, but addressed all challenges brought or that could have been brought in the IPR); *Sand Revolution II LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393, Paper 24 at 11–12 (PTAB June 16, 2020) (informative) (concerning a stipulation (Ex. 1015 in that proceeding) that required institution of an IPR, but addressed the challenges brought in the IPR). Petitioner's stipulation is contingent upon two things—our entry of the stipulation as part of the Petition and then completion of this *inter partes* review proceeding with a final written decision. Ex. 1021. First, if Petitioner suggests that we may consider the stipulation to be integrated into and a part of the Petition, which is somewhat unclear on the record, Petitioner is incorrect and the Petition will not be so-considered supplemented or expanded, even if the record includes the stipulation as evidence. Second, regardless of Petitioner's intent regarding the first contingent event and even though the stipulation is entered as a part of the record here, Petitioner ties its stipulation to an asserted likelihood of the court granting a stay in the related district court litigation. *See* Prelim. Reply 1.

In other words, absent a stay and given the district court trial date, the stipulation will have no effect because a trial would occur before the

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deadline for a final written decision here. As discussed above, we will not speculate whether the related district court litigation will be stayed, and thus we assume for purposes of this analysis that the jury trial in the parallel proceeding will occur several months before a final written decision will be statutorily due in this proceeding. Thus, Petitioner's prerequisite that requires a final written decision renders Petitioner's stipulation meaningless for purposes of our analysis of this factor.

We find the unique facts here weigh in favor of exercising discretion to deny institution under this factor.

Factor 5: Are Petitioner and the Defendant in the Parallel Litigation the Same Party?

It is undisputed that Petitioner is the defendant and Patent Owner the plaintiff in the related district court litigation. *See* Ex. 1003. We find this fact weighs in favor of exercising discretion to deny institution under this factor.

Factor 6: Other Circumstances, Including the Merits

Although we need not undertake a full merits analysis when evaluating *Fintiv* Factor 6, we consider the strengths and weaknesses of Petitioner's case, where stronger merits may weigh against discretionary denial and weaker merits may favor exercising discretion to deny institution. *Fintiv* at 15–16.

In our view, some challenges likely satisfy the "reasonable likelihood" threshold standard for instituting trial, and some may not. We would not characterize any challenge as sufficiently strong to override concerns about duplication of effort by the Board and the district court.

For example, under Petitioner's Ground 1, although Petitioner's and its witness's (Dr. Mudawar's) interpretations of the prior art as teaching the

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claimed subject matter are not unreasonable, the interpretations are not particularly clear or strong. Pet. 11–36. Petitioner pieces together portions from Best, Krajewski, and/or Cray that do not explicitly disclose the claimed subject matter, relying instead on Dr. Mudawar to interpret the references' disclosures as meeting specific claim limitations. *Id.* Further, Petitioner, for the most part, asserts that each limitation of, for example independent claim 1, is individually disclosed by one or more of Best, Krajewski, and/or Cray without clearly explaining how one reference's disclosed apparatus or system would be specifically modified by the ordinarily skilled artisan in view of the teachings of the others. *Id.* Moreover, when discussing a motivation to combine Best, Krajewski, and/or Cray, Petitioner relies on the fact that they are directed to analogous art and then, primarily, that the features they teach would achieve the same advantages extolled by the '457 patent itself for its claimed invention, which is not strong support that the prior art would have been combined or modified absent some improper hindsight. *Id.* at 32–36.

As another example, Petitioner's Ground 3 relies on a combination of Best and Gryzhin. *Id.* at 48 *et seq.* However, this ground relies on Petitioner's premise that Gryzhin is prior art to the '457 patent's claims because the '457 patent is not entitled to priority to provisional applications. *Id.* at 1–2, 4–6. Based only on the preliminary record, however, we find Patent Owner's arguments in support of the '457 patent's priority claim facially reasonable and that Petitioner's assertions on the matter appear to overlook the disclosures of the provisional applications identified by Patent Owner as describing the claimed subject matter. Prelim. Resp. 20–24.

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Thus, although Petitioner may have made a sufficient showing for institution of trial under certain grounds, there are significant issues of fact that would be left for trial and we are not confident Petitioner's case would survive the scrutiny of trial. We do not find that the Petition has provided a particularly well-developed explanation for motivation for or manner of combining the references so as to arrive at the claimed subject matter and there are significant issues about whether the Gryzhin reference qualifies as prior art in view of the '457 patent's priority claim to provisional applications.

Accordingly, we weigh this factor as neutral as to whether to exercise our discretion to deny institution.

3. Holistic Assessment of Factors Under Section 314(a)

After analyzing the *Fintiv* factors with a holistic view of whether the efficiency and integrity of the system are best served by denying or instituting review, we determine that the factors, on balance, weigh in favor of discretionary denial under the circumstances here. Hence, we exercise our discretion under § 314(a) to deny institution.

III. CONCLUSION

For the foregoing reasons, we exercise discretion not to institute *inter partes* review under 35 U.S.C. § 314(a).

ORDER

Accordingly, it is hereby:

ORDERED that the Petition is *denied* and no *inter partes* review is instituted.

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For PETITIONER:

Timothy K. Sendek
ACKERMAN LLP
tim.sendek@akerman.com
ip@akerman.com

Mary Jo Boldingh
CHAPMAN SPINGOLA LLP
mjboldingh@chapmanspingola.com

For PATENT OWNER:

Artie Pennington
Jeffrey D. Hunt
HUNT PENNINGTON KUMAR & DULA, PLLC
aapennington@hpkdlaw.com
jeffhunt@hpkdlaw.com

AO 120 (Rev. 08/10)

TO:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Northern District of Texas, Ft. Worth Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
4:20-cv-00555-O	5/29/2020	Northern District of Texas, Ft. Worth Division

PLAINTIFF	DEFENDANT
Midas Green Technologies, LLC	Immersion Systems LLC

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,405,457 B2	9/3/2019	Midas Green Technologies, LLC
2			
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY
11/24/2020	☑ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,820,446 B2	10/27/2020	Midas Green Technologies, LLC
2			
3			
4			
5			

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
Karen Mitchell	s/P. Fisher	11/25/2020

Copy 1—Upon initiation of action, mail this copy to Director **Copy 3—Upon termination of action, mail this copy to Director**
Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

Trials@uspto.gov
571.272.7822

Paper 16
Date: January 6, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

IMMERSION SYSTEMS LLC,
Petitioner,

v.

MIDAS GREEN TECHNOLOGIES, LLC,
Patent Owner.

IPR2021-01176
Patent 10,405,457 B2

Before FREDERICK C. LANEY, RYAN H. FLAX,
and ALYSSA A. FINAMORE, *Administrative Patent Judges*.

FLAX, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

Immersion Systems LLC ("Petitioner") filed a Petition for *inter partes* review challenging claims 1, 5, 6, 10, 11, and 14 of U.S. Patent 10,405,457 B2 (Ex. 1001, "the '457 patent"). Paper 2 ("Pet."). Midas Green Technologies, LLC ("Patent Owner") filed a Preliminary Response. Paper 10 ("Prelim. Resp."). Petitioner filed an authorized Preliminary Reply, and Patent Owner filed an authorized Preliminary Sur-Reply. Paper 11 ("Prelim. Reply"); Paper 12 ("Prelim. Sur-Reply").

Under 37 C.F.R. § 42.4(a), we have authority to determine whether to institute trial in an *inter partes* review. We may institute an *inter partes* review if the information presented in the petition filed under 35 U.S.C. § 311, and any preliminary response filed under § 313, shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. § 314.

However, we have discretion to deny a petition even when a petitioner satisfies the "reasonable likelihood" threshold standard for instituting trial. *See, e.g.*, *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) ("[T]he agency's decision to deny a petition is a matter committed to the Patent Office's discretion."). Based on the current record and for the reasons explained below, we exercise our discretion under 35 U.S.C. § 314(a) to deny institution of an *inter partes* review.

