

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
RESPONSE

Mail Stop "PATENT BOARD"
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

I. INTRODUCTION

Pursuant to 37 C.F.R. § 42.120 Air Essentials, Inc. (“Patent Owner”), submits its Response (“POR”) in response to the Institution Decision for *inter partes* review of claims 1, 4, and 7-10 of U.S. Patent No. 10,583,449 (the “’449 Patent”). For the reasons set forth herein, the Board should conclude that the challenged claims of the ‘449 Patent remain patentable over the prior art of record.

As will be demonstrated, Petitioner, Aroma360, LLC (“Petitioner”), has failed to carry its burden under 35 U.S.C. § 316(e) to prove, by a preponderance of the evidence, that any of the challenged claims are unpatentable. In particular, Petitioner’s asserted grounds rely on inappropriate characterizations of the prior art in an effort to map disparate disclosures onto distinct claim limitations, and expert testimony that is not grounded in measurements, calculations, or reliable technical analysis. Petitioner further advances combinations of prior art that neither disclose nor suggest the full scope of the claimed limitations. As will also be demonstrated, Patent Owner’s evidence and analysis further forecloses Petitioner’s ability to satisfy its burden under 35 U.S.C. § 316(e) to prove unpatentability by a preponderance of the evidence. For these reasons, the Board should conclude that Petitioner has not, and cannot, establish that claims 1, 4, and 7-10 ‘449 Patent are unpatentable.

II. STANDARD OF REVIEW

“In an [inter partes review], the petitioner has the burden from the onset to show with particularity why the patent [claims] it challenges [are] unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); *see also* 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”)); and *Twitter, Inc. v. VidStream LLC*, 825 F. App’x 844, 851 (Fed. Cir. 2020) (explaining that it is the petitioner’s burden “to establish the scope and content of a prior art reference by a preponderance of the evidence”). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

The petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Accordingly, expert testimony that merely repeats the conclusory argument and does not *explain why* the expert’s position is correct is given little weight. *See Xerox Corp. v. Bytemark, Inc.*, No. IPR2022-00624, 2022 WL 3648989, at *5- 6 (PTAB Aug. 24, 2022); *Xerox Corp. v. Bytemark, Inc.*, No. IPR2022-00624, Paper 12 at 3-6 (PTAB Feb. 10, 2023) (Director Vidal designating the Board’s decision as precedential and affirming the decision because little weight

should be given to declarations that “do[] not provide any technical detail, explanation, or statements supporting why the” expert’s position is correct).

Additionally, the petitioner’s case-in-chief must be made in the petition, and “[the] [p]etitioner may not submit new evidence or argument in reply that it could have presented earlier,” such as to bolster an insufficient petition that fails to establish a prima facie case of unpatentability. *VidStream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1064 (Fed. Cir. 2020) (quoting U.S. Patent Trial and Appeal Board, Consolidated Trial Practice Guide 73 (Nov. 2019)); 35 U.S.C. § 312(a)(3) (“the petition” must identify supporting evidence “with particularity”); 37 C.F.R. § 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art . . .”).

III. OVERVIEW OF THE PRIOR ART

The ‘449 Patent issued from U.S. Application Serial No. 16/154,373 (Exhibit 1004) (“the ‘373 Application”) and is a continuation in part of U.S. Application Serial No. 15/353,951, which was a continuation in part of U.S. Application Serial No. 14/844,650, which was a continuation of U.S. Application Serial No. 13/838,634 (Ex. 1005), which in turn claimed the benefit of U.S. Provisional Application Serial No. 61/694,500 (Ex. 1006).

The ‘373 Application was filed on October 8, 2018. It was subject to a non-final refusal on July 22, 2019 (Ex. 1004, p. 67). The Office indicated that original

Claims 8-10, and 13 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 7, 11, and 12 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 3,985,299 by Brenez. Lastly, all pending claims received a rejection for non-statutory double patenting based on Patent Owner's own U.S. Patent Nos. 9,126,215; 9,527,094; and 10,092,918. An appropriate terminal disclaimer was submitted on August 11, 2016 (Ex. 1004, p. 99) and the '650 Application issued as the '094 Patent on October 19, 2022. At the same time, Patent Owner amended original independent claim 7 to include the subject matter of allowable claim 8, overcoming the anticipation refusal. No other amendments were made to the claims and the '449 Patent issued on March 10, 2020.

IV. CLAIM CONSTRUCTION

Petitioner has indicated that it does not believe any term needs to be construed by the PTAB to decide the petition. Paper 1, page 12. Patent Owner agrees in light of the general proposition that “we 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). Patent Owner is not currently aware of any claim term that requires construction to resolve the petition.

V. LEVEL OF ORDINARY SKILL IN THE ART

Patent Owner does not dispute the level of ordinary skill in the art proposed by Petitioner because Patent Owner does not believe it is required at this stage to resolve the petition. Patent Owner reserves the right to address it should new issues materialize. Regardless, Patent Owner's Response is supported by the Declaration of Dr. Gerald J. Micklow, PhD, PE, who meets and exceeds Petitioner's proposed level of skill. *See* Ex. 2002.

**VI. GROUND 1
(Claims 1, 4, and 7-10 – Sevy)**

Although the Board instituted review on Ground 1, noting Petitioner's identification of structures in Sevy that it contends correspond to the "mixing chamber" limitations of independent claims 1 and 7 of the '449 patent, Petitioner has not met its ultimate burden to prove that either claim is unpatentable under 35 U.S.C. § 103 by a preponderance of the evidence, supported by substantial evidence. 35 U.S.C. § 316(e). As explained below, Petitioner's challenge fails because Sevy does not disclose, and a person of ordinary skill in the art (POSITA) would not recognize, any structure that constitutes the claimed "mixing chamber" as set forth in claims 1 or 7. Further, Sevy operates according to a fundamentally different principle of operation and solves a different technical problem than the invention of

the '449 patent. These deficiencies independently and collectively preclude a finding of obviousness as to either claim.

a. Sevy Was Considered by the USPTO During Prosecution.

Before addressing the merits of Ground 1, Patent Owner notes that Sevy was already considered by the USPTO (the “Office”) during prosecution of the application that matured into the '449 patent and the application family that led to the '449 patent. Although Sevy is not expressly listed on the face of the '449 patent, it is cited on the face of U.S. Patent No. 9,527,094, to which the '449 patent claims priority. Ex. 1001, Page 1. As a result, Sevy was before the Office and evaluated by the Examiner in assessing the patentability of the claims now under review. *See* MPEP § 609.02 (consideration of prior art cited during examination of a parent application).

While the Board is not precluded from reconsidering prior art previously before the Office, the fact that Sevy was already reviewed and deemed insufficient to preclude patentability is nevertheless relevant to the weight of Petitioner’s showing. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8–10 (PTAB Feb. 13, 2020) (explaining that previously considered art weighs against institution where the petitioner does not present materially different arguments showing the Office erred in evaluating the art or arguments).

