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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* BRIAN T. HAZEL, JESSICA L. SERRA, and XUAN LIU

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Appeal 2018–008580  
Application 14/993,582  
Technology Center 1700

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Before KAREN M. HASTINGS, CHRISTOPHER C. KENNEDY, and  
DEBRA L. DENNETT, *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>2</sup> appeals from the Examiner’s decision to reject claims 1, 2, 4–6, 9, 12–14, and 16–23 of Application 14/993,582. *See* Final Office Action (mailed December 7, 2017 (“Final Act.”)) 1. An oral hearing was held on November 1, 2019. We have jurisdiction under 35 U.S.C. § 6.

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<sup>1</sup> In our Decision, we refer to Specification filed January 12, 2016 (“Spec.”) of Application 14/999,582 (“the ’582 App.”); the Final Office Action dated October 3, 2017 (“Final Act.”); the Appeal Brief filed April 12, 2018 (“Appeal Br.”); and the Examiner’s Answer dated June 29, 2018 (“Ans.”); and the Reply Brief filed August 29, 2018 (“Reply Br.”).

<sup>2</sup> We use the word “Appellant” to refer to “Applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies United Technologies Corporation as the real party in interest. Appeal Br. 2.

For the reasons set forth below, we AFFIRM.

## BACKGROUND

The '582 Application relates to liquid feedstock suspension and solution plasma spray guns. Spec. ¶1. According to the Specification, suspension plasma spray (“SPS”) is a form of plasma spray wherein a particulate suspended in a carrier liquid is delivered to the plasma spray gun, and solution plasma spray involved delivery of a solution to the plasma spray gun. *Id.* ¶ 2. Both methods are considered liquid feedstock methods, as distinguished from methods wherein powder is fed directly into a gun to interact with plasma and residual carrier gas or from non-powder systems. *Id.* The plasma spray guns, apparatus, and methods of the claims comprise a plurality of liquid feedstock outlets. Appeal Br. 21–24 (Claims App.).

Claims 1 and 21 are representative of the '582 Application's claims and are reproduced below from the Claims Appendix of the Appeal Brief.

1. A plasma spray gun comprising:
  - a plasma outlet having an axis; and
  - a plurality of liquid feedstock outlets having a non-uniform distribution about said axis.
  
21. A plasma spray method using a plasma spray gun, the method comprising:
  - discharging a plasma from a plasma outlet; and
  - discharging a pair of liquid feedstock streams from a pair of liquid feedstock outlets, the liquid feedstock streams being drawn from a single liquid feedstock source and having a non-uniform distribution about an axis of the plasma.

Appeal Br. 21, 24 (indentation added).

## REFERENCES

The Examiner relies on the following prior art in rejecting the claims on appeal:

<b>Name</b>	<b>Reference</b>	<b>Date</b>
Vogts et al. (“Vogts”)	US 3,949,266	Apr. 6, 1976
Gupta et al. (“Gupta”)	US 4,198,442	Apr. 15, 1980
Coffee et al. (“Coffee”)	US 4,553,702	Nov. 19, 1985
Correll et al. (“Correll”)	US 2004/0230008 A1	Nov. 18, 2004
Mack et al. (“Mack”)	US 2009/0110904 A1	Apr. 30, 2009
Hazel et al. (“Hazel”)	US 2013/0224453 A1	Aug. 29, 2013
Cotler et al. (“Cotler”)	US 2013/0270355 A1	Oct. 17, 2013
VanEvery	US 2015/0086725 A1	Mar. 26, 2015

Stöver et al., *New Material Concepts for the Next Generation of Plasma-Sprayed Thermal Barrier Coatings*, J. Thermal Spray Tech., Vol. 13(1), 76–83 (2004) (hereinafter “Stöver”).

Kassner et al., *Application of Suspension Plasma Spraying (SPS) for Manufacture of Ceramic Coatings*, J. Thermal Spray Tech., Vol. 17(1), 115–123 (2008) (hereinafter “Kassner”).

## REJECTIONS

On appeal, the Examiner maintains the following rejections under 35 U.S.C. § 103(a):<sup>3</sup>

1. Claims 1, 2, 4, 17, and 20 over Kassner (Final Act. 4–6);

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<sup>3</sup> Because this application was filed before the March 16, 2013, effective date of the America Invents Act, we refer to the pre-AIA version of the statute.