I. INTRODUCTION

A. REAL PARTIES-IN-INTEREST

Petitioner and Patent Owner each, respectively, identifies itself as a real party-in-interest. Pet. 66; Paper 4, 1.

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B. RELATED MATTERS

Petitioner and Patent Owner each identifies "U.S. District Court for the Northern District of Texas, Case 20-cv-00555" (the "related district court litigation") as a related matter. Pet. 67; Prelim. Resp. 5; Paper 4, 2.

C. THE '457 PATENT

The '457 patent issued on September 3, 2019, from U.S. Application 14/355,533, which was filed on December 13, 2013 (as PCT/US2013/075126). Ex. 1001, codes (45), (21), (22), (86). On its face, the '457 patent claims priority to U.S. Provisional 61/737,200, filed on December 14, 2012, and U.S. Provisional 61/832,211, filed on June 7, 2013. *Id.* at code (60), 1:7–16.[1]

The '457 patent concludes with 16 claims, of which claims 1, 6, and 11 are independent claims. Ex. 1001, 9:33–12:20. Claim 1 is illustrative and reproduced below:

> 1. An appliance immersion cooling system comprising:
>
> 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:
>
> 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;
>
> a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and

[1] There is a dispute as to whether the '457 patent is entitled to priority to these provisional applications. *See* Pet. 4–6; Prelim. Resp. 20–24. We, however, need not resolve this dispute, in part, because we exercise our discretion under 35 U.S.C. § 314(a) to deny institution here.

> adapted to receive the dielectric fluid as it flows over the weir;
>
> 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;
>
> 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
>
> a control facility adapted 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.

Ex. 1001, 9:33–59. Independent claims 6 and 11 are similar to claim 1, but do not recite the "secondary fluid circulation facility," as in claim 1.

The '457 patent's Abstract indicates its invention is directed to:

> A[n] appliance immersion tank system comprising: a generally rectangular tank adapted to immerse in a dielectric fluid a plurality of appliances, each in a respective appliance slot distributed vertically along, and extending transverse to, the long axis of the tank; a primary circulation facility adapted to circulate the dielectric fluid through the tank; 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 a control facility adapted 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. A plenum, positioned adjacent the bottom of the tank, is adapted to dispense the dielectric fluid substantially uniformly upwardly through each appliance slot. A weir, integrated horizontally into a long wall of the tank, is adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot. All active and most passive components of both

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> the primary and secondary fluid circulation facilities, and the control facility are fully redundant, and are adapted automatically to operate in a fail-soft mode.

Id. at Abstract.

The '457 patent illustrates an apparatus or system as claimed and as described in its Abstract at its Figures 1 and 2, which we reproduced side-by-side below, annotated to highlight claimed features:

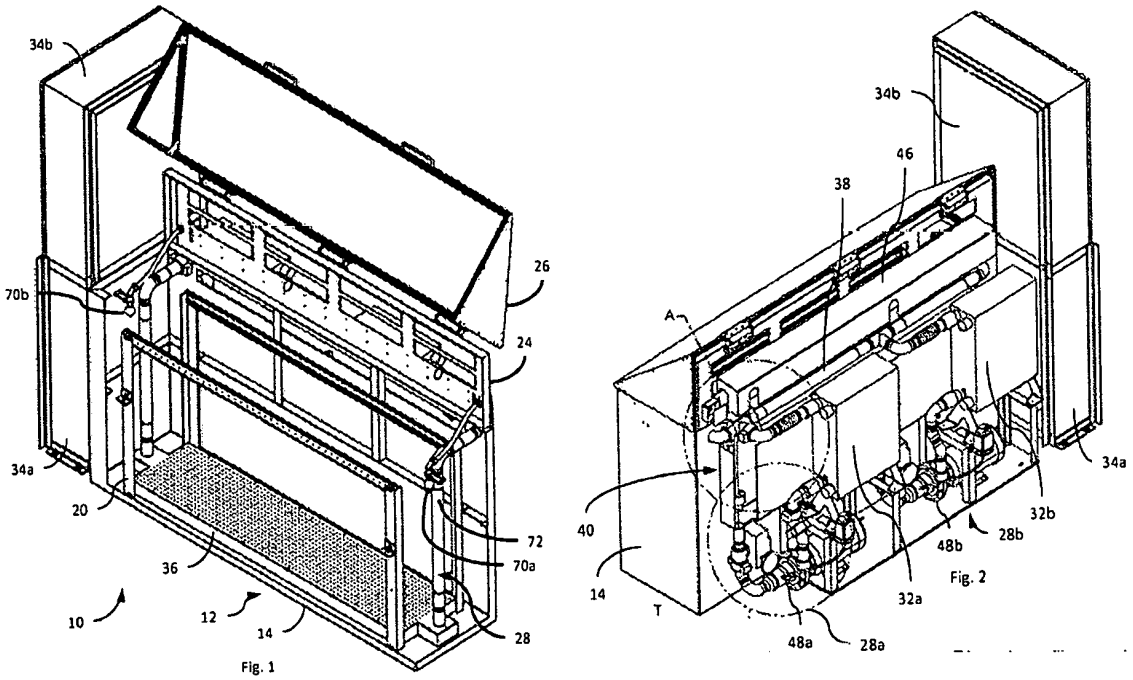


Figure 1, above-left, "illustrates, in partial cut-away form, a front perspective of a tank module or an appliance immersion cooling system constructed in accordance with [the] invention," and Figure 2, above-right, "illustrates a rear perspective of the tank module shown in FIG. 1." *Id.* at 2:59–63. The figures show tank module 10 having tank 12 with long axis 14, appliance rack facility 20, weir 22 (not labeled, but highlighted in yellow in Figure 1), cover 26, primary circulation facility 28, secondary fluid

circulation facility 30 (not labeled), heat exchangers 32a, 32b, plenum facility 36, fluid recovery facility 40, and reservoir 42 (not labeled, but highlighted in yellow in Figure 2). *Id.* at 3:36–4:49; *see also id.* at Figs. 3–6.

D. SUMMARY OF ASSERTED GROUNDS FOR UNPATENTABILITY

Petitioner asserts the following grounds for the unpatentability of claims 1, 5, 6, 10, 11, and 14 of the '457 patent:

Ground	Claims Challenged	35 U.S.C. §[2]	Reference(s)/Basis
1	1, 5, 6, 10, 11, 14	103	Best,[3] Krajewski,[4] Cray[5]
2	1, 5, 6, 10, 11, 14	103	Best, Oktay[6]
3	1, 5, 6, 10, 11, 14	103	Best, Gryzhin[7]
4	11, 14	103	Best

See Pet. 2.

In support of the grounds for unpatentability, Petitioner submits, *inter alia*, the Declaration of Issam Mudawar, Ph.D. (Ex. 1020).

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[2] The '457 patent has an actual filing date of December 13, 2013, which is after the AIA revisions to 35 U.S.C. § 103 took effect on March 16, 2013, but, on its face, the '457 patent asserts priority to a provisional application filed on December 14, 2012, which is before the AIA revisions took effect. 35 U.S.C. § 100 (note). Therefore, whether pre-AIA or AIA § 103 applies is in dispute. Our decision, however, is not impacted by which version of the statute applies.

[3] US 10,123,463 B2, issued Nov. 6, 2018 (filed Aug. 10, 2009) (Ex. 1006; "Best").

[4] US 5,167,511, issued Dec. 1, 1992 (Ex. 1007, "Krajewski").

[5] US 4,590,538, issued May 20, 1986 (Ex. 1008, "Cray").

[6] US 3,406,244, issued Oct. 15, 1968 (Ex. 1009, "Oktay").

[7] RU 2 500 013 C1, published Nov. 27, 2013 (filed Mar. 19, 2012) (Ex. 1011, Ex. 1012 (English translation), "Gryzhin").