Here, Petitioner relies on *the same reference the Examiner considered*, without identifying any material disclosure in Sevy that was overlooked during prosecution, and without offering a materially different interpretation grounded in the intrinsic disclosure of Sevy itself. Instead, Petitioner’s case depends on *post hoc* annotations, re-labeling, and functional inference—precisely the type of hindsight-driven reconstruction that cannot supply a proper basis for obviousness. See MPEP § 2145(X)(A).

b. Sevy Does Not Disclose the Claimed “Mixing Chamber” of Claims 1 or 7.

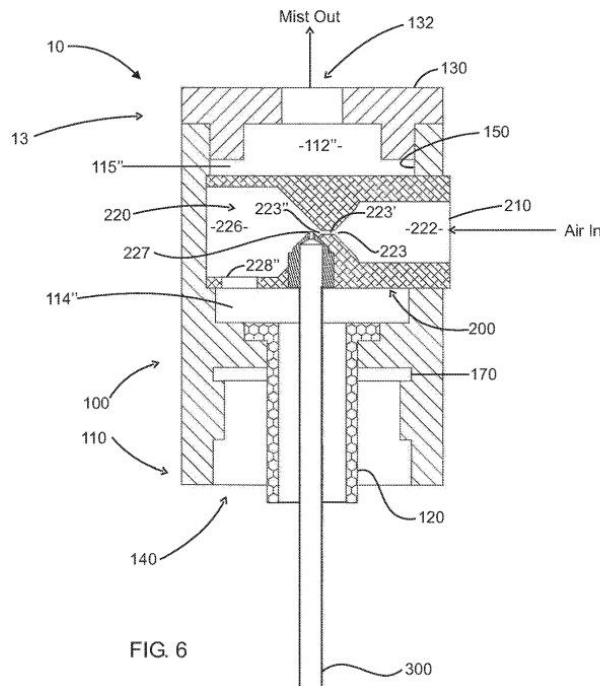
Petitioner’s Ground 1 challenge rests on the assertion that Sevy discloses the “mixing chamber” recited in independent claims 1 and 7 of the ’449 patent, which Petitioner identifies as orifice 118 in Sevy. That assertion fails as a matter of both structure and operation. Sevy does not disclose a mixing chamber as claimed, nor would a person of ordinary skill in the art understand Sevy’s orifice 118 to correspond to the claimed mixing chamber under any reasonable definition consistent with the ’449 patent. Although claims 1 and 7 recite different requirements with respect to the “mixing chamber,” neither is satisfied by Sevy.

c. Sevy Does Not Disclose the Mixing Chamber of Claim 7.

Independent claim 7 of the ’449 patent recites a “mixing chamber,” but, unlike claim 1, does not require that the “compressed air and the operative fluid mix

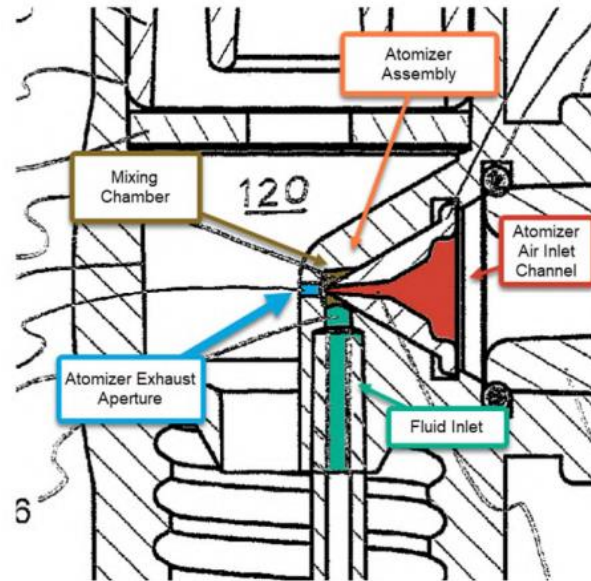
together in [the] mixing chamber to form the fluid dispersion.” Ex. 1001, 15:23-45, 66-67 – 16:1-14. Accordingly, the question for claim 7 is not where dispersion ultimately forms, but whether Sevy discloses a structure that a POSITA would recognize as a “mixing chamber” in the context of fluid dispersion systems.

The '449 patent describes the “mixing chamber” (i.e., reference numeral 226) as a discrete volumetric region within the atomizer assembly that receives compressed air and operative fluid and permits controlled interaction between them prior to downstream processing, as seen below. See Ex. 1001, Fig. 6. A “mixing chamber,” as understood in this art, is not a mere opening or constriction, but a spatial region that allows interaction, pressure equalization, and flow development.



Sevy’s orifice 118 does not meet that description. As shown in Sevy and as acknowledged by Petitioner’s own annotated figures, seen below, orifice 118 is a

narrow, sharp-edged opening that functions as a flow restriction. It lacks internal volume, residence time, or spatial extent, and thus cannot reasonably be characterized as a “chamber.” A person of ordinary skill in the art would understand orifice 118 to be a nozzle or restriction—not a mixing chamber.



From a fluid-dynamics perspective, inserting a sharp-edged orifice into a flow path primarily accelerates flow, increases turbulence, and causes a pressure drop. As Patent Owner’s expert explains, such structures tend to increase acoustic energy and disrupt smooth flow, rather than facilitate controlled mixing within a chamber. Ex. 2002 ¶¶ 19-23. Nothing in Sevy suggests that orifice 118 was designed or intended to function as a chamber for mixing air and fluid.

Accordingly, even without considering where or how a fluid dispersion forms, Sevy fails to disclose the “mixing chamber” of claim 7.

d. Sevy Also Fails to Meet the Mixing Chamber Limitation of Claim 1.

Independent claim 1 imposes an additional requirement beyond claim 7, namely that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Ex. 1001, 15:24-45. Even if Petitioner could somehow stretch Sevy’s orifice 118 into a “mixing chamber”—which it cannot—Sevy still does not disclose forming a fluid dispersion in that location.

Sevy expressly teaches that entrained droplets expelled from the exit orifice 119 collide with wall 121, where droplet breakup, separation, and agglomeration occur. Ex. 1009, ¶¶ 0014, 0082. Larger droplets strike the wall 121 and either coalesce and drift back toward the reservoir or break into smaller droplets which are later entrained in airflow downstream. *Id.* Thus, under Sevy’s own disclosure, whatever dispersion ultimately exists is formed ***after the droplets impact wall 121—not within orifice 118.***

Petitioner’s re-labeled diagrams therefore undermine its own position. By identifying orifice 118 as the “mixing chamber” as seen above, Petitioner necessarily points to a structure where a ***fluid dispersion is not formed***, according to Sevy’s express teachings. Indeed, as Petitioner’s expert explains, “larger droplets will be separated . . . from smaller droplets . . . [after the] larger droplets [impact] the wall[, which] produce smaller droplets[.]” and “under the influence of gravity, some larger droplets will fall out of the dispersion[.]” events which “will happen in chamber

120.” Ex. 2001, Pages 11-12. In other words, even under Petitioner’s expert’s account, droplet breakup, separation, and entrainment occur ***downstream of orifice 118, after impact with the wall 121 of chamber 120—not within the orifice itself.*** This testimony confirms that orifice 118 does not function as a mixing chamber in which compressed air and operative fluid interact in the manner contemplated by the ’449 patent, but instead serves merely as a restriction preceding downstream droplet processing. Therefore, Sevy does not disclose—either expressly or inherently—that compressed air and operative fluid mix together in a mixing chamber to form a fluid dispersion, as required by claim 1 of the ’449 patent.

e. Sevy Operates on a Fundamentally Different Principle and Solves a Different Technical Problem Than the Invention of the ’449 Patent.