2. Claims 5, 6, 9, and 12–14 over Kassner in view of Stöver, as evidenced by Correll (*id.* at 6–8);
3. Claim 16 over Kassner in view of Cotler and Vogts (*id.* at 8–9);
4. Claims 18 and 19 over Kassner in view Stöver, further in view of Mack, and for claim 18, as evidenced by Gupta (*id.* at 9–11);
5. Claim 16 over Kassner in view of Hazel (*id.* at 11–12);
6. Claims 18–20 over Kassner in view of Hazel and VanEvery (*id.* at 12–13);
7. Claims 21 and 22 over Kassner in view of Hazel and VanEvery, further in view of Coffey (*id.* at 13–16); and
8. Claim 23 over Kassner in view of Hazel, further in view of VanEvery and Coffee (*id.* at 16–18).

## DISCUSSION

### *Ground 1: Rejection of claims 1, 2, 4, 17, and 20 as obvious over Kassner*

The Examiner determines that claims 1, 2, 4, 17, and 20 would have been obvious over Kassner. Final Act. 4–6. Appellant argues the claims as a group. Appeal Br. 7–14. We select claim 1 as representative. Claims 2, 4, 17, and 20 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Regarding claim 1, the Examiner finds that Kassner discloses a plasma spray gun comprising a plasma outlet having an axis and a plurality of liquid feedstock outlets. Final Act. 4. The Examiner finds that Kassner teaches two feedstock injectors used at an angle of 120 degrees that give a

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non-uniform distribution about the plasma axis of the two outlets. *Id.* at 5 (citing Kassner, Fig. 5 and section 3.2.1); Ans. 6. In other words, Kassner describes using two outlets 120 degrees apart to feed a suspension in what would be an actual application, even if used for experimental purpose. Ans. 6.

The Examiner determines that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kassner to eliminate any outlets in addition to the two outlets because omission of an element and its function is obvious if the function of the element is not desired. Final Act. 5 (citing MPEP 2144.04(II)(A); *In re Larson*, 340 F.2d 965 (CCPA 1965); and *In re Kuhle*, 526 F.2d 553 (CCPA 1975)). The third, unused, outlet is an element whose presence and function may be omitted and obvious under current case law, according to the Examiner. Ans. 6–7, 12, and 13. Removal of the function of the outlet in Kassner would leave the device functioning properly because Kassner only uses two feedstock outlets. *Id.* at 13. Irrespective of other devices in the field, the operation of the device and process used in Kassner would not be altered negatively by the removal of an outlet. *Id.*

Appellant’s argument for patentability of claim 1 accuses the Examiner of engaging in hindsight reconstruction by imposing artificial constraints that ignore what a skilled artisan would do. *See* Appeal Br. 7, 8, 9, and 14. Appellant contends that Kassner discloses using spray guns with either three outlets or a single outlet. *Id.* at 8. Appellant explains that when Kassner discussed manufacturing solid oxygen fuel cells by injecting each of two suspensions separately (Kassner, Fig. 5), Kassner used two of the three

outlets of the spray gun for the separate injection of two suspensions; thus, three outlets were provided, even though only two were used. *Id.*

According to Appellant, the Examiner provides no support or reasoning, no teaching, suggestion, or motivation, for eliminating one of the three outlets in Kassner, such that two outlets remain in their original configuration of a 120 degree angle from each other (making them have a non-uniform distribution about the axis of the plasma outlet). *Id.* at 9, 10. Appellant argues that physically removing the (third) outlet rather than just not using it imposes costs with no offsetting benefit. *Id.* If redesigning the spray gun to have only two outlets, Appellant contends that the two outlets would be made diametrically opposite, as shown in Appellant’s illustration of a prior art device in Figure 2 of the ’582 Application. *Id.* Thus, Appellant urges, the Examiner’s proposed modification frustrates the purpose of Kassner in reusing an existing three-outlet gun for experimental purpose. *Id.*

Distinguishing *Larson* and *Kuhle*, Appellant argues that changing to asymmetric location of outlets is not akin to the mere capacity reduction as in *Larson*, and a function is not being removed as in *Kuhle*. *Id.* at 10. Instead, Appellant urges, the simpler alternative is to have just a diametrically opposed pair of outlets. *Id.*

Appellant does not show reversible error by the Examiner in rejecting claim 1 as obvious over Kassner.

We do not find persuasive Appellant’s arguments that we focus on “the art as a whole” and statements in the Specification, rather than on the specific prior art identified by the Examiner and the claims in issue. *See* Appeal Br. 10.

To render an invention obvious, the prior art does not have to address the same problem addressed by a patent applicant. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 419–20 (2007) (“In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.”). “One of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings.” *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1323, (Fed. Cir. 2005) (citing *In re Oetiker*, 977 F.2d 1443, 1448 (Fed. Cir. 1992); *see also KSR*, 550 U.S. at 418 (“[T]he [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”).