II. DISCUSSION

A. LEVEL OF ORDINARY SKILL IN THE ART

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

Petitioner states:

> A POSITA as of December 13, 2013 would have had a [*sic*] either a (a) Bachelor's degree in mechanical engineering, or an equivalent degree, with five years of liquid cooling systems experience including responsibility for designing such systems, or (b) Master's Degree in mechanical engineering, or an equivalent degree, including liquid cooling systems research and system design. Ex-1020, ¶75. A POSITA would also have had, through education or experience, familiarity and experience in particular with immersion cooling systems. Additional education could compensate for less practical experience and vice versa. *Id.*

Pet. 10. Other than arguing that the date for defining the ordinarily skilled artisan should be earlier than that used by Petitioner because the '457 patent is entitled to priority to provisional applications, Patent Owner "does not offer a competing definition for POSITA." Prelim. Resp. 25.

For the purposes of this Decision, we accept, as has Patent Owner, Petitioner's definition of the ordinarily skilled artisan. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) ("[T]he prior art itself [may] reflect[] an appropriate level" as evidence of the ordinary level of skill in the art. (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))).

B. CLAIM CONSTRUCTION

"[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'" *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Neither party asserts that any claim term should be expressly construed, and we do not expressly construe any claim language. Pet. 10–11; Prelim. Resp. 25–29; *see also* Ex. 2006 (district court claim construction order declining to expressly construe and claim language).

C. APPLICABLE LEGAL STANDARDS

"In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

Regarding obviousness, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007), reaffirmed the framework for determining obviousness set forth in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). The *KSR* Court summarized the four factual inquiries set forth in *Graham* (383 U.S. at 17–18) that are applied in determining whether a claim is unpatentable as obvious under 35 U.S.C. § 103(a) as follows:

(1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the

level of ordinary skill in the art;[8] and (4) considering objective evidence indicating obviousness or non-obviousness.[9] *KSR*, 550 U.S. at 406.

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 416. "[W]hen the question is whether a patent claiming the combination of elements of prior art is obvious," the answer depends on "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 417.

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; 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, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit

and "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.* at 418.

With these standards in mind, and in view of the definition of the ordinarily skilled artisan, we address Petitioner's challenges and the preliminary record below as applicable to our discretion to deny institution under 35 U.S.C. § 314(a).

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[8] *See supra* Section II.A.

[9] At this stage of the proceeding, there is no evidence pertaining to objective indicia of non-obviousness. *See* Prelim. Resp.

D. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 314(a)

1. Background and Legal Standards

Under § 314(a), the Director possesses "broad discretion" in deciding whether to institute an *inter partes* review. *See* 35 U.S.C. § 314(a); *Saint Regis Mohawk Tribe v. Mylan Pharm. Inc.*, 896 F.3d 1322, 1327 (Fed. Cir. 2018). The Board decides whether to institute an *inter partes* review on the Director's behalf. 37 C.F.R. § 42.4(a) (2021).

Patent Owner argues that we should exercise discretion under § 314(a) to deny institution of an *inter partes* review. *See* Prelim. Resp. 14–20; Prelim. Sur-Reply. Petitioner argues that we should decline to exercise our discretion under § 314(a) to deny institution. *See* Pet. 66; Prelim. Reply. For the reasons explained below, under the circumstances here, we exercise our discretion under § 314(a) to deny institution.

When deciding whether to exercise discretion under § 314(a) to deny institution, the Board has considered the status of litigation involving the parties in light of the AIA's objective "to provide an effective and efficient alternative to district court litigation." *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 12, 19–20 (PTAB Sept. 12, 2018) (precedential) (quoting *Gen. Plastic Indus. Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 16–17 (PTAB Sept. 6, 2017) (precedential as to § II.B.4.i)).

In *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"), the Board set forth the following nonexclusive factors to consider when determining whether to exercise discretion under § 314(a) to deny institution due to the advanced state of parallel litigation:

(1) whether the court granted a stay or evidence exists that one may be granted if the Board institutes a trial;

(2) the proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;

(3) the investment in the parallel litigation by the court and the parties;

(4) the overlap in the issues raised by the petition and the issues in the parallel litigation;

(5) whether the petitioner and the defendant in the parallel litigation are the same party; and

(6) other circumstances that impact the Board's exercise of discretion, including the merits.

These factors, considered below, "relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding." *Id.* at 6. Further, *Fintiv* instructs that the Board should take "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.* (citing PTAB Consolidated Trial Practice Guide at 58 (Nov. 2019)[10]).

As identified above in this Decision at Section I.B, the related, parallel proceeding at issue here is *Midas Green Technologies, LLC v. Immersion Systems LLC*, No. 4:20-cv-00555-O in the U.S. District Court for the Northern District of Texas. *See, e.g.*, Ex. 1003 (original complaint dated May 29, 2020); Ex. 1004 (affidavit of service indicating service was executed on Immersion Systems LLC on June 23, 2020).

[10] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

2. Analysis Under Section 314(a)

Factor 1: Whether a Stay has Been or is Likely to be Granted

The parties do not dispute that there is currently no stay in the related district court litigation, either requested or granted. Pet. 66; Prelim. Resp. 16; Prelim. Reply; Prelim. Sur-Reply. Petitioner indicates that, if trial is instituted here, it will request a stay in the related district court litigation. Prelim. Reply, 1; *see also* Ex. 1021, 1–2. Petitioner's assertion aside, we will not speculate as to whether the related district court litigation will be stayed, as the evidence is inconclusive concerning this factor.

Accordingly, we weigh this factor as neutral as to whether to exercise our discretion to deny institution.

Factor 2: Proximity of the Court's Trial Date to the Board's Final Written Decision

The statutory deadline for the issuance of a final written decision in this proceeding will be one year from the date of institution, if trial is instituted. 35 U.S.C. § 316(a)(11). Based upon the preliminary filings in this proceeding, the due date for our decision on institution is approximately January 14, 2022, meaning a final written decision would be due in January 2023. 35 U.S.C. § 314(b)(1).

The record includes a scheduling order from the related district court litigation, which sets a jury trial date of October 11, 2022. Ex. 2001, 3; *see also* Prelim. Resp. 16–17. Moreover, this same scheduling order goes on to state that "[t]he parties are advised that future requests to extend deadlines or modify the Scheduling Order will be disfavored and will not be granted by the Court absent good cause." Ex. 2001, 3; *see also* Prelim. Resp. 16. Patent Owner also notes that the district court "later referenced this same instruction in denying a subsequent motion to modify the schedule." Prelim.

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Resp. 16 (citing *Midas Green Technologies, LLC v. Immersion Systems LLC*, Civ. No. 4-20-cv-00555, Dkt. 73 (N.D. Tex. Aug. 18, 2021)).

Thus, a jury trial is scheduled to occur in the related district court litigation approximately three months prior to when a final written decision would be statutorily due in this *inter partes* review, and the district court has indicated that any changes to the schedule, including the trial date, are disfavored.

We find these facts weigh in favor of exercising discretion to deny institution under this factor.

Factor 3: Investment in the Parallel Litigation

If, at the time of the institution decision, the district court has issued substantive orders related to the challenged patent, such as a claim construction order, this fact weighs in favor of discretionary denial. *See Fintiv* at 9–10. On the other hand, if the district court has not issued such orders, this fact weighs against discretionary denial. *Id.* at 10.

The evidence of record indicates that the related district court litigation has progressed as far as the entry of a claim construction order. Ex. 2006 (Order dated Nov. 22, 2021). In addition, Patent Owner states that there has also been "significant discovery" by way of written discovery, document production, and a fact-witness deposition (with others scheduled if not having already occurred). Prelim. Resp. 17–18. Petitioner, on the other hand, indicates that, as of the Petition (and Preliminary Reply), "[t]he parties have invested little in the related litigation." Pet. 66; Prelim. Reply 1 (addressing resources invested on invalidity issues).