Sevy is further inapposite because, compared to the invention of the ’449 patent, Sevy is directed to a fundamentally different type of diffusion device that operates according to a different principle of operation and solves a different technical problem. As the Federal Circuit has recognized, prior art that is directed to solving a different problem, or that operates according to a different principle, is a poor—and often improper—basis for an obviousness challenge. *See, e.g., In re Klein*, 647 F.3d 1343, 1351–52 (Fed. Cir. 2011) (citing *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992) (“If [a reference] is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it.”)).

Sevy is directed to a small, self-contained fragrance diffuser intended for use in very small spaces, such as on a dresser, table, or nightstand. Ex. 1009, ¶ 0006 (“it would be an advance in the art to provide an integrated system having suitable weight for stability, ***a sufficiently small size so excessive footprint and volume are not occupied on a dresser, table, or a night stand***”) (emphasis added). Sevy’s design objectives thus center on size, weight, and convenience for use in small, enclosed spaces—such as bedrooms or similar residential environments. *Id.*

Consistent with that purpose, Sevy does not disclose or contemplate operation at elevated pressures, high volumetric flow rates, or sustained forced-air delivery of atomized fluid. *See* Ex. 1009. Nor does Sevy address the challenges associated with delivering fragrance uniformly across expansive environments, where higher airflow and pressure are required to maintain dispersion over distance. A person of ordinary skill in the art would therefore understand that Sevy’s low-pressure, small-scale device is optimized for personal or bedside use, not for large-area scenting applications.

By contrast, the invention of the ’449 patent is directed to fluid dispersion systems capable of operating at substantially higher pressures and airflow rates to distribute scent effectively throughout larger or commercial environments, such as offices, hotels, or other places of business. *See* Ex. 1001, 1:27–31 (“One drawback of many known fluid diffusion devices utilizing forced air is that they tend to make

an undesirable and often, depending on the location, such as an office or other place of business, a disruptive amount of noise when in operation.”). The ’449 patent further explains that the diffusion unit must be constructed to withstand compressed air at operative pressures ranging from about 5 to 50 psig, reflecting an operating regime far removed from Sevy’s compact, low-pressure diffuser. Ex. 1001, 3:42–47.

Because Sevy’s device is designed for low-pressure operation in small, personal spaces, it does not encounter—and therefore does not attempt to address—the technical challenges inherent in high-pressure, large-space fluid dispersion systems, including maintaining effective dispersion at scale under substantially different operating conditions. As a result, a person of ordinary skill in the art would not look to Sevy for guidance in designing a system like that claimed in the ’449 patent, which is subject to a distinct set of constraints, performance requirements, and design objectives.

Accordingly, Sevy is not only deficient with respect to the specific claim limitations at issue, but also non-analogous in principle and purpose. The invention of the ’449 patent and Sevy are directed to different operating environments, different performance regimes, and different technical problems, which further underscores why Sevy cannot serve as a proper primary reference for the claims under review.

f. Claims 4 and 8-10

Claims 4 and 8–10 depend, directly or indirectly, from independent claims 1 and 7. Because Petitioner has failed to establish the unpatentability of the independent claims from which these claims depend, the dependent claims necessarily stand as well. *See* IPR2015-00592, 2016 Pat. App. LEXIS 13343, at *38 (finding that where a petitioner has not shown, by a preponderance of the evidence, that an independent claim is unpatentable, the claims that depend on it likewise cannot be shown to be unpatentable). In any event, Petitioner’s challenge also fails on the merits as to each dependent claim.

g. Claim 8: Formation of the Fluid Dispersion in the Mixing Chamber

Claim 8 of the ’449 patent expressly adds the limitation that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Ex. 1001, 16:16-21. This limitation imposes a requirement that is absent from claim 7 and confirms that the claims are directed to different structural and operational configurations. Under well-settled principles of claim differentiation, claim 8 cannot be satisfied by structures or operations that merely permit fluid flow through a restriction or opening. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005).

As explained above, Sevy expressly teaches that atomized droplets exiting orifice 118 impact wall 121, where droplet breakup, agglomeration, and separation

occur. Ex. 1009, ¶¶ 0014, 0082. Larger droplets strike the wall and coalesce or drip back toward the reservoir, while smaller droplets are later entrained in airflow downstream. *Id.* Thus, under Sevy’s own disclosure, any fluid dispersion is formed **after** droplet impact with wall 121—not within orifice 118, which Petitioner identifies as the “mixing chamber.”

Petitioner’s expert confirms that “larger droplets will be separated . . . from smaller droplets . . . [after the] larger droplets [impact] the wall[, which] produce smaller droplets[.]” and “under the influence of gravity, some larger droplets will fall out of the dispersion[.]” events which “will happen in chamber 120.” Ex. 2001, Pages 11-12. In other words, even under Petitioner’s expert’s account, droplet breakup, separation, and entrainment occur **downstream of orifice 118, after impact with the wall 121 of chamber 120—not within the orifice itself**. This testimony confirms that orifice 118 does not function as a mixing chamber in which compressed air and operative fluid interact in the manner contemplated by the ’449 patent, but instead serves merely as a restriction preceding downstream droplet processing. Therefore, Sevy does not disclose—either expressly or inherently—that compressed air and operative fluid mix together in a mixing chamber to form a fluid dispersion, as required by claim 8 of the ’449 patent.

Petitioner’s reliance on re-labeled diagrams and functional inference cannot supply this missing limitation. A prior art reference does not disclose a claim

limitation merely because it could be modified or re-imagined to do so. See *In re Chudik*, 851 F.3d 1365, 1372 (Fed. Cir. 2017).

h. Claims 4 and 9-10

Claims 4 and 9–10 add further limitations that depend from claims 1, 7, and 8. Because Sevy fails to disclose the “mixing chamber” limitations of claims 1 and 7, and further fails to disclose formation of the “fluid dispersion” in the “mixing chamber” as required by claim 8, it necessarily fails to disclose the additional limitations of claims 4 and 9–10, which are predicated on those same deficiencies.

Petitioner does not identify any disclosure in Sevy that cures these foundational defects, nor does it explain how a POSITA would modify Sevy to arrive at the claimed invention without impermissible hindsight. As such, Petitioner has failed to meet its burden to show that claims 4 and 8–10 are unpatentable under 35 U.S.C. § 103.

i. Conclusion

Ground 1 should be rejected in the Final Written Decision, as Petitioner has not met its burden to show that claims 1, 4, and 7-10 are unpatentable under 35 U.S.C. § 103. Sevy does not disclose a structure that a POSITA would recognize as a “mixing chamber,” and because Sevy expressly teaches that fluid dispersion is formed downstream of the structure Petitioner identifies, Sevy fails to disclose or render obvious the “mixing chamber” limitations of independent claims 1 and 7 of

the '449 patent. These deficiencies are fatal to Ground 1 and cannot be cured by *post hoc* labeling, functional inference, or hindsight reconstruction.