For purposes of § 103, a reference is prior art for all that it discloses. *Symbol Techs., Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1578 (Fed. Cir. 1991). A reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in the art would have reasonably been expected to draw therefrom. *In re Fritch*, 972 F.2d 1260, 1264–65 (Fed. Cir. 1992). The question under 35 U.S.C. § 103 is not merely what the references teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made. All disclosures of the prior art must be considered. *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976).

Kassner discloses a plasma spray gun comprising a plasma outlet having an axis and two liquid feedstock outlets 120 degrees apart. Kassner,

Fig. 5. Comparing Kassner’s disclosure with claim 1, we find that the claim encompasses the prior art.

The name of the game is the claim. *See In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998) (“The invention disclosed in Hiniker’s written description may be outstanding in its field, but the name of the game is the claim.”). Analysis of obviousness requires comparison of the properly construed claim to the available prior art. *Oakley, Inc. v. SunGloss Hut International*, 316 F.3d 1331, 1339 (Fed. Cir. 2003); *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) (“Only when a claim is properly understood can a determination be made . . . whether the prior art anticipates and/or renders obvious the claimed invention.”). During prosecution, claims are given their broadest reasonable scope consistent with the specification. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). The words used in a claim must be read in light of the specification, as it would have been interpreted by one of ordinary skill in the art at the time of the invention. *Id.*

Claim 1 contains the open transitional term “comprising,” which permits elements in addition to those specified to be included in the composition of the claim. *In re Crish*, 393 F.3d 1253, 1257 (Fed. Cir. 2004) (“[I]t is well-established that ‘[c]omprising is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim.”) (quoting *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997)). “Comprising” in claim 1 permits the presence of more than two liquid feedstock outlets in a plasma spray gun. *See id.* Claim 1 requires “a plurality” of liquid feedstock outlets to have a non-uniform distribution

about the axis of the plasma outlet. Appeal Br. 21 (Claims App.). In light of the “comprising” language, the claim does not require *all* feedstock outlets have a non-uniform distribution to each other, merely that a plurality of feedstock outlets do.

One of ordinary skill in the art at the time of the invention would have found it obvious to employ a plasma spray gun as shown in Kassner and either hook up only two feedstock outlets, or remove a feedstock outlet, either of which solution reads on claim 1 (the two feedstock outlets employed in Kassner constitute “a plurality”). Appellant’s contention that two feedstock outlets would have been made diametrically opposite because they were so positioned in other prior art does not overcome Kassner’s disclosure of two feedstock outlets 120 degrees apart. Nor does Appellant’s position that Kassner is merely experimental negate the teaching of the reference.

It is well settled that the omission of a feature disclosed by the prior art along with its attendant function or advantage as a matter of simplicity would have been obvious to one of ordinary skill in the art. *See In re Thompson*, 545 F.2d 1290, 1294 (CCPA 1976) (obvious to eliminate wax pretreatment and its function); *In re Kuhle*, 526 F.2d at 555 (deletion of switch member and its function was an obvious expedient); *In re Marzocchi*, 456 F.2d 790, 793 (CCPA 1972) (omission of paraffin and its function would not be an unobvious expedient); *In re Larson*, 340 F.2d at 969 (obvious to dispense with added cargo handling features of prior art); *In re Keegan*, 331 F.2d 315, 319 (CCPA 1964) (omission of suture holder and its function of guarding against accidental displacement was obvious); and *In re Porter*, 68 F.2d 971, 973 (CCPA 1934) (no invention where omission of an

element is attended by a corresponding omission of the function performed by that element). Appellant has not demonstrated any unexpected result or particular advantage to manufacturing or purchasing a two-outlet spray gun with diametrically opposite outlets; Appellant merely posits that it would have been more expensive to modify a three-outlet spray gun. *See* Appeal Br. 9. Appellant’s argument is based on presumption, not facts. *See id.*

Appellant’s contention that modifying a three-outlet spray gun would frustrate Kassner’s purpose is not convincing. *See id.* Appellant again posits that Kassner’s purpose is merely to reuse an existing three-outlet spray gun for an experiment. *See id.* Kassner’s purpose, however, is employing two spray outlets for application of materials. *See* Kassner, Fig. 5. This purpose would not be frustrated by the Examiner’s proposed modification because the same two outlets could be employed to apply the materials.