We find the fact that a claim construction order has been entered, coupled with several other events, such as discovery, in the related district

court litigation is not insignificant. Although it appears that much is left to occur in the related district court litigation, the evidenced expended effort is nevertheless not insubstantial. Moreover, it appears that efforts and investment are continuing and ongoing and several of the events listed in the district court's scheduling order have due dates based on the entry date of the claim construction order, which has been entered. *See* Ex. 2001 (e.g., final infringement contentions were due 30 days from the court's claim construction ruling, that is, on December 30, 2021).

Further, *Fintiv* provides guidance on how the timing of various events can impact Factor 3:

> As a matter of petition timing, notwithstanding that a defendant has one year to file a petition, it may impose unfair costs to a patent owner if the petitioner, faced with the prospect of a looming trial date, waits until the district court trial has progressed significantly before filing a petition at the Office.

Fintiv at 11 (footnote omitted). However, "it is often reasonable for a petitioner to wait to file its petition until it learns which claims are being asserted against it in the parallel proceeding." *Id.* Accordingly, a petitioner should act expeditiously once the patent owner has identified the claims being asserted against it so that the petitioner can file a petition challenging all asserted claims—if it chooses to do so.

Here, although satisfying the one-year grace period afforded by 35 U.S.C. § 315(b) for filing a petition (based on the service date of a district court complaint), the evidence of record shows that Petitioner met the deadline by mere hours, filing its Petition in this proceeding on the last possible day. *See* Ex. 1004 (service executed on Petitioner June 23, 2020); Pet. (filed June 23, 2021). Although the district court's scheduling order indicates that final infringement contentions were not due until December

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30, 2021, Petitioner was not without notice of which claims were at issue in the litigation because Patent Owner's first amended complaint in the district court proceeding (indicates filing on November 24, 2020) identifies at least claims 1, 6, and 11 of the '457 patent as asserted against Petitioner, and Patent Owner asserts that preliminary infringement contentions were submitted on November 20, 2020. Ex. 1005, 8–9; Ex. 2001, 2; Prelim. Resp. 17; Ex. 2002 n.1 (identifying claims 1, 5, 6, 10, 11, and 14 of the '457 patent as asserted against Petitioner). And, Petitioner (there, defendant) filed or served detailed preliminary invalidity contentions in the district court proceeding addressing the same claims at issue here. Ex. 2002 (dated Jan. 11, 2021; asserting that claims 1, 5, 6, 10, 11, and 14 of the '457 patent are invalid). These facts do not evidence Petitioner's diligence here.

We find the facts weigh in favor of exercising discretion to deny institution under this factor.

Factor 4: Overlap in Issues Raised by the Petition and in the Parallel Litigation

"[I]f the petition includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel proceeding, this fact has favored denial." *Fintiv* at 12. "Conversely, if the petition includes materially different grounds, arguments, and/or evidence than those presented in the district court, this fact has tended to weigh against exercising discretion to deny institution under *NHK*." *Id.* at 12–13.

As noted above, for example at Section I.D, the Petition asserts that the '457 patent's claims 1, 5, 6, 10, 11, and 14 are unpatentable over the prior art combinations of Best-Krajewski/Cray, Best-Oktay, Best-Gryzhin, and Best individually. *See* Pet. 2. Petitioner's (there, defendant's) initial invalidity contentions in the related district court proceeding assert the

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invalidity of claims 1, 5, 6, 10, 11, and 14 over the Best-Krajewski combination several times, and supplemental preliminary invalidity and unenforceability contentions assert the invalidity of "[a]ll [c]laims-in-[s]uit" over the Best-Oktay and Best-Gryzin combinations. *See, e.g.*, Ex. 2002, at, *inter alia*, 2 n.1, 16, 20, 26, 28, 32, 35; Ex. 2005, 7 *et seq*. Patent Owner asserts that this is "*complete* overlap in the validity issues raised in these parallel proceedings." Prelim. Resp. 18–19. We agree with Patent Owner that there is overlap here.

We also determine that Petitioner's stipulation does not affect that overlap. Petitioner states that it has

> entered a stipulation (Ex. 1021) in the related [district court litigation] which states that, if [this IPR is] instituted, Petitioner intends to request a stay of the [district court litigation] until a final determination on the petition[ ] is issued by the PTAB. The stipulation is modeled on the *Sotera* decision and extends to grounds "raised or that could have been reasonably raised."

Prelim. Reply 1 (citing *Sotera Wireless v. Masimo Corp.*, IPR2020-01019, Paper 12 at 13 (PTAB Dec. 1, 2020) (precedential as to Section II.A)). Petitioner further argues that its stipulation filed in the related district court litigation means that this *inter partes* review "will 'function as a true alternative to litigation' because the expected stay and stipulation will mitigate any concern of duplicative efforts or conflicting decisions." *Id.*

The stipulation to which Petitioner refers states:

> Immersion hereby stipulates that if the PTAB (i) allows Immersion to enter this Stipulation as part of the IPR petition, and (ii) institutes review pursuant to 35 U.S.C. §314 of IPR2021-01176 ***that results in a final written decision***, then Immersion will not pursue in these district court proceedings the specific grounds identified above in connection with the '457 Patent and claims as originally issued on the instituted

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> inter parties review petition, or on any other ground for which the PTAB institutes that was raised or could have been reasonably raised in the IPR (*i.e.*, any ground that could be raised under 35 U.S.C. §§ 102 or 103 on the basis of prior art patents or printed publications).

Ex. 1021, 3 (emphasis added).

We find this stipulation to be very different from others the Board has relied upon to assuage concerns under this factor. *See Sotera*, IPR2020-01019, Paper 12 at 18 (concerning a stipulation (Ex. 1038 in that proceeding) that required institution of an IPR, but addressed all challenges brought or that could have been brought in the IPR); *Sand Revolution II LLC v. Continental Intermodal Group-Trucking LLC*, IPR2019-01393, Paper 24 at 11–12 (PTAB June 16, 2020) (informative) (concerning a stipulation (Ex. 1015 in that proceeding) that required institution of an IPR, but addressed the challenges brought in the IPR). Petitioner's stipulation is contingent upon two things—our entry of the stipulation as part of the Petition and then completion of this *inter partes* review proceeding with a final written decision. Ex. 1021. First, if Petitioner suggests that we may consider the stipulation to be integrated into and a part of the Petition, which is somewhat unclear on the record, Petitioner is incorrect and the Petition will not be so-considered supplemented or expanded, even if the record includes the stipulation as evidence. Second, regardless of Petitioner's intent regarding the first contingent event and even though the stipulation is entered as a part of the record here, Petitioner ties its stipulation to an asserted likelihood of the court granting a stay in the related district court litigation. *See* Prelim. Reply 1.

In other words, absent a stay and given the district court trial date, the stipulation will have no effect because a trial would occur before the

Petitioner Green Revolution Cooling, Inc., Ex-1002
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deadline for a final written decision here. As discussed above, we will not speculate whether the related district court litigation will be stayed, and thus we assume for purposes of this analysis that the jury trial in the parallel proceeding will occur several months before a final written decision will be statutorily due in this proceeding. Thus, Petitioner's prerequisite that requires a final written decision renders Petitioner's stipulation meaningless for purposes of our analysis of this factor.

We find the unique facts here weigh in favor of exercising discretion to deny institution under this factor.

Factor 5: Are Petitioner and the Defendant in the Parallel Litigation the Same Party?

It is undisputed that Petitioner is the defendant and Patent Owner the plaintiff in the related district court litigation. *See* Ex. 1003. We find this fact weighs in favor of exercising discretion to deny institution under this factor.

Factor 6: Other Circumstances, Including the Merits

Although we need not undertake a full merits analysis when evaluating *Fintiv* Factor 6, we consider the strengths and weaknesses of Petitioner's case, where stronger merits may weigh against discretionary denial and weaker merits may favor exercising discretion to deny institution. *Fintiv* at 15–16.

