

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AROMA360, LLC,

Petitioner,

v.

AIR ESSSENTIALS, INC.,

Patent Owner.

Case IPR 2025-00706
U.S. Patent No. 10,583,449

PATENT OWNER'S
SUR-REPLY

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PATENT OWNER'S UPDATED EXHIBIT LIST

Exhibit Number	Filing Party	Title
2001	Patent Owner	Transcript for the Deposition of Dr. Christopher White, PhD.
2002	Patent Owner	Declaration of Dr. Gerald Micklow, PhD.
2003	Patent Owner	CV and Qualifications of Dr. Gerald Micklow, PhD
2004	Patent Owner	Certified Translation of CN 20183273U (GAO)
2005	Patent Owner	Cengel Fluid Mechanics
2006	Patent Owner	Munson Fundamentals of Fluid Mechanics 2d Edition
2007	Patent Owner	Heywood Internal Combustion Engine Fundamentals, 2d Edition
2008	Patent Owner	Martinez Liquid Sprays
2009	Patent Owner	Fox Introduction to Fluid Mechanics 4th Edition
2010	Patent Owner	Micklow Primary and Secondary Spray Breakup
2011	Patent Owner	Lefebvre Atomization and Sprays 2d Edition
2012	Patent Owner	Micklow Fuel Spray Modeling
2013	Patent Owner	Smith Scientific Design of Exhaust & Intake Systems
2014	Patent Owner	Lefebvre Atomization and Sprays
2015	Patent Owner	Patent Owner's Supplemental Evidence in Response to Petitioner's Objection to Evidence
2016	Patent Owner	Supplemental Declaration of Dr. Gerald Micklow, PhD.

I. INTRODUCTION

Petitioner has not carried its burden under 35 U.S.C. § 316(e) of proving unpatentability by a preponderance of the evidence on any of the five grounds. Across each ground, Petitioner's Reply relies on inconsistent mappings, after-the-fact expert characterizations, and hindsight-driven combinations to fill gaps in what the prior art actually discloses, rather than identifying any express teaching that cures the deficiencies in the Petition. On the full record, including the testimony of Dr. Micklow ("Micklow") and the deposition admissions of Dr. White ("White"), the references do not teach, suggest, or anticipate U.S. Patent No. 10,583,449's (the "'449 Patent") claimed structures and functions, and the challenged claims should not be found unpatentable.

II. MICKLOW'S SUPPLEMENTAL DECLARATION

Petitioner filed an Objection to Evidence [Paper 18], wherein Petitioner objected to Exhibit 2002 under FRE 702. In response, on April 15, 2026 Patent Owner ("PO") served supplemental evidence in response to Petitioner's Objection to Evidence, namely, a Declaration of Micklow, each document of which is attached hereto as Exhibit 2015.

III. GROUND 1

Petitioner's Reply does not cure the deficiencies identified in PO's Response (the "POR") regarding Petitioner's Ground 1 challenge based on Sevy. At

institution, the Board found that Petitioner had made a sufficient preliminary showing based on the then-current record, but the Board expressly identified an issue for further briefing regarding Petitioner's treatment of "fluid dispersion" in limitation 1[G]. Paper 9, 15–17. On the full record—including Petitioner's inconsistent mapping of Sevy's alleged "mixing chamber," White's deposition admissions, and Micklow's technical testimony, Petitioner has not met its burden under 35 U.S.C. § 316(e) to prove that claims 1, 4, and 7–10 are unpatentable over Sevy.

A. Petitioner Mischaracterizes PO's Prosecution-History Argument

Petitioner first characterizes PO's prosecution-history argument as an improper request to revisit discretionary denial under 35 U.S.C. § 325(d). Paper 20, 9-10. That is not PO's point. PO does not ask the Board to revisit institution. Rather, PO explained that Sevy's prior consideration by the Office bears on the weight of Petitioner's merits showing, particularly where Petitioner relies on the same reference and the same general teachings without identifying any disclosure in Sevy that the Office overlooked. Paper 15, 7–8.

Petitioner argues that the Examiner "did not have the benefit of analysis in the Petition, including Dr. White's expert declaration." Paper 20, 10. However, expert testimony cannot replace missing disclosure in the prior art. Nor can *post hoc* annotations or litigation-driven characterizations transform Sevy into a reference

that discloses the claimed “mixing chamber” limitations under the parties’ stipulated meaning of “fluid dispersion.”