Appellant fails to show reversible error in asserting that the Examiner engages in hindsight by ignoring what “[t]he overwhelming bulk of prior art of record” shows is also unpersuasive of reversible error. Appeal Br. 7. While “[a]ny judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning,” “so long as it takes into account only knowledge”—such as Kassner—which was within a skilled artisan’s knowledge and “does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.” *See In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971). Such is the case here.

As to Appellant’s argument that Nylen (U.S. Patent No. 7, 557,324) (mentioned in the Final Office Action, but not a reference in the rejection) is a “massive teaching away,” we find that it is not. Appeal Br. 12. Nylen

merely states that “[p]referably, the nozzles (or powder ports) are evenly distributed (at the same angular distance from each other) around the inner periphery of the frame element.” *See* Appeal Br. 12. Teaching away requires that a reference “criticize, discredit, or otherwise discourage the solution claimed” by Appellant. *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). Nysten’s stated “preference” falls far short of the requirements for teaching away. *See Galderma Labs., L.P., v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013) (A “teaching away” requires more than the mere expression of a general preference.).

We sustain the rejection of claim 1 as obvious over Kassner. For the same reasons, we sustain the rejection of claims 2, 4, 17, and 20.

*Ground 2: Rejection of claims 5, 6, 9, and 12–14 as obvious over Kassner in view of Stöver, as evidenced by Correll*

Claim 5 depends from claim 1 and further recites, “wherein the plurality of liquid feedstock outlets comprises a pair of liquid feedstock outlets spaced by a nonzero angle of less than 45° about said axis.” Appeal Br. 21 (Claims Appendix). Claims 6, 9, and 12–14 depend from claim 5. *Id.* at 21–23.

The Examiner finds that Kassner describes using a pair of outlets at an angle of 120 degrees, and applying a different material from each of the outlets. Final Act. 6. Stöver, the Examiner finds, describes how composited materials of two different materials can be thermally sprayed as a mixture, or applied as co-sprayed with two injectors located on opposite sides. *Id.* The Examiner finds that Stöver teaches the desirability to provide a small angle—such as 10°—between particle jets to give a more homogeneous distribution of materials and avoid alternating layers of two materials created

when trajectories of the particle jets diverge after crossing in the plasma flame. *Id.* at 6–7. The Examiner finds that Correll evidences how co-spraying with a single device is understood to be providing a single device with two or more separate feed streams of different material, thus Stöver is understood to describe spraying one material from one injector and the other material from the other injector. *Id.* at 7. The Examiner concludes that it would have been obvious to one of ordinary skill in the art to modify Kassner with the teaching of Stöver and Correll to provide co-spraying of two different materials from two injector outlets set at a small angle to each other in order to provide a more homogeneous distribution of different materials. *Id.*

The Examiner finds that Stöver as evidenced by Correll indicates that outlet angles are result effective variables. *Id.* The Examiner finds that the references would suggest to one of ordinary skill in the art to optimize the angle between outlets to obtain a desirable coating, such angles being in the ranges claimed in claims 5, 12, and 13. *Id.* The Examiner finds that Stöver’s disclosure would apply to suspension plasma spraying, as both Stöver and Kassner feedstock include particles injected into plasma. *Id.* at 7–8.

Appellant argues that Stöver as evidenced by Correll does not cure the deficiencies of Kassner. Appeal Br. 14. Appellant contends that no basis exists for assuming that the two different specific materials (glass and metal) in Stöver have the same interaction as two liquid suspensions. *Id.* at 16. Appellant also argues that the Examiner’s rationale (providing a more homogeneous distribution of two different materials) does not apply to two

streams of the *same* material, discussed further in Appellant’s response to the rejections in Grounds 7 and 8. *Id.* at 15.

Appellant’s reliance on the December 4, 2017, Declaration of Brian T. Hazel (“Hazel Decl.”), a co-inventor on the ’580 Application, is unpersuasive of reversible error in the rejection. *See* Reply Br. 22; *see also* Hazel Decl. § 15. We agree with the Examiner that claims 5, 6, 9, and 12–14 do not require use of two flows of a single material, or prevent use of different materials, for each of the two outlets streams. *See* Ans. 15. Therefore, the skilled artisan would have been motivated to combine the modified device of Kassner with the narrower outlet angle of Stöver to provide a more homogeneous distribution of materials from the outlets. Both Kassner and Stöver teach the desirability of homogeneity of the deposited streams. *See* Kassner 118; *see also* Stöver 81. In addition, Stöver teaches that the industrially available bond coat powder and ordinary white container glass chosen were adapted for use with plasma spraying. Stöver 80.

As to Appellant’s argument that no basis exists for assuming that the two different specific materials (glass and metal) in Stöver have the same interaction as two liquid suspensions, we note that the rejected claims are not limited to liquid suspensions. *See* Appeal Br. 21–23.