In our view, some challenges likely satisfy the "reasonable likelihood" threshold standard for instituting trial, and some may not. We would not characterize any challenge as sufficiently strong to override concerns about duplication of effort by the Board and the district court.

For example, under Petitioner's Ground 1, although Petitioner's and its witness's (Dr. Mudawar's) interpretations of the prior art as teaching the

Petitioner Green Revolution Cooling, Inc., Ex-1002
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claimed subject matter are not unreasonable, the interpretations are not particularly clear or strong. Pet. 11–36. Petitioner pieces together portions from Best, Krajewski, and/or Cray that do not explicitly disclose the claimed subject matter, relying instead on Dr. Mudawar to interpret the references' disclosures as meeting specific claim limitations. *Id.* Further, Petitioner, for the most part, asserts that each limitation of, for example independent claim 1, is individually disclosed by one or more of Best, Krajewski, and/or Cray without clearly explaining how one reference's disclosed apparatus or system would be specifically modified by the ordinarily skilled artisan in view of the teachings of the others. *Id.* Moreover, when discussing a motivation to combine Best, Krajewski, and/or Cray, Petitioner relies on the fact that they are directed to analogous art and then, primarily, that the features they teach would achieve the same advantages extolled by the '457 patent itself for its claimed invention, which is not strong support that the prior art would have been combined or modified absent some improper hindsight. *Id.* at 32–36.

As another example, Petitioner's Ground 3 relies on a combination of Best and Gryzhin. *Id.* at 48 *et seq.* However, this ground relies on Petitioner's premise that Gryzhin is prior art to the '457 patent's claims because the '457 patent is not entitled to priority to provisional applications. *Id.* at 1 2, 4–6. Based only on the preliminary record, however, we find Patent Owner's arguments in support of the '457 patent's priority claim facially reasonable and that Petitioner's assertions on the matter appear to overlook the disclosures of the provisional applications identified by Patent Owner as describing the claimed subject matter. Prelim. Resp. 20–24.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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Thus, although Petitioner may have made a sufficient showing for institution of trial under certain grounds, there are significant issues of fact that would be left for trial and we are not confident Petitioner's case would survive the scrutiny of trial. We do not find that the Petition has provided a particularly well-developed explanation for motivation for or manner of combining the references so as to arrive at the claimed subject matter and there are significant issues about whether the Gryzhin reference qualifies as prior art in view of the '457 patent's priority claim to provisional applications.

Accordingly, we weigh this factor as neutral as to whether to exercise our discretion to deny institution.

3. Holistic Assessment of Factors Under Section 314(a)

After analyzing the *Fintiv* factors with a holistic view of whether the efficiency and integrity of the system are best served by denying or instituting review, we determine that the factors, on balance, weigh in favor of discretionary denial under the circumstances here. Hence, we exercise our discretion under § 314(a) to deny institution.

III. CONCLUSION

For the foregoing reasons, we exercise discretion not to institute *inter partes* review under 35 U.S.C. § 314(a).

ORDER

Accordingly, it is hereby:

ORDERED that the Petition is *denied* and no *inter partes* review is instituted.

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 621 of 656; IPR2025-00196

For PETITIONER:

Timothy K. Sendek
ACKERMAN LLP
tim.sendek@akerman.com
ip@akerman.com

Mary Jo Boldingh
CHAPMAN SPINGOLA LLP
mjboldingh@chapmanspingola.com

For PATENT OWNER:

Artie Pennington
Jeffrey D. Hunt
HUNT PENNINGTON KUMAR & DULA, PLLC
aapennington@hpkdlaw.com
jeffhunt@hpkdlaw.com

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas, Waco Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-000550	1/13/2022	Western District of Texas, Waco Division

PLAINTIFF	DEFENDANT
Midas Green Technologies, LLC	Rhodium Enterprises, Inc.; Rhodium Technologies, Inc.; Rhodium 10mw LLC; Rhodium 2.0 LLC; Rhodium 30mw LLC, Rhodium Encore LLC; et al

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,405,457	9/3/2019	Midas Green Technologies, LLC
2	10,820,446	10/27/2020	Midas Green Technologies, LLC
3			
4			
5			

In the above---entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED

INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1			
2			
3			
4			
5			

In the above---entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1---Upon initiation of action, mail this copy to Director Copy 3---Upon termination of action, mail this copy to Director
Copy 2---Upon filing document adding patent(s), mail this copy to Director Copy 4---Case file copy

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No**.	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

REQUEST FOR CORRECTION OF INVENTORSHIP IN PATENT PURSUANT TO 37 C.F.R. § 1.324(a)

Pittsburgh, Pennsylvania 15222
March 21, 2023

VIA ELECTRONIC FILING

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Pursuant to 37 C.F.R. § 1.324(a), Applicant respectfully requests amendment to the inventorship of U.S. Patent No. 10,405,457 B2 as outlined below.

An original Application Data Sheet was filed with the application naming Christopher L. Boyd, James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors. It has subsequently been determined that James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou should be removed as inventors of the patent.

Pursuant to 37 C.F.R. § 1.324(a), Applicant respectfully requests correction of the patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors. Christopher L. Boyd is the only inventor that should remain. In support of this request, and pursuant to 37

C.F.R. § 1.324, please find attached:

(1) A statement from each person currently named as an inventor agreeing to the change of inventorship and stating that he/she has no disagreement in regard to the requested change;

(2) a statement from the assignee of the parties, MIDAS GREEN TECHNOLOGIES, LLC, under paragraph 37 C.F.R. § 1.324(b)(1) agreeing to the change of inventorship in the patent, which complies with the requirements of § 3.73(c);

(3) updated Application Data Sheet removing Inventors 2-7 and updating the Assignee name as follows:

MIDAS GREEN ~~TECHNOLOGY~~, LLC

MIDAS GREEN TECHNOLOGIES, LLC

(4) Statement under 37 C.F.R. § 3.73(c) executed by MIDAS GREEN TECHNOLOGIES, LLC attaching corrective Assignment;

(5) Power of Attorney executed by MIDAS GREEN TECHNOLOGIES, LLC; and

(6) the processing fee under 37 C.F.R. § 1.20(b).

If the Applicant's representative can be of assistance in addressing any remaining issues relating to this correction of inventorship, the Examiner may contact the undersigned at the number set forth below.

Respectfully submitted,

/Mark G. Knedeisen/
Mark G. Knedeisen
Registration No. 42,747

K&L Gates LLP
K&L Gates Center
210 Sixth Avenue
Pittsburgh, Pennsylvania 15222-2613
(412) 355-6342

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: MIDAS GREEN TECHNOLOGIES, LLC

Application No./Patent No.: 10,405,457 Filed/Issue Date: September 3, 2019

Titled: Appliance Immersion Cooling System

MIDAS GREEN TECHNOLOGIES, LLC, a limited liability company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: CHRISTOPHER L. BOYD et al. To: MIDAS GREEN TECHNOLOGY, LLC

The document was recorded in the United States Patent and Trademark Office at

Reel 033551, Frame 0489, or for which a copy thereof is attached.

2. From: CHRISTOPHER L. BOYD et al. To: MIDAS GREEN TECHNOLOGIES, LLC

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Signature	Date: 3.7.23
Printed or Typed Name: James P Koeb	Title or Registration Number: CTO

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

Christopher L. Boyd	Austin	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building. 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

Appliance Immersion Cooling System

described, illustrated and claimed in an Application for Patent of the United States of America executed by me of even date herewith, together with the entire right, title and interest in and to said Application, and in and to Letters Patent which may be issued upon any Application for Letters Patent based on said Application, and upon any division, extension, continuation, or reissue of any such Application.