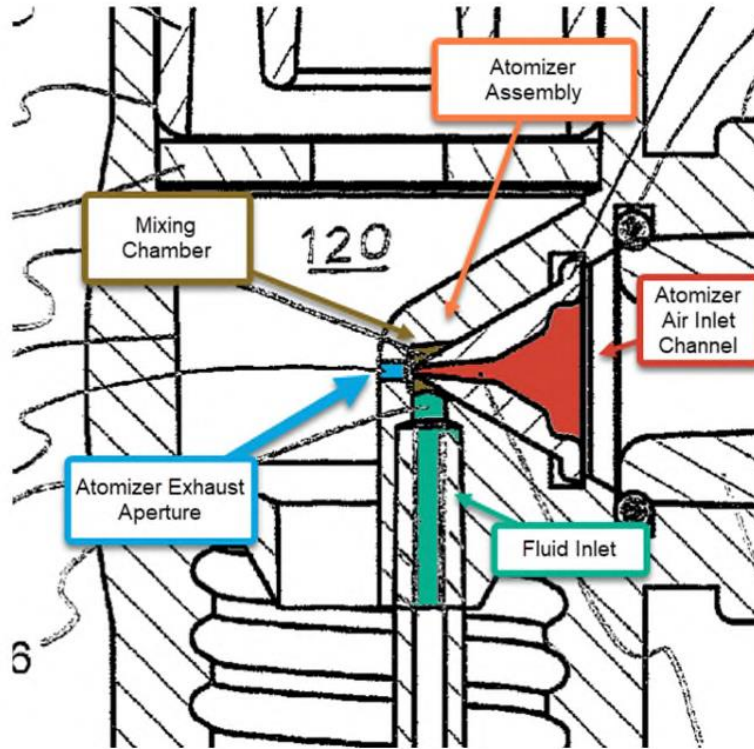
Thus, PO’s prosecution-history argument remains relevant to the merits. Petitioner is not relying on newly discovered art. It is relying on a previously considered reference and asking the Board to accept an expert-driven reinterpretation of Sevy’s droplet-generation and downstream separation process. That is insufficient to carry Petitioner’s burden under § 316(e).

B. Petitioner’s Inconsistent Mapping Does Not Cure Sevy’s Failure to Satisfy the Mixing-Chamber Limitations

Petitioner argues that PO’s Ground 1 response rests on an “erroneous assertion” that Petitioner mapped the claimed “mixing chamber” to Sevy’s orifice 118, whereas Petitioner now says it mapped the claimed “mixing chamber” to Sevy’s cavity 116. Paper 20, 10–11. That criticism is misplaced.

Petitioner’s own presentation created the issue. In both the Petition and the Reply, Petitioner relies on an annotated version of Sevy Figure 9 in which the “Mixing Chamber” is identified by brown shading, as seen below. Paper 2, 28; Paper 20, 10-11. PO understood Petitioner’s brown-shaded mapping as corresponding to orifice 118, which is consistent with the location visually highlighted in Petitioner’s annotated figure. Petitioner now insists that the “mixing chamber” is instead cavity 116, which, per the below, had previously been explicitly labeled the “fluid inlet.”

Paper 20, 10–11. At minimum, Petitioner’s mapping is confusing and internally inconsistent.



EX-1009, FIG. 9 (partial and enlarged)

The inconsistency is compounded by Petitioner’s substantive explanation. The Petition states that “cavity 116 has three openings,” including that the cavity is “open to the orifice 118 of the nozzle 92,” “open to the siphon 96,” and “open to yet another orifice 119.” Paper 2, 27. Petitioner then argues that liquid is “comminuted by the blast of high-speed air at orifice 118 within cavity 116,” and that the resulting air/droplet mixture passes through exit orifice 119 toward separator 120 and wall 121. Paper 2, 30. Thus, even Petitioner’s textual explanation depends on orifice 118 as the operative site of comminution/atomization within the alleged cavity 116.

Petitioner cannot now fault PO for addressing orifice 118 when Petitioner's own mapping and explanation placed orifice 118 at the center of its "mixing chamber" theory.

In any event, the dispute over whether Petitioner meant orifice 118 or cavity 116 does not save Ground 1. The dispositive issue is whether Sevy discloses the claimed "mixing chamber" limitations, including claim 1's requirement that "the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion." Ex. 1001, 15:43–45. It does not.

Sevy describes, at most, initial atomization into droplets of various sizes. Petitioner itself relies on Sevy's disclosure that liquid is drawn into cavity 116 and comminuted by high-speed air, after which "[t]he liquid from the siphon 96 is atomized into droplets of various size" and the "entire mixture of air and droplets passes through the exit orifice 119 toward the separator 120 and particularly toward the wall 121 thereof." Paper 2, 30; Ex. 1009 ¶¶ 81–82. That disclosure does not show formation of the claimed "fluid dispersion" in cavity 116. It shows initial atomization into droplets of various sizes, followed by downstream processing in separator 120.