VII. GROUND 2
(Claims 1, 4, and 7-10 – Sevy in view of Gao)

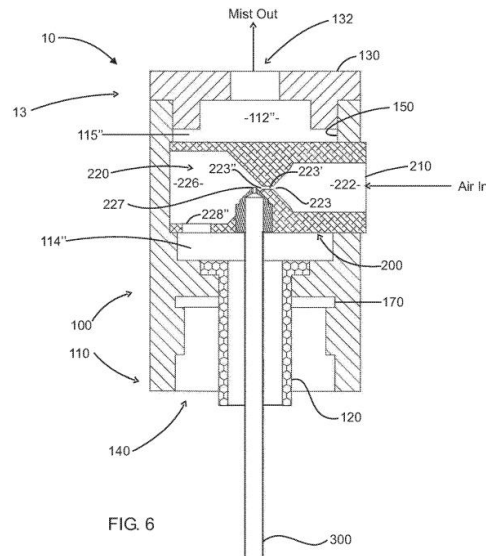
Although the Board instituted review on Ground 2, Petitioner has not met its ultimate burden to prove that claims 1 and 4 are unpatentable under 35 U.S.C. § 103 by a preponderance of the evidence, supported by substantial evidence. The Board's institution decision reflects a preliminary acceptance of Petitioner's description of Sevy and Gao, relying on Gao for the "fluid dispersion" limitation and on Sevy for the remaining structural elements. Paper 9, Page 20. However, ultimately, Petitioner has not shown that the proposed combination would result in the claimed fluid dispersion being formed in the manner and given the specific structural limitations as required by the claims.

a. The Combination Fails to Satisfy the "Fluid Dispersion" Limitation as Claimed and the Structure of the "Mixing Chamber" as Claimed.

Independent claim 1 of the '449 Patent requires that "the compressed air and the operative fluid mix together ***in said mixing chamber to form the fluid dispersion.***" As the Board recognized, Petitioner does not contend that Sevy alone satisfies this requirement. Paper 9, Pages 20–21. Instead, Petitioner relies on Gao's teachings regarding droplet size and uniformity to argue that Sevy's atomizer could

be modified to produce a “substantially uniform” fluid dispersion. Paper 1, Pages 38–42.

As such, the continued deficiency is that Gao’s teachings do not cure Sevy’s failure to form the claimed fluid dispersion *within the mixing chamber prior* to discharge, either considering Gao alone or considering Sevy in combination therewith, as required by the claim. Along these lines, the Board recognized that the stipulated construction of the term “fluid dispersion” to mean a mixture of an operative fluid in air comprising a plurality of substantially uniform droplets. Paper 9, Pages 15-16. As shown in Figure 6 of the ‘449 Patent, the mixing chamber (reference numeral 226) is a chamber where the fluid dispersion is formed:

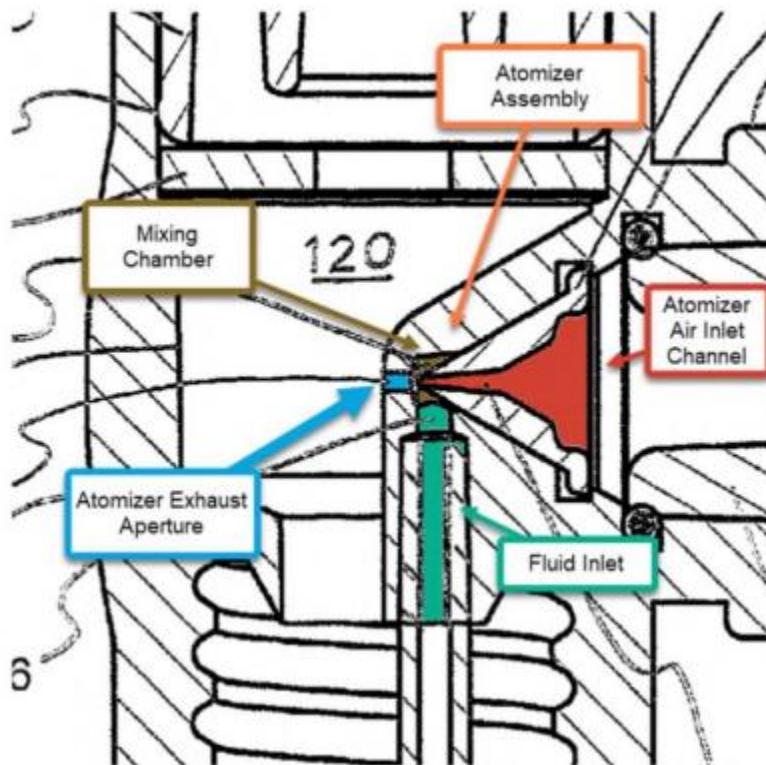


As can be seen, the mixing chamber is part of the atomizer assembly, as claimed. Ex. 1001, Figure 6. Neither Sevy nor Gao, individually or in combination of each other, suggest or disclose the mixing chamber as described by the disclosure

of the '449 patent (*i.e.* a mixing chamber beginning at the atomizer air inlet channel and increasing in dimension as compressed air flows past the fluid inlet), nor the mixing chamber's function in creating the fluid dispersion, as is also described in the patent. Ex. 1001, Col. 10, Lines 58-62 ("More importantly, the 'predetermined amount' of compressed air and the 'preselected amount' of the operable fluid are initially mixed together in the mixing chamber 226 to form a fluid dispersion.").

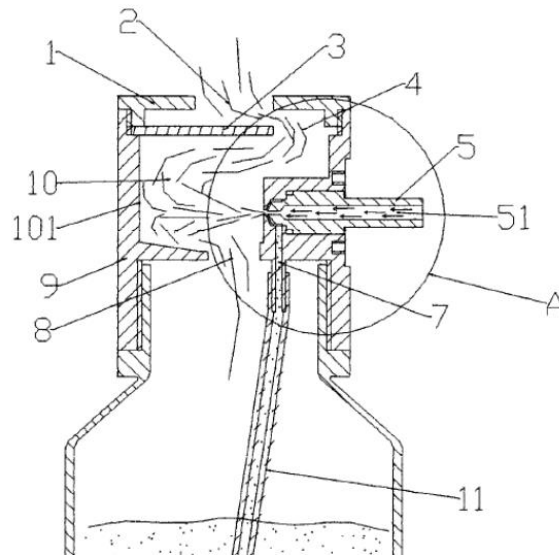
Rather, Sevy expressly discloses a heterogeneous spray that requires downstream correction. Sevy explains that droplets of excessive size are separated ***after formation***, either by striking internal surfaces or by being recaptured via a separator plate. Ex. 1009 ¶¶ 69, 74. That architecture is fundamentally inconsistent with the claimed requirement that the fluid dispersion (*i.e.* a mixture of an operative fluid in air comprising a plurality of substantially uniform droplets) be formed by mixing ***within the mixing chamber itself***, rather than being conditioned downstream through selective removal of nonconforming droplets.

As the Board pointed out and given the 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):



Paper 9, Page 22.

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." Ex-1013, ¶ 25.



Ex. 2004.