I hereby also sell, assign and transfer unto said Midas Green Tech, the entire right, title and interest in and to said invention, and in and to applications for Letters Patent therefor in all countries foreign to the United States of America, including all rights under any and all international conventions and treaties in respect of said inventions and said applications for Letters Patent in foreign countries, and I further authorize said Midas Green Tech, to apply for Letters Patent in foreign countries directly in its own name, and to claim the priority of the filing date of said application for Letters Patent of the United States of America under the provisions of any and all international conventions and treaties.

I hereby authorize and request the Commissioner for Patents of the United States of America to issue Letters Patent that may result from the timely filing of an Application for Letters Patent based on the aforesaid Application, as well as any division, extension, continuation or reissue of any such Application, to said Midas Green Tech, for the sole use and behalf of said Midas Green Tech, its successors, assigns and legal representatives, to the full end of the term for which said Letters Patent may be granted, the same as they would have been held and enjoyed by me had this assignment not been made, and I hereby authorize and request the equivalent authorities in foreign countries to issue the patents of their respective countries to said Midas Green Tech

I agree that, when requested, I will, without charge to Midas Green Tech, but at its expense, sign all papers, take all rightful oaths, and do all acts which may be necessary, desirable or convenient for securing and maintaining patents for said inventions in any and all countries and for vesting title thereto in said Midas Green Tech, its successors, assigns and legal representatives or nominees. I covenant with said Midas Green Tech, its successors, assigns and legal representatives, that the interest and property hereby conveyed is free from all prior assignment, grant, mortgage, license or other encumbrance.

12-13-2013

Christopher L. Boyd, Inventor Date

12/15/2013

O. Christopher Layne, Witness Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 628 of 656; IPR2025-00196

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

James P. Koen	Round Rock	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building. 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

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James P. Koen, Inventor — Date: 12.14.13

D. Christopher Segura, Witness — Date: 12/14/13

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 629 of 656; IPR2025-00196

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

David Christopher Laguna	Austin	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building. 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

Appliance Immersion Cooling System

described, illustrated and claimed in an Application for Patent of the United States of America executed by me of even date herewith, together with the entire right, title and interest in and to said Application, and in and to Letters Patent which may be issued upon any Application for Letters Patent based on said Application, and upon any division, extension, continuation, or reissue of any such Application.

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Dec. 16 2013
David Christopher Laguna, Inventor Date

Dec 16th 2013
Mario Cesar Garcia, Witness Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 630 of 656; IPR2025-00196

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

Mario Conti Garcia	Austin	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building. 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

Appliance Immersion Cooling System

described, illustrated and claimed in an Application for Patent of the United States of America executed by me of even date herewith, together with the entire right, title and interest in and to said Application, and in and to Letters Patent which may be issued upon any Application for Letters Patent based on said Application, and upon any division, extension, continuation, or reissue of any such Application.

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December 16th 2013
Mario Conti Garcia, Inventor Date

12/14/13
David Christopher Lyons, Witness Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 631 of 656; IPR2025-00196

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

John Charles Tribou	Austin	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building. 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

Appliance Immersion Cooling System

described, illustrated and claimed in an Application for Patent of the United States of America executed by me of even date herewith, together with the entire right, title and interest in and to said Application, and in and to Letters Patent which may be issued upon any Application for Letters Patent based on said Application, and upon any division, extension, continuation, or reissue of any such Application.

I hereby also sell, assign and transfer unto said Midas Green Tech, the entire right, title and interest in and to said invention, and in and to applications for Letters Patent therefor in all countries foreign to the United States of America, including all rights under any and all international conventions and treaties in respect of said inventions and said applications for Letters Patent in foreign countries, and I further authorize said Midas Green Tech, to apply for Letters Patent in foreign countries directly in its own name, and to claim the priority of the filing date of said application for Letters Patent of the United States of America under the provisions of any and all international conventions and treaties.

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I agree that, when requested, I will, without charge to Midas Green Tech, but at its expense, sign all papers, take all rightful oaths, and do all acts which may be necessary, desirable or convenient for securing and maintaining patents for said inventions in any and all countries and for vesting title thereto in said Midas Green Tech, its successors, assigns and legal representatives or nominees. I covenant with said Midas Green Tech, its successors, assigns and legal representatives, that the interest and property hereby conveyed is free from all prior assignment, grant, mortgage, license or other encumbrance.

16 Dec 2013

John Charles Tribou, Inventor Date

16 Dec 2013

James P Rocco Witness Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 632 of 656; IPR2025-00196

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

Thomas R. Turner	Georgetown	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

Appliance Immersion Cooling System

described, illustrated and claimed in an Application for Patent of the United States of America executed by me of even date herewith, together with the entire right, title and interest in and to said Application, and in and to Letters Patent which may be issued upon any Application for Letters Patent based on said Application, and upon any division, extension, continuation, or reissue of any such Application.

I hereby also sell, assign and transfer unto said Midas Green Tech, the entire right, title and interest in and to said invention, and in and to applications for Letters Patent therefor in all countries foreign to the United States of America, including all rights under any and all international conventions and treaties in respect of said inventions and said applications for Letters Patent in foreign countries, and I further authorize said Midas Green Tech, to apply for Letters Patent in foreign countries directly in its own name, and to claim the priority of the filing date of said application for Letters Patent of the United States of America under the provisions of any and all international conventions and treaties.

I hereby authorize and request the Commissioner for Patents of the United States of America to issue Letters Patent that may result from the timely filing of an Application for Letters Patent based on the aforesaid Application, as well as any division, extension, continuation or reissue of any such Application, to said Midas Green Tech, for the sole use and behoof of said Midas Green Tech, its successors, assigns and legal representatives, to the full end of the term for which said Letters Patent may be granted, the same as they would have been held and enjoyed by me had this assignment not been made, and I hereby authorize and request the equivalent authorities in foreign countries to issue the patents of their respective countries to said Midas Green Tech

I agree that, when requested, I will, without charge to Midas Green Tech, but at its expense, sign all papers, take all rightful oaths, and do all acts which may be necessary, desirable or convenient for securing and maintaining patents for said inventions in any and all countries and for vesting title thereto in said Midas Green Tech, its successors, assigns and legal representatives or nominees. I covenant with said Midas Green Tech, its successors, assigns and legal representatives, that the interest and property hereby conveyed is free from all prior assignment, grant, mortgage, license or other encumbrance.

8/12/2014
Thomas R. Turner, Inventor ..... Date

8/12/2014
..... Witness Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 633 of 656; IPR2025-00196

ASSIGNMENT AND AGREEMENT

For good and valuable consideration, the receipt of which is hereby acknowledged, I,

Kenneth D. Swinden	Hutto	Texas, USA

have sold, assigned and transferred, and do hereby sell, assign and transfer unto Midas Green Technologies ~~Technology~~, LLC, a limited liability company of the State of Texas, having its principal office at 8500 Shoal Creek, Building 2, Suite K, Austin TX 78757 ("Midas Green Tech"), and its successors, assigns, and legal representatives, the entire right, title and interest for the United States of America in and to certain inventions relating to improvements in:

Appliance Immersion Cooling System

described, illustrated and claimed in an Application for Patent of the United States of America executed by me of even date herewith, together with the entire right, title and interest in and to said Application, and in and to Letters Patent which may be issued upon any Application for Letters Patent based on said Application, and upon any division, extension, continuation, or reissue of any such Application.

I hereby also sell, assign and transfer unto said Midas Green Tech, the entire right, title and interest in and to said invention, and in and to applications for Letters Patent therefor in all countries foreign to the United States of America, including all rights under any and all international conventions and treaties in respect of said inventions and said applications for Letters Patent in foreign countries, and I further authorize said Midas Green Tech, to apply for Letters Patent in foreign countries directly in its own name, and to claim the priority of the filing date of said application for Letters Patent of the United States of America under the provisions of any and all international conventions and treaties.