White's deposition confirms the same sequence. He testified that droplets of different sizes are produced in Sevy's atomizer assembly, that droplets are also produced immediately downstream of the atomizer exhaust, that impact of droplets

on the wall in Sevy produces additional smaller droplets, and that larger droplets are separated from smaller droplets in chamber 120. Ex. 2001, 10:11–11:17. That testimony confirms that Sevy’s relevant droplet breakup, separation, and size selection occur downstream of the alleged mixing chamber, not as a completed “fluid dispersion” formed in cavity 116.

Petitioner’s “cavity 116” reframe therefore does not cure the deficiency. At most, cavity 116 is the location of initial atomization into droplets of various sizes. The claimed limitation requires more: compressed air and operative fluid must mix together in the mixing chamber “to form the fluid dispersion.” Ex. 1001, 15:43–45. Because the parties stipulated that “fluid dispersion” means a mixture including substantially uniform droplets, Sevy’s disclosure of initial atomization into droplets of various sizes does not satisfy claim 1 because they are not substantially uniform, as the stipulated definition of “fluid dispersion” requires.

Nor does Petitioner’s mapping cure the deficiency as to claim 7. Claim 7 recites a “mixing chamber” as part of the atomizer assembly. Petitioner’s only substantive response is that cavity 116 is called a “cavity/chamber” and that liquid and air initially interact there. Paper 20, 11–12. But that argument treats any region of initial air/liquid interaction as the claimed mixing chamber, without accounting for the claimed context of the atomizer assembly and without resolving the separate failure to form the claimed fluid dispersion in claim 1 and claim 8.

C. Petitioner Cannot Rewrite “Fluid Dispersion” When It Appears in the Mixing-Chamber Limitation

The Board identified at institution that Petitioner’s treatment of “fluid dispersion” in limitation 1[G] required further attention. Paper 9, 15–17. Specifically, the Board noted that the parties stipulated “fluid dispersion” means a “mixture of an operative fluid in air comprising a plurality of substantially uniform droplets (having substantially the same diameter) of the operative fluid dispersed throughout the air,” and questioned how that phrase could be read differently merely because it appears in relation to the “mixing chamber.” Paper 9, 15–17.

Petitioner’s Reply does not resolve that problem. Instead, Petitioner doubles down, arguing that limitation 1[G] and the equivalent limitation in claim 8 “do not require the ‘fluid dispersion’ be present in the mixing chamber.” Paper 20, 7. That position is inconsistent with the claim language. Claim 1 does not merely require that compressed air and operative fluid begin interacting somewhere before a fluid dispersion is later formed elsewhere. It requires that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Ex. 1001, 15:43–45.

Petitioner’s contrary reading effectively rewrites “to form the fluid dispersion” into “to begin a process that may later result in a fluid dispersion.” That is not what the claim says. If “fluid dispersion” has the stipulated meaning, then the

phrase “to form the fluid dispersion” must be given that meaning in claim 1 and claim 8. Petitioner cannot preserve the stipulated construction for some purposes while avoiding it when the claim language places “fluid dispersion” in relation to the mixing chamber.

Petitioner’s reliance on claim 9 does not change the result. Petitioner argues that because claim 9 recites that the diffusion chamber “facilitates formation of the fluid dispersion,” claim 8 should not require formation of the fluid dispersion in the mixing chamber. Paper 20, 9–10. But there is no inconsistency. Claim 8 requires compressed air and operative fluid to mix together in the mixing chamber to form the fluid dispersion. Claim 9 adds that the diffusion chamber facilitates formation of the fluid dispersion prior to discharge. A downstream chamber may further facilitate or condition a dispersion that has already been formed; that does not erase claim 8’s express requirement that mixing in the mixing chamber forms the fluid dispersion.

In short, Petitioner’s interpretation reads the words “to form the fluid dispersion” out of claims 1 and 8. The Board should reject that construction-by-reply and apply the stipulated meaning of “fluid dispersion” consistently.

D. Petitioner’s “Downstream Processing” Argument Does Not Cure Sevy’s Deficiencies

Petitioner also argues that PO improperly criticizes “downstream processing” even though the ’449 patent itself contemplates downstream processing in the diffusion chamber. Paper 20, 8–9. That argument misses PO’s point.

PO does not contend that downstream processing is categorically excluded from the claims. Nor does PO contend that droplets can never undergo further conditioning after leaving the mixing chamber. Rather, PO’s point is that claims 1 and 8 expressly require the compressed air and operative fluid to mix together in the mixing chamber to form the claimed “fluid dispersion.” Ex. 1001, 15:43–45, 16:16–21. Sevy does not do that.