Further to this point, Patent owner contends that the design of Gao would not, result in a fluid dispersion ***at all***, as defined by the stipulated definition of the Parties. Rather, Gao's fluid mixed with air would strike the wall 101 and coalesce. Ex. 2002, ¶¶ 24-25. Further, as the fluid flows around the reference numeral 3, the flow of the fluid would have increased turbulence and sound magnitude as a result of continued coalescence. *Id.* As a result, ultimately, Gao could not obtain a fluid dispersion as the particle sizes of the atomization would be nonuniform. *Id.*

Ultimately, the two references do not disclose or suggest that a substantially uniform fluid dispersion is formed in the mixing chamber as required by Claim 1. As such, the analogized atomizer assemblies of Sevy and Gao do not produce a substantially uniform dispersion at the point of mixing.

Thus, even under the combined teachings, Petitioner has not shown that the air and operative fluid mix together in the mixing chamber to form the claimed fluid dispersion, as required by claim 1.

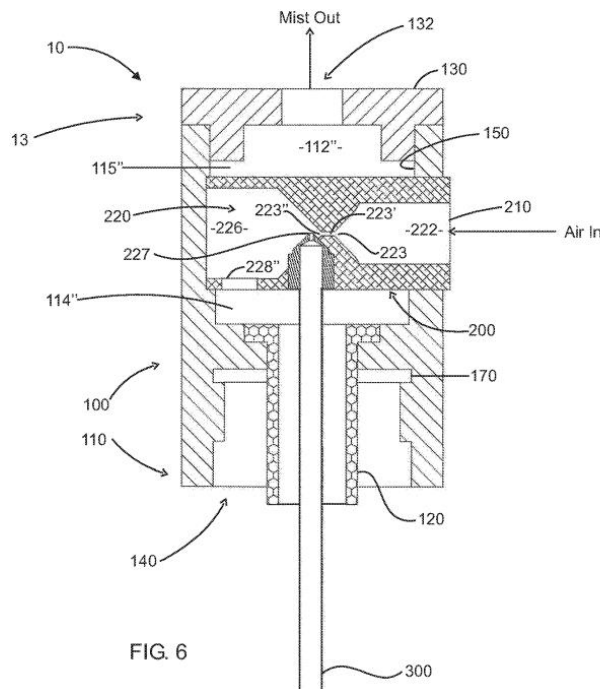
b. Claim 4

As claim 4 depends on claim 1 and because Petitioner fails to establish unpatentability of claim 1 under Ground 2, the dependent claim cannot be shown to be unpatentable under the theory that Sevy and Gao renders them obvious. IPR2015-00592, Paper 72, 2016 Pat. App. LEXIS 13343, at *38 (finding that where a petitioner has not shown, by a preponderance of the evidence, that an independent claim is unpatentable, the claims that depend on it likewise cannot be shown to be unpatentable).

c. Gao Does Not Disclose the Mixing Chamber of Claim 7.

As an initial point, the section relating to Ground 1 and why Sevy does not disclose the mixing chamber of Claim 7 is incorporated herein. To that end, the independent claim 7 of the '449 patent recites a “mixing chamber,” but, unlike claim 1, does not require that the “compressed air and the operative fluid mix together in [the] mixing chamber to form the fluid dispersion.” Ex. 1001, 15:23-45, 66-67 – 16:1-14. Accordingly, the question for claim 7 is not where dispersion ultimately forms, but whether Gao discloses a structure that can be recognized as a “mixing chamber” in the context of fluid dispersion systems.

The '449 patent describes the “mixing chamber” (i.e., reference numeral 226) as a discrete volumetric region within the atomizer assembly that receives compressed air and operative fluid and permits controlled interaction between them prior to downstream processing, as seen below. See Ex. 1001, Fig. 6. A “mixing chamber,” as understood in this art, is not a mere opening or constriction, but a spatial region that allows interaction, pressure equalization, and flow development.



Gao’s atomizing cavity 6 does not meet that description. As shown in Gao, the atomizing cavity 6 is a narrow, sharp-edged opening that functions as a flow restriction. It lacks internal volume, residence time, or spatial extent, and thus cannot reasonably be characterized as a “chamber.” A person of ordinary skill in the art would understand the cavity 6 to be a nozzle or restriction; not a mixing chamber.

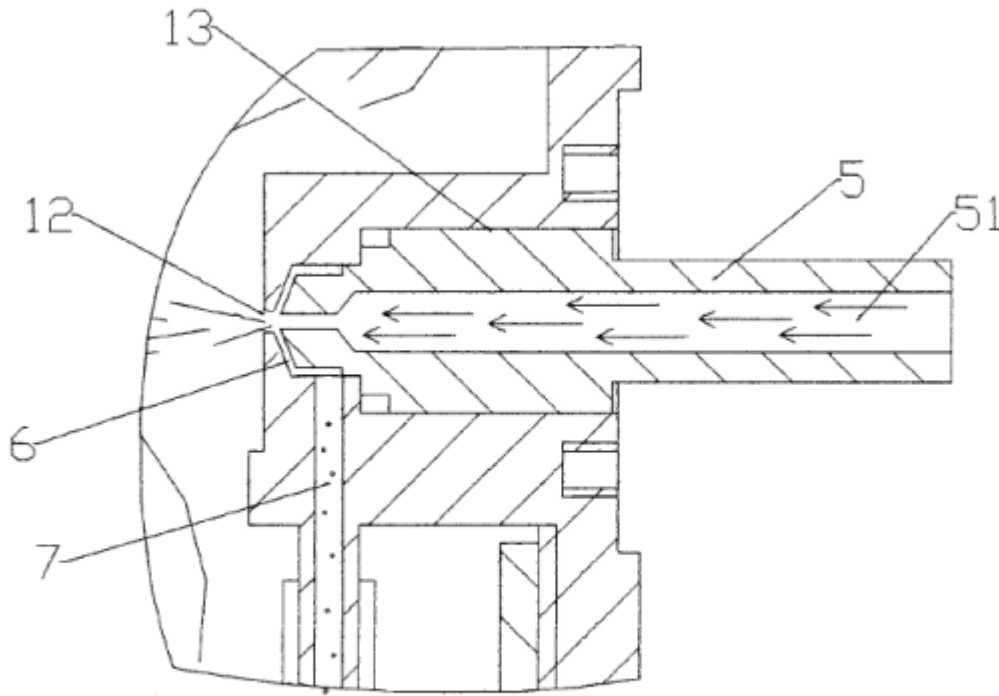


FIG. 2

From a fluid-dynamics perspective, inserting a sharp-edged orifice into a flow path primarily accelerates flow, increases turbulence, and causes a pressure drop. Nothing in Gao suggests that the atomizing cavity 6 was designed or intended to function as a chamber such as that disclosed in the '449 Patent and in claim 7. Rather, it is just an area for fluid to be ejected from, to be mixed after ejection, similar to Sevy. Accordingly, even without considering where or how a fluid dispersion forms, Gao fails to disclose the “mixing chamber” of claim 7.

d. Claims 4 and 8-10

Claims 4 and 8–10 depend, directly or indirectly, from independent claims 1 and 7. Because Petitioner has failed to establish the unpatentability of the independent claims from which these claims depend, the dependent claims necessarily stand as well. *See* IPR2015-00592, 2016 Pat. App. LEXIS 13343, at *38 (finding that where a petitioner has not shown, by a preponderance of the evidence, that an independent claim is unpatentable, the claims that depend on it likewise cannot be shown to be unpatentable).

e. Claim 8: Formation of the Fluid Dispersion in the Mixing Chamber

Claim 8 of the '449 patent expressly adds the limitation that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Ex. 1001, 16:16-21. This limitation imposes a requirement that is absent from claim 7, but is present within Claim 1. Accordingly, for the same reasons described in Claim 1 related to Gao and Sevy, Gao and Sevy cannot render the dependent claim patent as obvious.