We sustain the rejection of claims 5, 6, 9, and 12–14 as obvious over Kassner in view of Stöver, as evidenced by Correll.

*Ground 3: Rejection of claim 16 as obvious over Kassner in view of Cotler and Vogts*

Claim 16 depends from claim 1:<sup>4</sup>

16. A plasma spray apparatus including the plasma spray gun of claim 0 [sic] and further comprising:

a suspension or solution supply line coupled to the plasma spray gun;

a suspension of solution supply coupled to the suspension of solution supply line;

a carrier gas supply coupled to the plasma spray gun; and

a power line coupled to the plasma spray gun.

Appeal Br. 23 (Claims App.).

The Examiner finds that Kassner teaches providing suspension through outlets (injectors) attached to a spray gun. Final Act. 9. The Examiner finds that Cotler teaches that it was conventional to provide a suspension supply coupled to a suspension supply line coupled to an injector. *Id.* The Examiner determines that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kassner to be coupled to a suspension supply line coupled to an injector, as taught by Colter, in order to provide a desirable supply of feedstock. *Id.* at 8–9.

The Examiner finds that Vogt discloses that plasma spray guns are conventionally provided with coupled carrier gas supplies and power lines. *Id.* at 9. The Examiner concludes that it would have been obvious to the skilled artisan to modify Kassner in view of Cotler to provide a carrier gas

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<sup>4</sup> In the Claims Appendix to the Appeal Brief, claim 16 recites “the plasma spray gun of claim 0,” but this appears to be a typographical error based on the originally filed version of claim 16, which depends from claim 1.

supply and a power line because Kassner provides use of a plasma spray gun and Vogt discloses that plasma sprays conventionally have a power line and gas supply coupled to the spray gun. *Id.*

Appellant merely argues that the Examiner's assertions do not cure the deficiencies in Ground 1 (obviousness over Kassner). Appeal Br. 16; *see also* Reply Br. 22.

Having found no deficiencies in Kassner in Ground 1, *supra*, we sustain the rejection of claim 16 as obvious over Kassner in view of Cotler and Vogt.

*Ground 4: Rejection of claims 18 and 19 as obvious over Kassner in view of Stöver and Correll, and further in view of Mack and Gupta*

Claims 18 and 19 depend from claim 17. We sustained the rejection of claim 17 as obvious over Kassner in Ground 1 *supra*. Claims 18 and 19 recite that the method of claim 17 is used to apply a coating to a part wherein (1) the part comprises a nickel-based superalloy substrate (claim 18), or (2) the part is a gas turbine engine component (claim 19). Appeal Br. 23–24 (Claims App.).

The Examiner finds, *inter alia*, that Mack teaches that glass-metal composites can be desirably applied as part of forming thermal barrier coatings on gas turbine engine components, and the substrate can be a superalloy. Final Act. 10. The Examiner finds that Gupta provides a nickel base superalloy. *Id.* The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Kassner in view of Stöver, as evidenced by Correll, to apply glass-metal composites to nickel base superalloy and gas turbine engine components, as suggested by Mack and evidenced by Gupta. *Id.* More

specifically, the Examiner concludes that Kassner in view of Stöver and Correll would have indicated how mixed material coatings could be applied using two injectors, one for each component, and Stöver would have indicated such material could be a glass-metal composite. *Id.* Further, the Examiner concludes that Mack and Gupta would have indicated applying composites such as nickel base superalloys to gas turbine engine components. *Id.* at 10–11.

Appellant merely argues that the Examiner’s assertions do not cure the deficiencies in Ground 1 or Ground 2. Appeal Br. 16; *see also* Reply Br. 22.

Having sustained the rejections in Grounds 1 and 2, we sustain the rejection of claims 18 and 19 as obvious over Kassner in view of Stöver and Correll, and further in view of Mack and Gupta.

*Ground 5: Rejection of claim 16 as obvious over Kassner in view of Hazel*

Claim 16 was reproduced in the discussion of Ground 3 *supra*. In this rejection, the Examiner’s findings regarding Kassner’s disclosure are the same as in Ground 3. *Compare* Final Act. 8–9 *and* 11. With regard to Hazel, the Examiner finds that Hazel shows that it was conventional to provide a suspension supply coupled to a suspension supply line coupled to a spray gun, also coupled to a power line and gas supply. *Id.* at 11–12.

As in Ground 3, here Appellant merely argues that the Examiner’s assertions do not cure the deficiencies in Ground 1. Appeal Br. 17; *see also* Reply Br. 22.