I hereby authorize and request the Commissioner for Patents of the United States of America to issue Letters Patent that may result from the timely filing of an Application for Letters Patent based on the aforesaid Application, as well as any division, extension, continuation or reissue of any such Application, to said Midas Green Tech, for the sole use and behoof of said Midas Green Tech, its successors, assigns and legal representatives, to the full end of the term for which said Letters Patent may be granted, the same as they would have been held and enjoyed by me had this assignment not been made, and I hereby authorize and request the equivalent authorities in foreign countries to issue the patents of their respective countries to said Midas Green Tech

I agree that, when requested, I will, without charge to Midas Green Tech, but at its expense, sign all papers, take all rightful oaths, and do all acts which may be necessary, desirable or convenient for securing and maintaining patents for said inventions in any and all countries and for vesting title thereto in said Midas Green Tech, its successors, assigns and legal representatives or nominees. I covenant with said Midas Green Tech, its successors, assigns and legal representatives, that the interest and property hereby conveyed is free from all prior assignment, grant, mortgage, license or other encumbrance.

8-15-14
Kenneth D. Swinden, Inventor Date

8-16-14
Witness Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 634 of 656; IPR2025-00196

PTO/AIA/81A (02-15)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Patent Number	10,405,457
Issue Date	September 3, 2019
First Named Inventor	Christopher L. Boyd
Title	Appliance Immersion Cooling System
Attorney Docket No.	JMG001-01

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith: 26285

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the:

☐ Applicant.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

SIGNATURE of Applicant or Patent Owner

Signature		Date	3-7-23
Name	James Koen	Telephone	512 944 5131
Title and Company	Chief Technology Officer – MIDAS GREEN TECHNOLOGIES, LLC		

NOTE: Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☑ A total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
14/355,533	**03/21/2023 03:37:57 PM ET**	**JMG001-01**

Title of Invention

Appliance Immersion Cooling System

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	10405457
CONFIRMATION #	3995	FILED BY	Amanda Kernan
PATENT CENTER #	61777787	FILING DATE	04/30/2014
CUSTOMER #	44070	FIRST NAMED INVENTOR	Christopher L. Boyd
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Mark Knedeisen

Documents

TOTAL DOCUMENTS: 7

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
3-21-2023 - 457 - Request for Correction of Inventorship.pdf	2	Request under Rule 48 correcting inventorship	102 KB
3-21-2023 - 457 - Midas Statement Agreeing to Change Inventorship.pdf	1	Request under Rule 48 correcting inventorship	929 KB
3-21-2023 - 457 - Executed POA.pdf	1	Power of Attorney	1776 KB
3-21-2023 - 457 - Executed 3-73 Attaching corrected assignment.pdf	9	-	14454 KB

3-21-2023 - 457 - Executed 3-73 Attaching corrected assignment-R3.73.pdf	(1-2)	2	Assignee showing of ownership per 37 CFR 3.73	2650 KB
3-21-2023 - 457 - Executed 3-73 Attaching corrected assignment-LET..pdf	(3-9)	7	Miscellaneous Incoming Letter	11802 KB
3-21-2023 - 457 - Inventor Statements.pdf		7	Request under Rule 48 correcting inventorship	4306 KB
3-21-2023 - 457 - marked-up ADS-.pdf		6	Miscellaneous Incoming Letter	2850 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
3-21-2023 - 457 - Request for Correction of Inventorship.pdf	06C59149881607170269705F1CC57E1E2779739623AA725F50DDC8C7046182DEDE4643E916A9BB8A2C7AEAF6C4C915EEA1A9F8668C15EEE807A7B0B58B9A46CE
3-21-2023 - 457 - Midas Statement Agreeing to Change Inventorship.pdf	8D9924825D5BFF6D2726B6F58A308476D3D72C21775CB224828BC20011CA59580D1B383CE38CFFE5F65ABEE0CD0DCD80B2E9545CD0B398E435BFC87C7C939E27
3-21-2023 - 457 - Executed POA.pdf	00F745F282299B1FAFBCAACC9208B89CD24AAB4C9719B920F0E0E96ECAA4BAAD9CA5278DAB1BD449C8C4E66B110361D8E11F00BC76D40402FF78F0FEE3BE1721
3-21-2023 - 457 - Executed 3-73 Attaching corrected assignment.pdf	B8BC725C25A5E03E137030CB392E691B7FE99B98DD57E86120435D0798ED132338AC6D9DC2330D0C776D67BFACB1284376BEFA77A0579FF35139B9C33B211BF6
3-21-2023 - 457 - Executed 3-73 Attaching corrected assignment-R3.73.pdf	FC34EFA5BE6EC163D7EB87952F9C249CED35EBF28FA0E2DA0A60D857B685975232276EA9252A9FA418F22795CB8EE56E45202F838D1D501B172AEDE1D2D122FC

3-21-2023 - 457 - Executed 3-73 Attaching corrected assignment-LET..pdf	03F259498D8B22DE7DF8EB248C823C0134F08D701AA92B9EF521DE0A3042D841EFC643E6AEB2EDFD750A8D6E4D81D56839903D803C57743E31798A98216B83C9
3-21-2023 - 457 - Inventor Statements.pdf	0C2716A608990C128D9883C6363142CFA1579D01D97961E0A9B3C44F5C83F5C1DBFFDA163C8ECD11550BAB9B81CA310C1D90381EE25B82F719A9194153DB9C7C
3-21-2023 - 457 - marked-up ADS-.pdf	D903A2C2C5AB17E5FD3E1257F736A5259442E9F0D5F0E5C2768508488A431B57D6C9B729CC45F29E4AE4E73787E1141D1B16FF2BA7FEBC2E86E5ADEF05827549

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
14/355,533	03/21/2023 03:37:57 PM ET	JMG001-01

Title of Invention

Appliance Immersion Cooling System

Application Information

APPLICATION TYPE	Utility - U.S. National Stage under 35 USC 371	PATENT #	10405457
CONFIRMATION #	3995	FILED BY	Amanda Kernan
PATENT CENTER #	61777787	AUTHORIZED BY	Mark Knedeisen
CUSTOMER #	44070	FILING DATE	04/30/2014
INTL. APPLICATION #	-	INTL. FILING DATE	-
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Christopher L. Boyd

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
DA / 021818	E20233KF39246758	Amanda Kernan

PRE-AUTHORIZED ACCOUNT	PRE-AUTHORIZED CATEGORY
021818	37 CFR 1.17 (Patent application and reexamination processing fees); 37 CFR 1.19 (Document supply fees); 37 CFR 1.20 (Post Issuance fees); 37 CFR 1.21 (Miscellaneous fees and charges); 37 CFR 1.492 (National application filing, search, and examination fees)

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2816	PROCESSING FEE FOR CORRECTING INVENTORSHIP IN A PATENT	160.00	1	160.00
			TOTAL AMOUNT:	$160.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as

described in MPEP 503.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, Christopher L. Boyd, am named as an inventor for U.S. Patent No. 10,405,457 B2. I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

Christopher L. Boyd

Signature 2-24-25
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, James P. Koen, am named as an inventor for U.S. Patent No. 10,405,457 B2. I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

James P. Koen

Signature

2-13-22

Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, David Christopher Laguna, am named as an inventor for U.S. Patent No. 10,405,457 B2. I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

David Christopher Laguna

Signature

March 20, 2023
Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, Mario Conti Garcia, am named as an inventor for U.S. Patent No. 10,405,457 B2. I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

Mario Conti Garcia

MConti 02/23/23

Signature Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, John Charles Tribou, am named as an inventor for U.S. Patent No. 10,405,457 B2. I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

John Charles Tribou

Signature Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, Thomas R. Turner, am named as an inventor for U.S. Patent No. 10,405,457 B2.