VIII. GROUND 3
(Claims 1, 4, and 7-10 Goubet)

Petitioner’s Ground 3 fails to demonstrate Claims 1, 4, and 7-10 are unpatentable under 35 U.S.C. § 103 because Goubet does not disclose or suggest an apparatus capable of creating a “fluid dispersion” as defined in the specification of

the ‘449 Patent and required by all claims therein. Specifically, a POSITA would appreciate that the circular shape of the baffle formed by enclosures 12 and 13 and passage 14 necessitates that the droplets undergo multiple twists and turns, which would cause the droplets to remain in close contact and eventually coalesce into larger droplets. Ex. 2002, ¶ 26. Additionally, fine atomization of a liquid to create the uniform microdroplets required for a “fluid dispersion” is time-dependent; the relatively short time spent traversing the baffle of Goubet would result in a non-uniform spray. Ex. 2002, ¶ 26. Petitioner’s assertions to the contrary are based on the testimony of their expert who has not conducted any testing or analysis of any embodiment of Goubet and should not be permitted to carry Petitioner’s burden. Ex. 1002,

Ground 3 should be rejected in the Final Written Decision, as Petitioner has not met its burden to show that Claims 1, 4, and 7-10 are unpatentable under 35 U.S.C. § 103. Goubet does not disclose or suggest a diffusion assembly capable of creating a “fluid dispersion” as required by each Claim of the ‘449 Patent. The deficiency in Petitioner’s argument compels a finding in Patent Owner’s favor.

IX. GROUND 4
(Claims 1, 4, and 7-10 – Goubet in View of Kaiser)

Petitioner’s Ground 4 fails to demonstrate Claims 1, 4, and 7-10 are unpatentable under 35 U.S.C. § 103 for at least two independent reasons. First,

Petitioner does not establish that Goubet renders the ‘449 Patent obvious, as described above. Second, Petitioner has not met its burden to show that Kaiser is analogous art, nor that a POSITA would have been motivated to combine Kaiser with Goubet. Along these lines, the Board itself recognized at institution that the record is insufficient on Kaiser being analogous art and if there was a motivation-to-combine Goubet and Kaiser. Paper 9, Page 34.

a. Kaiser Is Not Analogous Art

The Board expressly noted at institution that “the record on the analogous art issue is incomplete” and that there is 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.” Paper 9, Page 32. Ultimately, Petitioner bears the burden to prove unpatentability by a preponderance of the evidence, supported by substantial evidence. 35 U.S.C. § 316(e).

Along these lines, Petitioner is unable to effectively address the issue that Kaiser is analogous art because Kaiser is so patently distinct from the ‘449 Patent. Indeed, in the case cited by the Board, *Sanofi-Aventis*, the Federal Circuit reasons that the petitioner must establish, with substantial evidence, that ***each relied-upon reference is analogous to the challenged patent***. See *Sanofi-Aventis Deutschland GmbH v. Mylan Pharms. Inc.*, 66 F.4th 1373, 1379-80 (emphasis added). It is insufficient to argue that a reference is analogous only to another prior art reference

in the asserted combination, because obviousness must be assessed from the perspective of the claimed invention, not from a daisy-chain of prior art analogies. *See id.*

As such, here, Petitioner offers no evidence that Kaiser is analogous to the ‘449 Patent. Rather, Petitioner provides testimony of Dr. White, who only attempts to describe *how* a POSITA may combine Goubet and Kaiser to achieve the novel effects produced by the ‘449 Patent as claimed, not *why* one might consider the references in light of, or their analogousness to, the ‘449 Patent. Paper 1002, ¶¶ 246-257. Accordingly, Dr. White, nor Petitioner describes why or how Kaiser is analogous to the challenged patent.

Along these lines, Petitioner cannot show that Kaiser is analogous to the challenged patent. Rather, Kaiser is directed to electrospray injection and combustion in mesoscale power-generation systems, using high-voltage electric fields to generate charged fuel droplets for controlled combustion in catalytic micro-combustors. Paper 1014 at 42–44. Its objective is efficient fuel burning, emissions reduction, and thermal efficiency in power systems, not scent dispersion, consumer appliances, or acoustic attenuation.

More specifically, as Dr. Micklow explains, Kaiser operates in a fundamentally different atomization regime from the fluid-flow-driven mechanisms of the ‘449 Patent, one based on electrosprays, in which charged droplets are formed

from capillaries and dispersed through Coulombic repulsion. Ex. 2002, ¶¶ 27-32. As such, the droplets in Kaiser are generated from a semi-conducting liquid, not from an operative fluid as described and claimed in the '449 Patent. *Id.* In Kaiser, droplets are formed and electrically charged via a capillary tube under a high potential relative to a nearby ground electrode, rather than introduced as an uncharged fluid into a mixing chamber as taught in the '449 Patent. *Id.*

Further, dispersion in Kaiser occurs through Coulombic repulsion (an electrostatic force) of charged droplets, not through a gas-flow and liquid-particle interaction as found in the '449 Patent. *Id.* Accordingly, the atomization in Kaiser is electrostatic and entirely decoupled from gas-flow processes, making the underlying physical mechanisms markedly different from the fluid-flow-based atomization of the '449 Patent. *Id.* For these reasons, a POSITA would not look to an electrostatic atomizer such as Kaiser when considering the teachings of the '449 Patent, as such a POSITA would generally lack coursework or practical experience with this type of electrostatic system in the context of the claimed technology. *Id.*

Therefore, the above demonstrates that Kaiser is of a different field of endeavor than that of the '449 patent as claimed as not reasonably pertinent to the problem faced by the inventor. *See generally Virtek Vision Int'l ULC v. Assembly Guidance Sys. Inc.*, 97 F.4th 882, 886-87 (Fed. Cir. 2024) (describing that a reference is analogous art only if it is (1) from the same field of endeavor, or (2)

reasonably pertinent to the problem faced by the inventor). As a result, Kaiser should not be considered prior art, nor should it be combinable with any reference to qualify as prior art.

b. Petitioner Fails to Articulate a Legally Sufficient Motivation to Combine.