Sevy teaches initial atomization into droplets of various sizes, followed by downstream impact, breakup, separation, agglomeration, and entrainment in chamber 120. Ex. 1009 ¶¶ 69–70, 82–84. Petitioner’s own expert admitted that droplets of different sizes are produced in Sevy, that additional smaller droplets are produced by impact on the wall, and that larger droplets separate and fall out in chamber 120. Ex. 2001, 10:11–11:17. That is not the same as forming the stipulated “fluid dispersion” in cavity 116.

Petitioner’s Reply therefore blurs two different concepts: initial atomization and formation of the claimed fluid dispersion. Sevy may disclose initial atomization

in or around cavity 116, but the Petition itself relies on downstream droplet impact and separator-plate filtering to reach the droplet characteristics Petitioner associates with “fluid dispersion.” Paper 2, 30–35. That reliance confirms PO’s point: the alleged “fluid dispersion” is not formed in the mixing chamber as claims 1 and 8 require.

Petitioner’s reliance on White’s Supplemental Declaration does not cure the defect. White’s supplemental opinions address statistical concepts such as uniform distribution and Sauter Mean Diameter, but those opinions do not identify any new disclosure in Sevy showing that cavity 116 forms the claimed fluid dispersion. Ex. 1047 ¶¶ 5–20. The relevant question for Ground 1 remains whether Sevy discloses or renders obvious the claim language as written. Petitioner’s statistical reframing does not supply the missing disclosure.

E. Petitioner’s Reply Does Not Cure Sevy’s Different Principle and Purpose

Petitioner also argues that Sevy is analogous art because the ’449 patent generally relates to dispersing fluids into an enclosed airspace and Sevy diffuses essential oil into a room or enclosed space. Paper 20, 12–13. That framing is too broad and does not respond to PO’s actual argument.

PO’s point is not that claim 7 is limited to commercial environments or a specific pressure range. Rather, PO explained that Sevy is directed to a small, self-

contained consumer diffuser designed for small spaces, whereas the '449 patent addresses forced-air fluid dispersion systems operating under different pressure, scale, and performance constraints. Paper 15, 12–14. That difference matters because Petitioner's obviousness theory depends on treating Sevy's small-scale atomizer and downstream separator as if they disclose the same mixing-chamber architecture and fluid-dispersion formation required by the claims of the '449 patent.

Petitioner's field-of-end endeavor argument also proves too much. If any device that emits fragrance into any enclosed space is in the same field for all purposes, then the field becomes so broad that it no longer meaningfully addresses whether a POSITA would have looked to Sevy for the specific claimed arrangement. PO's point was narrower: Sevy's design goals, operating environment, and droplet-handling mechanism differ materially from the '449 patent's claimed arrangement and the problems it addresses.

Accordingly, Sevy remains inapposite not merely because it is a small device, but because Petitioner's use of Sevy requires hindsight-driven mapping of Sevy's initial atomization and downstream droplet separation onto claim limitations requiring a mixing chamber and, for claims 1 and 8, formation of the claimed fluid dispersion in that mixing chamber.

F. Petitioner Offers No Separate Showing for Dependent Claims 4 and 8–10

Petitioner asserts that PO does not separately argue meaningful distinctions for dependent claims 4 and 8–10. Paper 20, 13. That argument does not advance Petitioner’s burden.

Claim 4 depends from claim 1. Because Petitioner has not shown that Sevy discloses or renders obvious claim 1, Petitioner likewise has not shown that claim 4 is unpatentable over Sevy.

Claim 8 independently confirms the flaw in Petitioner’s Ground 1 theory. Claim 8, like claim 1, expressly requires that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Ex. 1001, 16:16–21. Petitioner’s Reply argues that this language does not require the stipulated “fluid dispersion” to be present in the mixing chamber and further asserts that PO relied on a “faulty assumption” that orifice 118 is the mixing chamber. Paper 20, 7–10, 13. But Petitioner’s own annotated mapping and explanation created that issue, and Petitioner’s cavity 116 reframe still does not show that the stipulated “fluid dispersion” is formed in the claimed mixing chamber.

Claims 9 and 10 depend, directly or indirectly, from claim 8. Because Sevy does not disclose or render obvious claim 8, Petitioner has not shown that claims 9 and 10 are unpatentable. The Reply identifies no independent disclosure in Sevy that

cures the failure to satisfy the claim 8 mixing-chamber limitation. Accordingly, Ground 1 should be rejected as to claims 1, 4, and 7–10.