Having sustained the rejection in Ground 1 and 2, we sustain the rejection of claim 16 as obvious over Kassner in view of Hazel.

*Ground 6: Rejection of claims 18–20 as obvious over Kassner in further of Hazel and VanEvery*

Claims 18–20 depend from claim 17. Appeal Br. 23–24 (Claims App.). Claims 18 and 19 were discussed in Ground 4 *supra*. Claim 20 recites that the method of claim 17 is used to apply a coating to a part wherein the coating is a stabilized zirconia. *Id.* at 24.

The Examiner’s findings regarding Kassner as it applies to claim 17 were previously discussed. The Examiner finds that Hazel describes how stabilized zirconia coatings can be applied by suspension plasma spraying desirably onto gas turbine engine components and nickel base superalloys. Final Act. 12. The Examiner finds that VanEvery provides that larger volumes of feedstock can be injected with increased output is desirable in plasma spraying. *Id.* The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Kassner to provide application of stabilized zirconia coatings to nickel base superalloys and gas turbine engines as suggested by Hazel in order to provide a desirable coated article. *Id.* at 12–13. The Examiner also concludes that it would have been obvious to modify Kassner to apply stabilized zirconia coatings using multiple nozzles described in Kassner to increase coating output as suggested by VanEvery. *Id.* at 13.

Appellant argues first that the Examiner misuses a three-outlet system disclosed in Kassner configured to discharge three streams of the same material to discharge two streams of two different substances. Appeal Br. 17. Appellant contends that Kassner discharges two different streams for a limited experimental purpose. *Id.* Appellant then argues that the Examiner modifies Kassner back in a different way to discharge identical streams, defeating the purpose of starting with Kassner. *Id.* Appellant contends that

the Examiner’s findings ignore the teaching of the art as a whole, as well as that of the references. *Id.*

Appellant contends that VanEvery identifies diametrically opposite feedstock injectors, which, combined with Kassner’s three-outlet device, fails to suggest an asymmetric two-outlet system. *Id.*

Appellant fails to show reversible error in the rejection. Kassner discloses successful use of two feedstock outlets separated by 120 degrees. *See* Kassner Fig. 5. Hazel describes spraying stabilized zirconia coatings on gas turbine engines or nickel-based superalloy by suspension plasma spraying. *See* Hazel §§ 1, 3, 5, and 16. VanEvery discloses spraying a single material from multiple feedstock injectors. VanEvery ¶ 37. VanEvery’s disclosure of a preferred embodiment having feedstock injectors located opposite to each other does not negate Kassner’s teaching of two outlets at an angle of 120 degrees. Appellant’s argument that the Examiner misuses the three-outlet system disclosed in Kassner is unavailing, as Kassner clearly shows use of only two outlets asymmetrically located. The Examiner provides sufficient rationale for combining the references, i.e., to increase output of a plasma sprayer system. The Examiner’s explanation of the reasons a person of ordinary skill in the art would have had to combine the prior art teachings is sufficient when an allowance is made for “the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418.

We sustain the rejection of claims 18–20 as obvious over Kassner in view of Hazel and VanEvery.

*Group 7: Rejection of claims 21 and 22 over Kassner in view of Hazel and VanEvery, and further in view of Coffee*

Claim 21 is independent and recites:

21. A plasma spray method using a plasma spray gun, the method comprising:

discharging a plasma from a plasma outlet; and

discharging a pair of liquid feedstock streams from a pair of liquid feedstock outlets, the liquid feedstock streams being drawn from a single liquid feedstock source and having a non-uniform distribution about an axis of the plasma.

Appeal Br. 24 (Claims App.). Claim 22 depends from claim 21, and further requires that “a flowpath from the single liquid feedstock source branches out to feed the pair of liquid feedstock outlets.” *Id.*

The Examiner finds that Kassner teaches a plasma spray gun comprising a plasma outlet and discharging liquid feedstock streams from a pair of outlets having non-uniform distribution about an axis of the plasma. Final Act. 13–14. As in Ground 6, the Examiner finds that Hazel and VanEvery teach applying a single coating with a plasma spray gun with increased coating output. *Id.* at 14. The Examiner finds that Coffee discloses providing one liquid supply source through a flowpath that branches to outlets. *Id.* at 15. The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device disclosed in Kassner to include a single liquid feedstock source that branches out to feed a pair of liquid feedstock outlets as suggested by Coffee. *Id.* at 16.