I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

Thomas R. Turner

Thomas R Turner 2/28/2023

Signature Date

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

I, Kenneth D. Swinden, am named as an inventor for U.S. Patent No. 10,405,457 B2. I hereby agree to change, and have no disagreement with changing, the inventorship of this patent to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

Kenneth D. Swinden

Signature 2-25-2023
Date

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 647 of 656; IPR2025-00196

PTO/SB/14 (11-08)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JMG001-01
	Application Number	
Title of Invention	Appliance Immersion Cooling System	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1 Remove

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Christopher	L.	Boyd	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Austin	State/Province	TX	Country of Residence i	US

Citizenship under 37 CFR 1.41(b) i: US

Mailing Address of Applicant:

Address 1	1309 Bonham Terrace		
Address 2			
City	Austin	State/Province	TX
Postal Code	78704	Country i	US

~~Applicant 2~~ ~~Remove~~

~~Applicant Authority~~ ◉ ~~Inventor~~ ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

~~Prefix~~	~~Given Name~~	~~Middle Name~~	~~Family Name~~	~~Suffix~~
	~~James~~	~~P.~~	~~Koen~~	

~~Residence Information (Select One)~~ ◉ ~~US Residency~~ ○ Non US Residency ○ Active US Military Service

~~City~~	~~Round Rock~~	~~State/Province~~	~~TX~~	~~Country of Residence i~~	~~US~~

~~Citizenship under 37 CFR 1.41(b)~~ i: ~~US~~

~~Mailing Address of Applicant:~~

~~Address 1~~	~~2302 Falcon Drive~~		
~~Address 2~~			
~~City~~	~~Round Rock~~	~~State/Province~~	~~TX~~
~~Postal Code~~	~~78681~~	~~Country i~~	~~US~~

~~Applicant 3~~ ~~Remove~~

~~Applicant Authority~~ ◉ ~~Inventor~~ ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

~~Prefix~~	~~Given Name~~	~~Middle Name~~	~~Family Name~~	~~Suffix~~
	~~David~~	~~Christopher~~	~~Laguna~~	

~~Residence Information (Select One)~~ ◉ ~~US Residency~~ ○ Non US Residency ○ Active US Military Service

~~City~~	~~Austin~~	~~State/Province~~	~~TX~~	~~Country of Residence i~~	~~US~~

Petitioner Green Revolution Cooling, Inc., Ex-1002
Page 648 of 656; IPR2025-00196

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JMG001-01
	Application Number	
Title of Invention	Appliance Immersion Cooling System	

Citizenship under 37 CFR 1.41(b) i	US				
Mailing Address of Applicant:					
Address 1	2011 E. 6th Street				
Address 2					
City	Austin	State/Province	TX		
Postal Code	78702	Country i	US		

Applicant 4 — Remove

Applicant Authority (•) Inventor ( ) Legal Representative under 35 U.S.C. 117 ( ) Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Thomas	R.	Turner	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Georgetown	State/Province	TX	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i	US				

Mailing Address of Applicant:

Address 1	4210 Malaga Dr.				
Address 2					
City	Georgetown	State/Province	TX		
Postal Code	78628	Country i	US		

Applicant 5 — Remove

Applicant Authority (•) Inventor ( ) Legal Representative under 35 U.S.C. 117 ( ) Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Kenneth	D.	Swinden	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Hutto	State/Province	TX	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i	US				

Mailing Address of Applicant:

Address 1	132 Mustang Creek North Loop				
Address 2					
City	Hutto	State/Province	TX		
Postal Code	78634	Country i	US		

Applicant 6 — Remove

Applicant Authority (•) Inventor ( ) Legal Representative under 35 U.S.C. 117 ( ) Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Mario	Conti	Garcia	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Austin	State/Province	TX	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i	US				

Petitioner Green Revolution Cooling, Inc., Ex-1002
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JMG001-01
	Application Number	
Title of Invention	Appliance Immersion Cooling System	

Mailing Address of Applicant:					
Address 1	9624 Woody Ridge View				
Address 2					
City	Austin	State/Province	TX		
Postal Code	78730	Country i	US		

Remove

Applicant 7

Applicant Authority (•) Inventor ( ) Legal Representative under 35 U.S.C. 117 ( ) Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	John	Charles	Tribou	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Austin	State/Province	TX	Country of Residence i	US
Citizenship under 37 CFR 1.41(b) i	US				

Mailing Address of Applicant:					
Address 1	9109 Middlebe Dr.				
Address 2					
City	Austin	State/Province	TX		
Postal Code	78750	Country i	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	~~44070~~ 26285		
Email Address	~~jvm@jvmyers.com~~	Add Email	Remove Email

Application Information:

Title of the Invention	Appliance Immersion Cooling System		
Attorney Docket Number	JMG001-01	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	7	**Suggested Figure for Publication (if any)**	1

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JMG001-01
	Application Number	
Title of Invention	Appliance Immersion Cooling System	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	~~44070~~ 26285		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	a 371 of international	PCT/US13/75126	2013-12-13
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US13/75126	non provisional of	61/737200	2012-12-14
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
PCT/US13/75126	non provisional of	61/832211	2013-06-07

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country [1]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			◉ Yes ○ No

Petitioner Green Revolution Cooling, Inc., Ex-1002
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	JMG001-01
	Application Number	
Title of Invention	Appliance Immersion Cooling System	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1 Remove

If the Assignee is an Organization check here. [X]

Organization Name	~~Midas Green Technology, LLC~~ Midas Green Technologies, LLC

Mailing Address Information:

Address 1	8500 Shoal Creek		
Address 2	Building 2, Suite K		
City	Austin	**State/Province**	TX
Country [i]	US	Postal Code	78757
Phone Number	512.420.8099	Fax Number	
Email Address	jim@midasgreentech.com		

Additional Assignee Data may be generated within this form by selecting the **Add** button. Add

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Mark G. Knedeisen/			Date (YYYY-MM-DD)	2023-03-21
First Name	Mark	Last Name	Knedeisen	Registration Number	42747

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Petitioner Green Revolution Cooling, Inc., Ex-1002
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	MIDAS GREEN TECHNOLOGY, LLC	**Examiner:**	Devon, Russell L.
Inventor(s):	C. Boyd et al.	**Art Unit:**	3763
Patent No.	10,405,457 B2	**Serial No.:**	14/355,533
Issue Date:	September 3, 2019	**Confirmation No.**	3995
		Docket No.	JMG0001-01

Title: APPLIANCE IMMERSION COOLING SYSTEM

STATEMENT AGREEING TO CHANGE OF INVENTORSHIP

Pursuant to 37 C.F.R. § 1.324(a), this is a statement from the assignee of the parties, MIDAS GREEN TECHNOLOGIES, LLC, under paragraph 37 C.F.R. § 1.324(b)(1) agreeing to the change of inventorship for U.S. Patent No. 10,405,457 B2, which complies with the requirements of 37 C.F.R. § 3.73(c). MIDAS GREEN TECHNOLOGIES, LLC agrees to the change of inventorship to remove James P. Koen, David Christopher Laguna, Thomas R. Turner, Kenneth D. Swinden, Mario Conti Garcia, and John Charles Tribou as inventors.

Signature

3-20-23
Date

Printed Name: James P Koen

Title: CTO

MIDAS GREEN TECHNOLOGIES, LLC

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01

CONFIRMATION NO. 3995

POWER OF ATTORNEY NOTICE

44070
J. V. MYERS & ASSOCIATES, P.C.
P. O. BOX 130
DRIFTWOOD, TX 78619

OC000000137648181

Date Mailed: 03/28/2023

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/21/2023.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mteklemichael/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/355,533	04/30/2014	Christopher L. Boyd	JMG001-01

CONFIRMATION NO. 3995

POA ACCEPTANCE LETTER

26285
K&L GATES LLP-Pittsburgh
210 SIXTH AVENUE
PITTSBURGH, PA 15222-2613

OC000000137648185

Date Mailed: 03/28/2023

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/21/2023.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mteklemichael/

Petitioner Green Revolution Cooling, Inc., Ex-1002
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