IV. GROUND 2

PO does not attack Sevy and Gao individually, and Petitioner's reliance on *Bradium* to say PO did is misplaced. See *Bradium Technologies LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (finding that obviousness cannot be overcome by attacking references individually where the rejection is based upon the teaching of a combination of the references). PO's position is explicitly that the **combination** Petitioner proposes fails to teach or suggest the '449 Patent as claimed, as its structure would not contain nor disclose the structure as required per the '449 Patent's claims. Paper 15, 20-21 ("As the Board pointed out and given Petitioner's labeling of the Sevy reference, the mixing chamber of Sevy only serves to eject a fluid dispersion to be further made into a fluid dispersion (such as in reference numeral 120 of Sevy): Gao's disclosure does not remedy this mismatch and only produces a fluid dispersion in a manner similar to Sevy. Indeed, Gao states that 'the high-speed gas mixture is then ejected through a gas flow port and hits an inner wall 101 of the lower part cavity, thus the liquid is atomized into micro sized fine particles.' Ex1013, ¶ 25."). Accordingly, Petitioner has not met its burden to show that the references, considered together, actually teach the claimed invention, at least

with respect to Claim 1 and 8. As such, the Claims of the ‘449 Patent should be maintained in force.

V. GROUND 3

A. Goubet Still Cannot Create a Fluid Dispersion as Claimed

Petitioner’s attack on the fatal distinctions between the ‘449 Patent and Goubet suffers from inapposite comparisons that fail to address the core issue: Goubet does not teach or disclose a system that produces a fluid dispersion in accordance with the ‘449 Patent.

The Institution Decision notes that “Petitioner presents its initial case based on the ***stipulated construction*** of ‘fluid dispersion’ as ‘a mixture of operative fluid in air comprising a plurality of ***substantially uniform droplets*** . . . dispersed ***throughout*** the air.” Paper 9, Page 16 (emphasis added). In light of this admission, Petitioner’s reliance on “Goubet’s express teaching” [Paper 20, Page 16] fails because Goubet never “express[ly] teach[es]” ***substantial uniformity*** in any amount. *See generally* Exhibit 1016. Petitioner cites to Goubet as teaching that droplet size is “reduced as much as possible” [Paper 20, Page 16] without acknowledging that what is “possible” depends on the constraints of a given system and is not an objective term; in other words, what is “possible” for Goubet to achieve does not limit what is “possible” under the ‘449 Patent. Petitioner’s conclusory dismissal of Dr. Micklow’s analysis [Paper 20, Page 17] does nothing to bolster its faltering

position, when Dr. Micklow has adequately explained that the baffle path of Goubet would not result in a plurality of substantially uniform droplets. Exhibit 2002, Para. 26. Petitioner cannot carry its burden of proving otherwise by simply disagreeing with Dr. Micklow.

Petitioner attempts to fall back on a theory of including “additional enclosures to further decrease droplet size and *improve uniformity*.” Paper 20, Page 17 (emphasis added). In so doing, Petitioner erroneously cites to pages 60 and 61 of its Petition and Paragraphs 277-280 of White’s declaration. Paper 20, Page 17. PO notes that while these page ranges do not correspond to the argument made, the Petition and White’s declaration *do* conclude elsewhere—without support or reasoning—that “[a] POSITA *would* modify Goubet’s diffuser head to include additional disclosures.” Ex. 1002, Para. 168 (emphasis added). This conclusion alone cannot satisfy Petitioner’s burden.

B. Claims 4 and 8–10

Because Petitioner has not established the unpatentability of claim 1 and 7 under Ground 3, its attacks on the dependent claims fail for the reasons set out in the POR. Paper 16, Page 27.

VI. GROUND 4

Petitioner's Reply does not cure the deficiencies the Board identified in its Institution Decision [Paper 9, Page 40], and on the full record, Kaiser is neither

analogous art, nor would a POSITA combine it with Goubet as Petitioner so proposes. Paper 9, Page 40 (“On the current record and in view of our decision to institute based on other grounds, we reach no conclusion as to whether Petitioner has made a sufficient showing that one of ordinary skill in the art would have combined Goubet and Kaiser as proposed”). Ultimately, Petitioner's Reply [Paper 20, Pages 18-21] relies on *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995 (Fed. Cir 2016) that glaringly shows Kaiser is not from the same field of endeavor as the claimed invention, distorts problems to which the ‘449 Patent relates, and entirely overlooks an explicit showing of how a POSITA would consider Kaiser in light of the invention at hand. Accordingly, on the full record, Petitioner has not carried its burden under 35 U.S.C. § 316(e) to demonstrate that Kaiser is analogous art or that a POSITA would have combined Goubet and Kaiser as proposed, and the Board should reject Ground 4 in its Final Written Decision.

A. Petitioner's Field-of-Endeavor Theory Entirely Mischaracterizes the *Unwired Planet* Case with Respect to the Purposes of the Claimed Invention.

As an initial point, Paper 15 identifies that Kaiser “operates in a fundamentally different atomization regime from the fluid-flow-driven mechanisms of the ‘094 Patent, one based on electrosprays, in which charged droplets are formed from capillaries and dispersed through Coulombic repulsion.” Paper 15, Pages 29-30 (citing Ex. 2002 ¶¶ 27-32).

As such, when considering *Unwired Planet*, 841 F.3d at 1001, although “[a] field of endeavor is not limited to the specific point of novelty or a particular focus within a given field” as Petitioner states, at the same time, Petitioner entirely overlooks the unquestionably identical fields of endeavors at issue within the referenced case. See *Unwired Planet*, 841 F.3d at 1001 (finding the patent as teaching methods for ordering and displaying information, such as within menus, on graphical user interfaces where the prior art reference generally dealt with graphical user interface design and included a chapter devoted to menu design with specific suggestions for how to order menu items and an example related to the problem the patent addressed). The Court found that the patent and reference overlapped not only because reference had directly relevant information on graphical user interfaces, including an example, which is what the patent taught, ***but also because “a skilled artisan ... would reasonably look to [the prior art reference], which teaches solutions to the same problem.”*** *Id.* (emphasis added).

Therefore, Petitioner's proposed framing of what the '449 Patent relates to, “the field of dispersion of various fluids including, but not limited to, fragrant oils... into a generally enclosed airspace” [Paper 20, Page 18 (citing Ex. 1001, 1:7:11)] attempts to sweep in any technology that involves liquid/fluid entering a confined space. Under that conception, fire suppression, agricultural pesticide application, fuel injection, and ink-jet printing would all share a field of endeavor with the '449

Patent. However, none of those technologies, nor Kaiser's high-voltage electrospray combustion technology, shared the kind of concrete technical overlap *Unwired Planet* requires to support an analogous field of endeavor finding. As such, Petitioner's argument should not be given weight.

B. Kaiser is Not Reasonably Pertinent to the Problem Faced by the Inventor of the '449 Patent and the *Donner Technology, LLC* Case Petitioner Cites to Confirms this.

Petitioner's reasonable-pertinence argument fares no better. Petitioner cites *Donner* for the rule that a reference is analogous art if it "is reasonably pertinent to one of the problems purportedly solved by the '449 Patent...." Paper 20, Page 19 (citing *Donner Tech., LLC v. Pro Stage Gear, LLC*, 979 F.3d 1353, 1359 (Fed. Cir. 2020)). However, Petitioner ignores the core holding of the case. See *Donner*, 979 F. 3d at 1360-61 (reversing the Board's analogous-art determination because the reasonable-pertinence inquiry "must be carried out from the vantage point of a [POSITA] who is considering turning to the teachings of references outside her field of endeavor," and the relevant question is whether a POSITA "would reasonably have consulted" the reference in solving the relevant problem).

Petitioner's evidence on this point is exactly what *Donner* forecloses. Petitioner relies on Dr. White's general statement that uniform droplet size correlates with uniform evaporation and that Kaiser can be consulted to modify Goubet's existing structure for producing more uniform droplets. Paper 20, Pages 18-19

(citing Ex. 1014, 43; Paper 2, Pages 59-60; Ex. 1002 ¶¶ 251-57). ***Again, at no point does Petitioner explain if a POSTIA would have reasonably consulted the reference in solving the relevant problem, Petitioner only argues that it could have been done.*** See MPEP § 2145(X)(A) (forbidding hindsight-driven reconstruction of references to render claims obvious).

Petitioner then relies on a minuscule, irrelevant portion from Dr. Micklow's deposition on this point where he stated, in the context of describing how the human nose detects scent, that “in combustion, you want [particles] to be small, so you get a rapid burn.” Paper 20, Page 20 (citing Ex. 1046, 21:16-19). As should be apparent, neither Petitioner's reliance on Dr. White's declaration, nor Dr. Micklow's deposition speaks to the controlling *Donner* question: whether a POSITA solving problems set forth in the '449 Patent would have consulted Kaiser, a paper on high-voltage electrospray injection for catalytic combustion in mesoscale power systems. But, within the Deposition of Dr. Micklow, ***when discussing Kaiser***, this question is answered, which Petitioner conveniently ignores.

Indeed, Dr. Micklow, an engineer with fifty years of experience in fluid dynamics and atomization, testified that he has “never seen [electrospray] used” in spray atomization “in [his] 50 years as an engineer” “because it's not practical.” Ex. 1046, 236:9-13. He testified that, when considering Kaiser, “it is just not the type of system we're modeling here. This cannot be something that could be designed,

developed and proceeded and sold,” and “a mechanical engineer or somebody that did fluid flow wouldn't think about [Kaiser]. It's just — it's just not there.” Ex. 1046, 237:21-238:12. And he testified that electrospray “would not be a choice of a mechanical engineer designing a system like this.” Ex. 1046, 240:3-7. That is the precise testimony *Donner* identifies as dispositive: a POSITA's vantage point on whether to consult the reference at all. See *Donner*, 979 F.3d at 1361 (“The relevant question is whether a [POSITA] 'would reasonably have consulted' the reference in solving the relevant problem.”).

Accordingly, Petitioner has not established that a POSITA considering the problems purportedly solved by the ‘449 Patent would have reasonably consulted Kaiser, and Kaiser is therefore not reasonably pertinent to the problems with which the ‘094 Patent inventor was involved. To this end, a POSITA would not have a motivation to combine Goubet and Kaiser. As such, the relevant claims should not be found unpatentable in light of Goubet and Kaiser.

C. Claims 4, 8-10

Because Petitioner has not established the unpatentability of claims 1 and 7 under Ground 4, the dependent claims fail for the reasons set out in the POR. Paper 1, Pages 32-33.

VII. GROUND 5

Petitioner's Reply is a whiff, and misses the argument Patent Owner puts forth, which was not discussed in the Board's Institution Decision. The following confirms that Gao does not anticipate Claim 1 under the controlling standard: anticipation requires that the prior art reference disclose elements "arranged as in the claim." *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (citing *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) (quotations omitted)). A careful reading of the claim language, Petitioner's evidence, and Petitioner's own Reply concession shows Gao does not satisfy that exacting standard as to Claim 1.

A. Claim 1 Requires That the Fluid Dispersion Be Formed In the Mixing Chamber

As mentioned in Paper 15 at Pages 33-34, Claim 1 recites that "... air and the operative fluid mix together *in said mixing chamber to form the fluid dispersion.*" Ex. 1001, Claim 1. The parties have stipulated that "fluid dispersion" means a "mixture of an operative fluid in air comprising a plurality of substantially uniform droplets" Ex. 1018, Ex. A. Reading those two together, Claim 1 unquestionably requires that the mixing of air and an operative fluid inside the mixing chamber produce a mixture comprising substantially uniform droplets.

B. Gao's Text and Petitioner's Position is that a Fluid Dispersion, per the Parties Stipulated Definition is not Formed Within the "Cavity" of Gao. Rather, The Fluid Dispersion is Formed Only After Ejection from Gao's Cavity

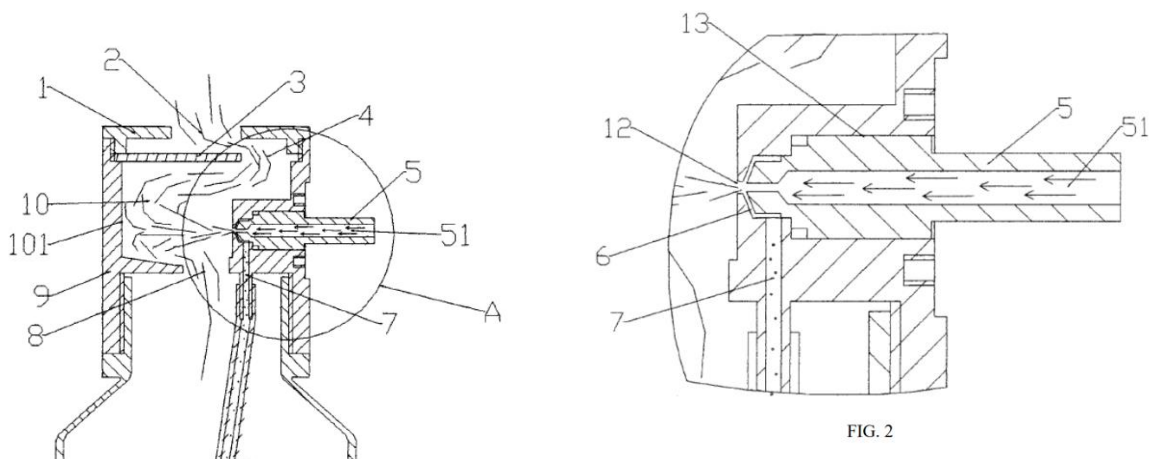
Petitioner identifies Gao's atomizing cavity 6 as the claimed mixing chamber.

Paper 20, Page 22 (citing Pet. 68-69; Ex. 1002 ¶¶ 277-287). Gao discloses, under

PO's certified translation:

"...liquid is drawn into the atomizing chamber **6**, allowing the liquid and air to ***mix thoroughly***. The high-speed gas-liquid mixture is then sprayed out through the airflow outlet and hits an inner wall, hitting the inner wall 101 of the lower chamber 10, ***atomizing the liquid into micron-sized fine particles.***"

Ex. 2004, ¶ 25 (emphasis added). Petitioner's translation stands for the same proposition that ***after*** a liquid mixture is ejected from a gas flow spray hole **12** and hits an inner wall of the lower part of the cavity **10** (not 6), it is ***then atomized into micron sized fine particles.*** See Ex. 1013 ¶ 25 (emphasis added).



Ex. 1013, Figures 1-2.

Accordingly, as a consequence of that wall impact, the liquid atomized into micron sized fine particles. At best, the causal connector "thus" links the atomization, and therefore, the ***formation of the fluid dispersion*** to the wall impact, not to anything that happens inside cavity 6. Even so, nothing within Gao, nor Petitioner's Reply indicates that post-atomization, the atomization of Gao will be ***substantially uniform droplets required by the stipulated construction of fluid dispersion***. As such, elements, as arranged in the claim, do not exist within cavity 6 within Gao's own text, and it should not render the '449 Patent as anticipated.

C. Petitioner's Reply Concedes the Point

Petitioner's Reply confirms this reading. Petitioner writes that "Gao's atomization cavity 6 meets either Parties' construction of the 'mixing chamber' limitation because compressed air and fluid are 'mixed' therein before the gas-liquid mixture is ejected through the gas flow port, ***starting to form the fluid dispersion in the process.***" Paper 20, Page 23 (emphasis added). Petitioner's own characterization of what occurs in cavity 6 is that the fluid air mixture is "***starting to form***" a fluid dispersion. Starting to form a fluid dispersion is not the same as forming one. Claim 1 requires the latter.

Petitioner's cited-to expert testimony confirms the same point from a different angle. Petitioner relies on Dr. White's opinion at Ex. 1002 ¶ 290, which clearly states: "The high-speed gas-liquid mixture is then ejected against an inner wall 101 of main

body 9 to atomize the liquid mixture into micron-sized particles.” Ex. 1002 ¶ 290 (citing Ex. 1013). That testimony confirms the very arrangement problem that defeats anticipation. Dr. White concedes that the atomization producing micron-sized particles (which may or may not be uniform to fit the stipulated definition of the fluid dispersion) occurs against inner wall 101 of main body 9, a structure distinct from and downstream of cavity 6.

Petitioner's suggestion that Dr. Micklow's declaration at paragraphs 24-25 is unclear as to whether it relates to Gao does not withstand a plain reading. *Compare* Paper 20, Page 24 *with* Ex. 2002, ¶¶ 24-25. Further, contrary to Petitioner's assertion, it is entirely clear that Dr. Micklow's position is well-reasoned, well-explained, and comments directly on Gao's disclosure and record. *I.* As such, Dr. Micklow's declaration only serves to show Gao should not be found to anticipate Claim 1 of the '449 Patent. Ultimately, the claimed structure forms substantially uniform droplets within the mixing chamber. Granted, even if those substantially uniform droplets are later refined into even more uniform droplets, the claim and stipulated language clearly requires at least substantially uniform droplets to be formed within the mixing chamber.

D. Claim 4

Claim 4 depends from Claim 1. Because Petitioner has not established that Gao discloses each element of Claim 1 arranged as in the claim, Claim 4 likewise cannot be shown to be anticipated.

E. Claims 7-10

PO maintains the arguments set forth in the Response with respect to Claims 7-10. POR at 36-39. That said, related to claim 8, for the reasons discussed above and in the POR, Gao should not be found to anticipate it.

VIII. CONCLUSION

For the reasons set forth above and in the POR, Petitioner has not carried its burden under 35 U.S.C. § 316(e) of proving by a preponderance of the evidence that challenged claims of the '449 Patent are unpatentable on any of the five grounds. Petitioner's Reply does not cure the deficiencies in the Petition's reliance on Sevy, Sevy in view of Gao, Goubet, Goubet in view of Kaiser, or Gao, and the testimony of Micklow and the admissions of White confirm those deficiencies on the full record. The challenged claims should be maintained in force.

Dated: May 15, 2026

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH WORD COUNT LIMIT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that this Patent Owner's Sur-Reply (the "POSR") contains **5,324** words, excluding the parts of the POSR exempted by 37 C.F.R. § 42.24(c), as determined by the word count function of the word-processing program used to prepare this document.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of Patent Owner's Sur-Reply (the "POSR") has been served in its entirety on May 15, 2026, by causing the POSR and accompany documents (if any) to be electronically mailed to the following attorneys of record for the Petitioner:

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