Appellant argues that the Examiner has not cured the deficiencies in Grounds 1 and 6. Appeal Br. 18. Appellant contends that Coffee involves an agricultural sprayer, thus is not in Applicant’s field of endeavor and not

reasonably pertinent to Applicant’s problem. *Id.* at 19. Appellant urges that it is known to supply suspension plasma sprays in symmetric patterns from multiple outlets being fed from one source. *Id.*

We addressed the combination of Kassner, Hazel, and VanEvery in Ground 6 *supra*. Here, we agree with the Examiner that Coffee is analogous art to the claimed invention.

“Whether a reference in the prior art is ‘analogous’ is a fact question.” *In re Clay*, 966 F.2d 656, 658 (Fed. 1992). The scope of analogous art is to be construed broadly. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238 (Fed. Cir. 2010) (“The Supreme Court’s decision in *KSR* . . . directs us to construe the scope of analogous art broadly, stating that *familiar items may have obvious uses beyond their primary purposes*, and a person of ordinary skill often will be able to fit the teachings of multiple patents together like pieces of a puzzle.”). To label a reference as analogous art “merely connotes that it is relevant to a consideration of obviousness under [section] 103 as ‘prior art.’” *In re Sovish*, 769 F.2d 738, 742 (Fed. Cir. 1985).

Our reviewing court has stated that “[t]wo separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed[;] and (2) if the reference is not within the field of the inventor’s endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (citations and internal quotes omitted). Art is “reasonably pertinent” when it would “logically commend itself” to an inventor’s attention in considering his problem. *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1379–80 (Fed. Cir. 2007) (citing *Clay*, 966 F.2d at 658–59).

In the case at bar, we agree with the Examiner that Coffee is reasonably pertinent to Appellant’s problem because the reference describes how liquids conventionally can be fed from one material source to multiple outlets, while Appellant is similarly concerned with providing single sources of suspensions to multiple feedstock outlets. *See* Ans. 21. Moreover, Appellant acknowledges that it was known to supply suspension plasma sprays in symmetric patterns from multiple outlet being fed from one source. *See* Appeal Br. 19. The skilled artisan seeking to deliver a feedstock to multiple outlets would logically look to art broader than that of plasma spray systems, and find Coffee’s disclosure of a single source of material feeding multiple outlets because Coffee addresses the same problem. *See Icon Health and Fitness*, 496 F.3d at 1379–80.

We sustain the rejection of claims 21 and 22 as obvious over Kassner in view of Hazel and VanEvery, and further in view of Coffee.

*Ground 8: Rejection of claim 23 over Kassner in view of Hazel, and further in view of VanEvery and Coffee*

Claim 23 depends from claim 16, and further recites, “the suspension of solution supply line branches out from the suspension of solution supply to the plurality of liquid feedstock outlets.” Appeal Br. 24 (Claims App.).

The Examiner makes the same findings regarding Kassner and Hazel as in Ground 3 *supra*. Final Act. 16. The Examiner makes the same findings regarding Hazel, VanEvery, and Coffee as in Ground 7 *supra*. *Compare id.* at 14–15 with 17. The Examiner determines that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device in Kassner in view of Hazel and VanEvery to provide a single supply for liquid feedstock to be sprayed to achieve an increased

output of feedstock. *Id.* The Examiner concludes that it would have been obvious to provide a supply line from a single liquid source that branches out to feed a plurality of liquid feedstock outlets as suggested by Coffee, which, like VanEvery, uses multiple outlets. *Id.*

Appellant argues that the rejection in Ground 8 fails to cure the deficiencies in Grounds 1 and 6. Appeal Br. 20.

For the reasons provided in our discussion of the rejections in Grounds 1 and 6, Appellant’s arguments do not show reversible error. We sustain the rejection of claim 23 as obvious over Kassner in view of Hazel, further in view of VanEvery and Coffee.

#### *Hazel Declaration*

Appellant refers to, but does not elaborate on, sections of the Hazel Declaration in multiple places in the Appeal Br. *See, e.g.*, Appeal Br. 10, 12, 14, and 16. We here separately address the Hazel Declaration.

In section 11, Mr. Hazel states “if one were designing a gun for injection of YSZ and LSM described in Kassner, one would not provide the two outlets at the 120° angle and remove the third but rather would use a conventional diametrically opposed two-outlet configuration.” Hazel Decl. § 11. However, Mr. Hazel provides no analysis or factual support as to *why* one of skill in the art would use a diametrically opposed two-outlet configuration, other than that such plasma spray guns were known in the art. *See id.* Mr. Hazel does not address Kassner’s use of two outlets in a plasma spray gun wherein the two outlets are separated by 120 degrees. We do not find this portion of the declaration sufficient to overcome the teachings of the art.