Even if Kaiser were analogous art (which it is not), Petitioner still fails to provide a substantial reasoned explanation for why a POSITA would combine the references in the manner proposed. Ultimately, it is not enough that two systems were merely “known” to combine them for purposes of evaluating obviousness; there must be a reason a skilled artisan would have made the specific substitution or combination. *Id.*

The Board noted at institution that it reached “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.” Paper 9, Page 35. Indeed, Petitioner’s asserted motivation boils down to the conclusory statement that given Goubet and Kaiser, “it was well known in the field at the time of the invention that droplets of greater uniformity result in uniform droplet evaporation.” Paper 1, Page 59. That is precisely the kind of generic, outcome-driven rationale rejected by the Federal Circuit. *See Palo Alto Networks, Inc. v. Centripetal Networks, LLC*, 122

F.4th 1378, 1384–86 (Fed. Cir. 2024) (legal error to rely on isolated disclosures without articulating a concrete rationale for integration).

The testimony of Dr. White is equally void of a sufficient showing that a POSITA would have combined Goubet and Kaiser. Paper 1002, ¶¶ 246-257. Rather, Dr. White merely describes the ability to achieve the effect as in the claimed patent, not why a POSITA would look to the field of electrospray injection and combustion in mesoscale power-generation systems, using high-voltage electric fields to generate charged fuel droplets for controlled combustion in catalytic micro-combustors when considering atomization for scents. *Id.*

The fact of the matter is that a POSITA would not look to an electrostatic atomizer such as Kaiser when considering the ‘449 Patent, as such a POSITA would generally lack coursework or practical experience with this type of electrostatic system in the context of the claimed technology. Ex. 2002, ¶¶ 27-32.

c. Claims 4, 8-10

As claim 4 depends on claim 1 and claims 8-10 depend from claim 7 and because Petitioner fails to establish unpatentability of claims 1 and 7 under Ground 4, the dependent claims cannot be shown to be unpatentable under the theory that Goubet and Kaiser renders them obvious. IPR2015-00592, Paper 72, 2016 Pat. App. LEXIS 13343, at *38 (finding that where a petitioner has not shown, by a

preponderance of the evidence, that an independent claim is unpatentable, the claims that depend on it likewise cannot be shown to be unpatentable).

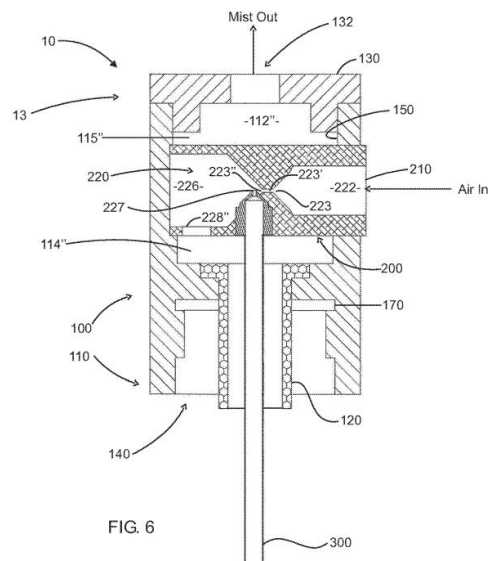
d. Conclusion

Ground 4 should be rejected in the Final Written Decision. Petitioner has not met its burden to show that claims 1, 4, and 7-10 are unpatentable under § 103. Goubet does not render the patent obvious; Kaiser is non-analogous art; and Petitioner has failed to articulate a legally sufficient motivation to combine. The deficiencies identified by the Board at institution persist and compel a finding in Patent Owner's favor that Claims 1, 4, and 7-10 are not obvious in light of the references presented.

X. GROUND 5
(Claims 1, 4, and 7-10 – Gao)

Although the Board instituted review on Ground 5, Petitioner has not met, and cannot meet, its burden to prove anticipation by Gao under 35 U.S.C. § 102. Anticipation requires that each and every element of the challenged claims be disclosed in a single reference, arranged as in the claim. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). Gao does not satisfy this exacting standard, as Gao does not disclose nor inherently describe a “mixing chamber to form [a] fluid dispersion as claimed.” Ex. 1001, Claim 1.

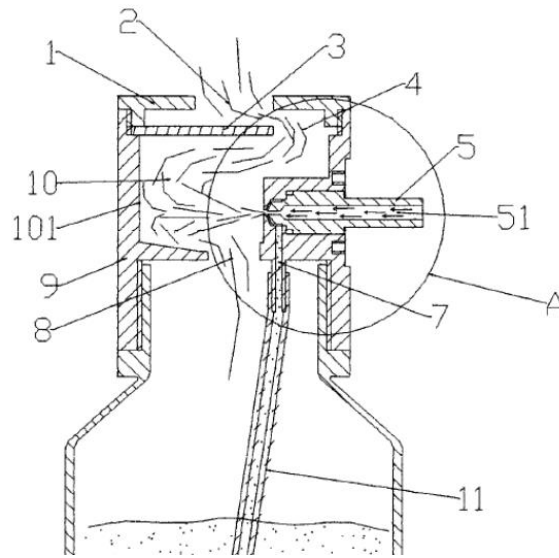
Indeed, independent claim 1 of the '449 Patent requires that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Gao does not disclose nor inherently describe formation of the claimed fluid dispersion (which has been stipulated by the parties to mean “a mixture of an operative fluid in air comprising a plurality of substantially uniform droplets”), as Gao does not teach forming the claimed fluid dispersion ***within the mixing chamber prior*** to discharge. As shown in Figure 6 of the '449 Patent, the mixing chamber (reference numeral 226) is a chamber where the fluid dispersion is formed:



As can be seen, the mixing chamber is part of the atomizer assembly, as claimed.

Ex. 1001, Figure 6.

Gao, at best, produces what might be described as an atomization via ejecting high speed gas through a gas flow port, which hits an inner wall of a cavity such that liquid is atomized into micro sized fine particles. See Ex-1013, ¶ 25.



Ex. 2004.

Further to this point, Patent owner contends that the design of Gao would not, result in a fluid dispersion ***at all***, as defined by the stipulated definition of the Parties. Rather, Gao's fluid mixed with air would strike the wall 101 and coalesce. Ex. 2002, ¶¶ 24-25. Further, as the fluid flows around the reference numeral 3, the flow of the fluid would have increased turbulence and sound magnitude as a result of continued coalescence. Ex. 2002, ¶¶ 24-25. As a result, ultimately, Gao could not obtain a fluid dispersion as the particle sizes of the atomization would be nonuniform. Ex. 2002, ¶¶ 24-25.

Ultimately, Gao cannot teach nor inherently describe a substantially uniform fluid dispersion is formed in the mixing chamber as required by Claim 1. Therefore, Petitioner has not shown, and cannot show that Claim 1 should be rendered unpatentable under 35 U.S.C. § 102.

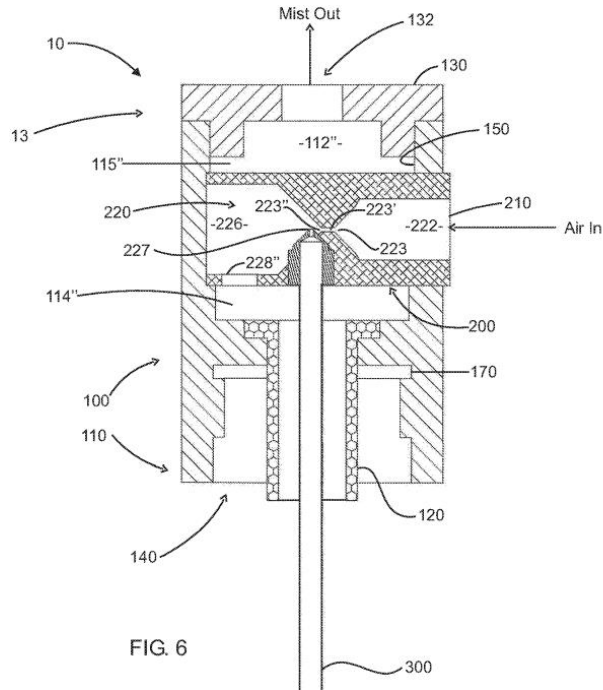
a. Claim 4

As claim 4 depends on claim 1 and because Petitioner fails to establish unpatentability of claim 1 under Ground 5, the dependent claim cannot be shown to be unpatentable under the theory that Gao anticipates it. IPR2015-00592, Paper 72, 2016 Pat. App. LEXIS 13343, at *38 (finding that where a petitioner has not shown, by a preponderance of the evidence, that an independent claim is unpatentable, the claims that depend on it likewise cannot be shown to be unpatentable).

b. Gao Does Not Disclose the Mixing Chamber of Claim 7

Further, Independent claim 7 of the '449 patent recites a “mixing chamber,” but, unlike claim 1, does not require that the “compressed air and the operative fluid mix together in [the] mixing chamber to form the fluid dispersion.” Ex. 1001, 15:23-45, 66-67 – 16:1-14. Accordingly, the question for claim 7 is not where dispersion ultimately forms, but whether Gao discloses a structure that can be recognized as a “mixing chamber” in the context of fluid dispersion systems.

The '449 patent describes the “mixing chamber” (i.e., reference numeral 226) as a discrete volumetric region within the atomizer assembly that receives compressed air and operative fluid and permits controlled interaction between them prior to downstream processing, as seen below. See Ex. 1001, Fig. 6. A “mixing chamber,” as understood in this art, is not a mere opening or constriction, but a spatial region that allows interaction, pressure equalization, and flow development.



Gao's atomizing cavity 6 does not meet that description. As shown in Gao, the atomizing cavity 6 is a narrow, sharp-edged opening that functions as a flow restriction. It lacks internal volume, residence time, or spatial extent, and thus cannot reasonably be characterized as a "chamber." A person of ordinary skill in the art would understand the cavity 6 to be a nozzle or restriction; not a mixing chamber.

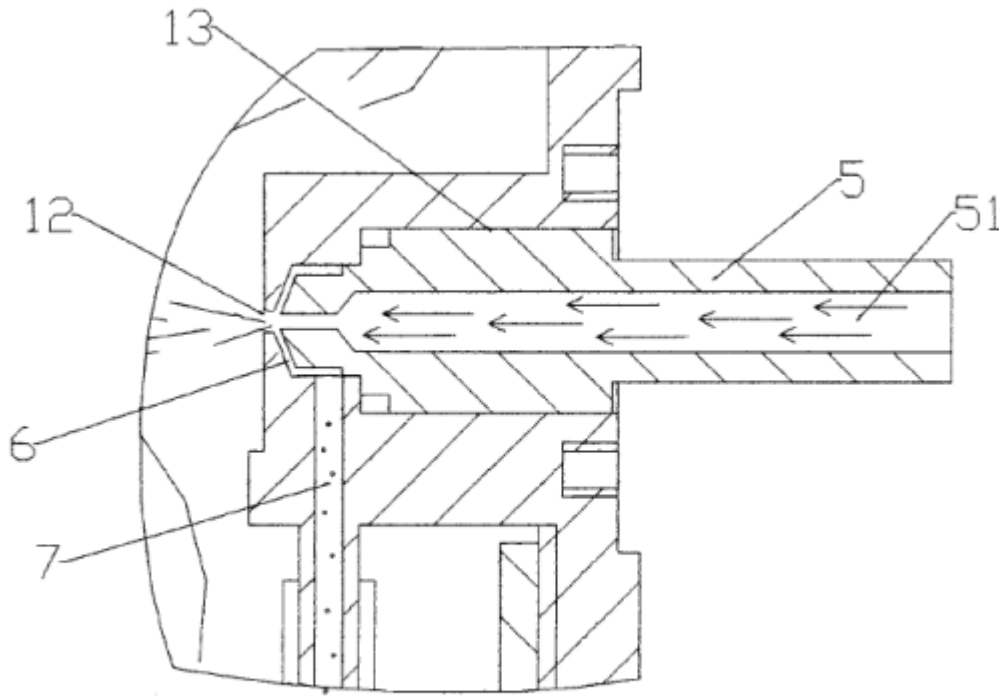


FIG. 2

From a fluid-dynamics perspective, inserting a sharp-edged orifice into a flow path primarily accelerates flow, increases turbulence, and causes a pressure drop. Nothing in Gao suggests that the atomizing cavity 6 was designed or intended to function as a chamber such as that disclosed in the '449 Patent and in claim 7. Rather, it is just an area for fluid to be ejected from, to be mixed after ejection. Accordingly, even without considering where or how a fluid dispersion forms, Goa fails to disclose the “mixing chamber” of claim 7.

c. Claims 4 and 8-10

Claims 4 and 8–10 depend, directly or indirectly, from independent claims 1 and 7. Because Petitioner has failed to establish the unpatentability of the independent claims from which these claims depend, the dependent claims necessarily stand as well. *See* IPR2015-00592, 2016 Pat. App. LEXIS 13343, at *38 (finding that where a petitioner has not shown, by a preponderance of the evidence, that an independent claim is unpatentable, the claims that depend on it likewise cannot be shown to be unpatentable).

d. Claim 8: Formation of the Fluid Dispersion in the Mixing Chamber

Claim 8 of the '449 patent expressly adds the limitation that “the compressed air and the operative fluid mix together in said mixing chamber to form the fluid dispersion.” Ex. 1001, 16:16-21. This limitation imposes a requirement that is absent from claim 7, but is present within Claim 1. Accordingly for the same reasons described in Claim 1 related to Gao, Gao cannot render the dependent claim patent as anticipated.

XI. CONCLUSION

For the foregoing reasons, the evidentiary record confirms that Petitioner has not met, and cannot meet, its burden under 35 U.S.C. § 316(e) to prove the unpatentability of claims 7–9 and 11 by a preponderance of the evidence. Petitioner’s case rests on legally impermissible labelling of prior art, unsupported

technical assumptions, and assertions that find no footing in the prior art or in reliable expert analysis. By contrast, Patent Owner has demonstrated that the asserted references neither disclose nor suggest the full scope of the challenged claims, and that Petitioner's theories fail both as a matter of law and as a matter of fact. Accordingly, Patent Owner respectfully asks the Board enter a Final Written Decision confirming the patentability of claims 7–9 and 11 of the '449 Patent and denying all grounds of unpatentability.

Dated: January 15, 2026

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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 Response (the "POR") contains **7607** words, excluding the parts of the POR exempted by 37 C.F.R. § 42.24(a)(1), 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 Response (the "POR") has been served in its entirety on January 15, 2026, by causing the POR and accompany documents (if any) to be electronically mailed to the following attorneys of record for the Petitioner:

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