Section 13 of the declaration states that the Nylen reference “is clear teaching away.” Hazel Decl. § 13. Such testimony is conclusory and inadequately supported by factual evidence, thus entitled to little weight. *See In re Chilowsky*, 306 F.2d 908 (CCPA 1962).

We consider Mr. Hazel’s testimony that Nylen teaches an even distribution of nozzles (outlets), but find that it does not overcome the teaching of the prior art cited by the Examiner. *See id.*

Mr. Hazel also quotes Zimmermann: “To benefit from the triple symmetry [], it is preferable to select three injectors arranged in a way that maximum energy of the three arcs is used for melting and accelerating the powder.” *Id.* (quoting Zimmermann, 170). Mr. Hazel testifies that the relationship (of three injectors and three arcs) reflects the general knowledge in the art and practice of the Triplex manufacturer for the correlation between three cathodes and three outlets. *Id.* Mr. Hazel then testifies that Zimmermann teaches away from the Examiner’s proposal. *Id.*

We consider Mr. Hazel’s testimony that the general knowledge in the art correlates three outlets and three cathodes. However, the weight to be given Mr. Hazel’s conclusion is limited to Zimmermann’s discussion of the specific configuration of three cathodes and three outlets. Mr. Hazel does not address the disclosure in Kassner, which is the primary reference at issue before us, and the Examiner does not rely on Zimmermann in the rejections.

In section 14 Mr. Hazel indicates that removing third outlet in Kassner “appears to be an absurd artificial constraint,” and that Kassner did not teach any desirability of a 120 degree spacing outlets. *Id.* § 14. Mr. Hazel testifies that Zimmermann teaches that three in-use powder outlets have a synergistic relationship with the three cathodes, but that this does not constitute a

teaching of some advantageous property of 120 degrees for a two-outlet configuration. *Id.* We note that the Examiner does not rely on Zimmermann for teaching two outlets separated by 120 degrees. *See, e.g.*, Final Act. 4–5. Mr. Hazel’s testimony as to what Zimmermann does not teach does not outweigh the Examiner’s findings in relation to Kassner.

Mr. Hazel testifies in section 15 that the Examiner committed clear error in finding that Stöver would be understood to apply to suspension plasma spraying. *Id.* § 15. Such testimony is on a legal conclusion, thus entitled to no weight.

In section 16, Mr. Hazel quotes the Examiner’s findings regarding the Hazel and VanEvery references, and testifies that the Examiner “appears to require Applicant to prove impossibility rather than massive teaching away and other logical flows.” *Id.* § 16. Mr. Hazel provides no analysis or factual support for his conclusion.

Finally, in section 17, Mr. Hazel testifies that Coffee involves an agricultural sprayer on a tractor, and that it “is not the art of anything else at issue and has no relevance thereto.” *Id.* § 17. We consider Mr. Hazel’s testimony, but decline to let it guide us on the issue of relevance.

We have discretion to give more weight to one item of evidence over another “unless no reasonable trier of fact could have done so.” *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010); *see also In re American Academy of Science Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weight the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations.”); and *Velandar v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) (“In giving more weight to prior publications than to subsequent

conclusory statements by experts, the Board acted well within [its] discretion.”). Conclusory statements in a declaration is entitled to little weight. *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) (“[M]ere conclusory statements in the [S]pecification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements.”); *see also In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978) (In assessing the probative value of declaratory evidence, one must consider the nature of the matter sought to be established as well as the strength of the opposing evidence.). A declaration that primarily characterizes the experts opinion about what the references says without providing additional technical analysis is insufficient to supplant its actual teachings. Moreover, an affidavit by a co-applicant as to the advantages of his invention is less persuasive than one made by a disinterested person. *See In re Bulina*, 362 F.2d 555, 559 (CCPA 1966).

## CONCLUSION

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 2, 4, 17, 20	103(a)	Kassner	1, 2, 4, 17, 20	
5, 6, 9, 12–14	103(a)	Kassner, Stöver, Correll	5, 6, 9, 12–14	
16	103(a)	Kassner, Cotler, Vogts	16	
18, 19	103(a)	Kassner, Stöver, Correll, Mack, Gupta	18, 19	
16	103(a)	Kassner, Hazel	16	
18–20	103(a)	Kassner, Hazel, VanEvery	18–20	

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21, 22	103(a)	Kassner, Hazel, VanEvery, Coffee	21, 22	
23	103(a)	Kassner, Hazel, VanEvery, Coffee	23	
<b>Overall Outcome</b>			1, 2, 4–6, 9, 12–14, 16–23	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED