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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* CHRISTOPHER JOSEPH LOCHNER,  
JOSHUA LEE MARGOLIES, and JON E. DICKINSON

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Appeal 2018-008055  
Application 13/493,364  
Technology Center 1700

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Before JAMES C. HOUSEL, DEBRA L. DENNETT, and  
JANE E. INGLESE, *Administrative Patent Judges*.

INGLESE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant<sup>1</sup> requests our review under 35 U.S.C. § 134(a) of the Examiner’s decision to finally reject claims 8–10, 12, 14–16, and 20.<sup>2</sup> We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

We AFFIRM.

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<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies General Electric Company as the real party in interest. Appeal Brief filed February 16, 2018 (“Appeal Br.”) at 2.

<sup>2</sup> Final Office Action entered August 16, 2017 (“Final Act.”).

### CLAIMED SUBJECT MATTER

Appellant claims a method of operating a thermal spray system. Appeal Br. 2–4. Independent claims 8 and 15 illustrate the subject matter on appeal, and are reproduced below with contested subject matter italicized:

8. A method of operating a thermal spray system, comprising:
  - producing an emission of material toward a surface with a thermal spray torch;
  - capturing an image of the emission of the material, wherein capturing the image of the emission of the material comprises:
    - capturing a first image of the emission of the material with a first camera configured to scan the emission of the material in a first direction; and
    - capturing a second image of the emission of the material with a second line scan camera configured to scan the emission of the material in a second direction, wherein the first direction is perpendicular to the second direction;
    - determining a characteristic of the emission of the material based on the image, wherein determining the characteristic of the emission of the material comprises determining coordinates associated with the characteristic, the image of the emission of the material comprising material emitted from the thermal spray torch and the material as deposited on the surface; and*
    - adjusting a position of the thermal spray torch based on the characteristic, and further comprising emitting a laser beam onto the surface as a point from which a coordinate system is determined by a diagnostic system.
15. A method operating a thermal spray system, comprising:
  - producing an emission of material toward a surface with a thermal spray torch; capturing an image of the emission of the material, wherein capturing the image of the emission of the material comprises:
    - capturing a first image of the emission of the material with a first camera configured to scan the emission of the material in a first direction; and

capturing a second image of the emission of the material with a second line scan camera configured to scan the emission of the material in a second direction,

wherein the first direction is perpendicular to the second direction;

*determining a center point of the emission of the material based on the image, the image of the emission of the material comprising material emitted from the thermal spray torch and the material as deposited on the surface;*

*determining a correct center point of emission, wherein determining the center point of the emission of the material comprises determining coordinates for the center point of the emission of material within the coordinate system; and*

adjusting the thermal spray torch based on the center point of the emission of the material such that a center point of the emission of the material is aligned with the correct center point of emission, and further comprising emitting a laser beam onto the surface as a point from which a coordinate system is determined by a diagnostic system.

Appeal Br. 13–15 (Claims Appendix) (emphasis added).

## REJECTION

The Examiner maintains the rejection of claims 8–10, 12, 14–16, and 20 under 35 U.S.C. § 103(a) as unpatentable over Gevelber<sup>3</sup> in view of Strock<sup>4</sup>, Moreau<sup>5</sup>, and Siniaguine<sup>6</sup> in the Examiner’s Answer entered June 8, 2018 (“Ans.”).

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<sup>3</sup> Gevelber et al., US 2004/0031776 A1, published February 19, 2004 (“Gevelber”).

<sup>4</sup> Strock et al., US 2008/0166489 A1, published July 10, 2008 (“Strock”).

<sup>5</sup> Moreau et al. US 2006/0246213 A1, published November 2, 2006 (“Moreau”).

<sup>6</sup> Siniaguine, US 2002/0017508 A1, published February 14, 2002.

## FACTUAL FINDINGS AND ANALYSIS

Upon consideration of the evidence relied upon in this appeal and each of Appellant's contentions, we affirm the Examiner's rejection of claims 8–10, 12, 14–16, and 20 under 35 U.S.C. § 103(a), for the reasons set forth in the Final Action, the Answer, and below.

We review appealed rejections for reversible error based on the arguments and evidence the appellant provides for each issue the appellant identifies. 37 C.F.R. § 41.37(c)(1)(iv); *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (explaining that even if the Examiner had failed to make a prima facie case, “it has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections”)).

### *Claims 8–10, 12, and 14*

Appellant presents arguments directed to limitations in independent claim 8, from which claims 9, 10, 12, and 14 depend. Appeal Br. 4–10. We, therefore, select claim 8 as representative, and decide the appeal as to claims 8–10, 12, and 14 based on claim 8 alone. 37 C.F.R. § 41.37(c)(1).

Appellant also presents arguments for the separate patentability of independent claim 15. Appeal Br. 10. We, therefore, separately address claim 15 below.

Independent claim 8 requires the recited method of operating a thermal spray system to comprise, in part, producing an emission of material toward a surface with a thermal spray torch, capturing an image of the emission of the material, and determining a characteristic of the emission of the material based on the image, where determining the characteristic

comprises determining coordinates associated with the characteristic.

The Examiner finds that Gevelber discloses a method for operating a thermal spray system that comprises producing an emission of material toward a surface with a thermal spray torch; capturing an image of the emission of the material with a line scan camera; determining a center point (a characteristic) of the emission of the material based on the image; determining a corrected center point of emission; and adjusting the position of the thermal spray torch so that the center point of the emission of the material is aligned with the corrected center point of emission. Final Act. 4 (citing Gevelber Abstr.; Figs. 1, 2, 5, 17a–21b, 23a, 29; ¶¶ 61, 63, 96, 101, 116, 123, 133, 138, 150, 155, 159, 160, 180; claims 36, 39). The Examiner finds that determining a center point of the emission of the material as disclosed in Gevelber “requires determining coordinates.” Final Act. 4; *see also* Ans. 3.

The Examiner finds that Gevelber does not disclose capturing an image of the material as deposited on the surface. Final Act. 4. Appellant, however, does not dispute the Examiner’s finding that Stroock discloses a method for controlling a thermal spray coating process that includes monitoring the temperature of a material (a characteristic) throughout deposition of the material onto a surface, by imaging the material during deposition with an infra-red camera. *Compare* Final Act. 4 (citing Stroock ¶¶ 37, 40; claim 6), *with* Appeal Br. 4–10. In view of this disclosure in Stroock, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of Appellant’s invention to modify Gevelber’s method to include capturing an image of the material as deposited on the surface when capturing an image of the emission of the material, to permit

the temperature of the material to be monitored during deposition, as disclosed in Strock. Final Act. 4–5.

The Examiner finds that Gevelber and Strock do not disclose emitting a laser beam onto the deposition surface as a point of reference. Final Act. 5. Appellant, however, does not dispute the Examiner’s finding that Moreau discloses a thermal spray method that involves using an optical triangulation profilometer including a camera, mirror, and laser, in conjunction with a spray torch, to capture a profile of a projected point of light emitted by the laser onto a deposition surface, in order to measure the thickness of material as it is deposited in successive layers on the surface. *Compare* Final Act. 5 (citing Moreau Abstr.; Figs. 1, 3, 5, 8; ¶¶ 44–49), *with* Appeal Br. 4–10. Nor does Appellant dispute the Examiner’s finding that Moreau discloses aligning the position on the surface where each measurement of the triangulation profilometer occurs, which “would have suggested emitting a laser beam onto the surface as a point from which a coordinate system is determined by a diagnostic system.” *Compare* Final Act. 5 (citing Moreau ¶¶ 29–32, 55), *with* Appeal Br. 4–10.

In view of these disclosures in Moreau, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of Appellant’s invention to further modify Gevelber’s method as modified by Strock “by capturing an image including both the emission of material and a laser beam emitted on the surface as a point of reference,” in view of Moreau’s disclosure of “using a laser and a camera to obtain a reference for a spray coating process,” because “such data would have been obviously useful for aligning [Gevelber’s] thermal spray.” Final Act. 5.

The Examiner finds that Gevelber, Strock, and Moreau do not disclose

“capturing a second image with a second line scan camera at a right angle to the first and configured to scan the emission in a second direction.” Final Act. 6. Appellant, however, does not dispute the Examiner’s finding that Siniaguine discloses “monitoring a thermal spray emission using two line-scan cameras placed at right angles to each other to achieve [] desired properties.” *Compare* Final Act. 6 (citing Siniaguine Abstr.; Figs. 2, 3A, 6; ¶¶ 21, 30, 37), *with* Appeal Br. 4–10. In view of this disclosure in Siniaguine, the Examiner concludes it would have been obvious to one of ordinary skill in the art at the time of Appellant’s invention to further modify Gevelber’s method as modified by Strock and Moreau to include capturing a second image of the emission of the material with a second line-scan camera perpendicular to the first camera, in view of Siniaguine’s disclosure of using two cameras positioned in this configuration to “improve the properties of the spray.” Final Act. 6.

Appellant argues that although the Examiner “points to a wide array of the Gevelber disclosure,” Gevelber “does not teach, suggest, [or] disclose coordinates,” as required by claim 8. Appeal Br. 6–7.

Appellant’s argument does not identify reversible error in the Examiner’s rejection, for reasons that follow.

Gevelber discloses a plasma spray process for depositing a powdered material on a substrate that “vastly increases control over the sprayed coating structure” by controlling the centroid position of the spatial distribution of sprayed particles. Gevelber Abstr.; Figs. 1a, Fig.1b; ¶¶ 27–36, 84. Gevelber discloses that the method involves spraying particles 44 with torch 40 in distribution 58 at surface 46, and using spray pattern sensor 76c to “provide[] spray pattern shape and centroid position.” Gevelber Figs.

1a, 1b, 5; ¶ 116. Gevelber discloses that the spray pattern sensor can be a line-scan camera that measures the intensity of light emitted from the sprayed particles. Gevelber ¶¶ 123, 159, 180. Gevelber discloses using the measured radiant intensity to determine the size and location of the spray pattern, and to determine the spray pattern centroid, which Gevelber indicates is “the location of the center of mass of the sprayed particles.” Gevelber ¶¶ 89, 101 123, 159; claims 36, 39. Gevelber discloses subtracting the centroid position so determined from a “desired and present centroid position setpoint,” and providing “[t]he difference or error in centroid position” to a controller, “which has an algorithm to adjust torch gas flow or carrier gas flow to torch 40.” Gevelber ¶ 160.

Consistent with Gevelber’s explicit disclosures, one of ordinary skill in the art would have understood that the particle spray “centroid” described in Gevelber is the “center of mass” of the sprayed particles, or the “point whose coordinates (see COORDINATE entry 3 sense 1)<sup>7</sup> are the averages of the corresponding coordinates of a given set of points [particles] and which for a given plane or three-dimensional figure (such as a triangle or sphere) [spray pattern] corresponds to the center of mass of a thin plate of uniform thickness and consistency or a body of uniform consistency having the same boundary.” Centroid, Merriam-Webster.com (accessed March 2, 2020), <https://www.merriam-webster.com/dictionary/centroid>.

Accordingly, as the Examiner explains, although Gevelber does not explicitly disclose that determining the centroid (characteristic) of the

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<sup>7</sup> Coordinate (Entry 3, sense 1a): “any of a set of numbers used in specifying the location of a point on a line, on a surface, or in space.” Merriam-Webster.com (accessed March 2, 2020), <https://www.merriam-webster.com/dictionary/coordinate>.

particle spray (the emission of the material) involves determining coordinates associated with the centroid (characteristic), one of ordinary skill in the art would have understood that determining the centroid of the particle spray “necessarily require[s] a coordinate system” because the particle spray “centroid” is, by definition, the point having *coordinates* that correspond to the center of mass of the particle spray. Ans. 3 (citing Gevelber ¶ and Figs. 1b–2, 7c, 12a, 12b, 13a, and 13b).

Appellant argues that “[l]ooking at each individual piece of applied art, Appellants respectfully submit that there is nothing in the Final Action, especially in terms of proper evidence, to lead a person of ordinary skill in the art to combine the references.” Appeal Br. 9. Appellant argues that the Examiner’s rejection is, therefore, based on impermissible hindsight because the Examiner “has not provided any substantiated evidence in any of the applied art how or why to combine the applied art.” *Id.*

Appellant’s arguments again do not identify reversible error in the Examiner’s rejection. We point out initially that it is well-established that “the test for combining references is not what the individual references themselves suggest but rather what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art.” *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971); *see also In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“[t]he test for obviousness is not whether . . . the claimed invention [is] expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”); *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the

teachings of a combination of references.”).

Furthermore, “evidence of a motivation to combine need not be found in the prior art references themselves, but rather may be found in ‘the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved.’” *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1366 (Fed. Cir. 2006) (quoting *In re Dembiczak*, 175 F.3d 994, 999 (Fed. Cir. 1999)); *see also KSR Int’l. Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) (“Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”).

As discussed above, the Examiner provides a reasoned explanation having rational underpinning based on factual finding gleaned from the applied prior art references for why one of ordinary skill in the art would have been led to combine the relied-upon disclosures in Gevelber, Stroock, Moreau, and Siniaguine. Final Act. 4–6. Contrary to Appellant’s arguments, the Examiner’s rejection is, therefore, based on objective evidence of record (the relied-upon disclosures of the applied prior art) rather than impermissible hindsight.

Appellant’s arguments do not identify any *specific* error in the Examiner’s reasoning, or the Examiner’s rationale for the proposed combination. Nor do Appellant’s arguments identify any *specific* error in the Examiner’s factual findings that underlie the Examiner’s articulated reasons for combining the relied-upon disclosures of the applied prior art references. Appellant’s conclusory assertions, therefore, lack the requisite degree of specificity necessary to identify error in the Examiner’s rejection.

*In re Baxter Travenol Labs.*, 952 F.2d 388, 391 (Fed. Cir. 1991) (“It is not the function of this court to examine the claims in greater detail than argued by an appellant, looking for nonobvious distinctions over the prior art.”); *see also* 37 C.F.R. § 41.37(c)(iv) (requiring, for each argument, “the basis therefor, with citations of the statutes, regulations, authorities, and parts of the Record relied on” and further requiring that the “arguments shall explain why the examiner erred as to each ground of rejection”).

We, accordingly, sustain the Examiner’s rejection of claims 8–10, 12, and 14 under 35 U.S.C. § 103(a).

*Claim 15, 16, and 20*

Appellant presents arguments for the separate patentability of independent claim 15, but does not provide arguments for claims 16 and 20, which depend from claim 15. Appeal Br. 10. Claims 16 and 20, therefore, stand or fall with claim 15. 37 C.F.R. § 41.37(c)(1).

Similar to Appellant’s arguments for claim 8, Appellant argues that the Examiner “alludes to Gevelber determin[ing] a ‘characteristic, such as a center point’ but never provides any specifics in Gevelber that a center point is determined.” Appeal Br. 10. Appellant argues that Gevelber, Strock, Moreau, and Siniaguine do not teach, suggest, or disclose determining a correct center point of emission by determining coordinates for the center point of the emission of material within a coordinate system, and adjusting the thermal spray torch based on the center point of the emission of the material, such that a center point of the emission of the material is aligned with the correct center point of emission. *Id.*

As discussed above, however, Gevelber discloses determining the centroid of a spatial distribution of particles generated by plasma spray

(Gevelber ¶¶ 110, 116, 123, 159), which necessarily involves determining coordinates associated with the centroid, because, by definition, the particle spray “centroid” is the point having coordinates that correspond to the center of mass of the particle spray. As also discussed above, Gevelber discloses subtracting the centroid position so determined from a “desired and present centroid position setpoint,” and providing “[t]he difference or error in centroid position” to a controller, “which has an algorithm to adjust torch gas flow or carrier gas flow to torch 40.” Gevelber ¶ 160. Contrary to Appellant’s arguments, this disclosure in Gevelber corresponds to determining a correct center point of emission by determining coordinates for the center point of the emission of material within a coordinate system, and adjusting the thermal spray torch based on the center point of the emission of the material, such that a center point of the emission of the material is aligned with the correct center point of emission, as recited in claim 15.

Also similar to Appellant’s arguments for claim 1, Appellant argues that “there is nothing in Moreau or Strock, Gevelber, and Siniaguine to suggest the[ir] combination, as ill-reasoned by the Final Rejection, absent the instant application.” Appeal Br. 10.

As discussed above, however, the Examiner provides a reasoned explanation having rational underpinning based on factual finding gleaned from the applied prior art references for why one of ordinary skill in the art would have been led to combine the relied-upon disclosures in Gevelber, Strock, Moreau, and Siniaguine. Final Act. 4–6. Appellant’s conclusory arguments do not identify any *specific* error in the Examiner’s reasoning, or the Examiner’s rationale for the proposed combination. Nor do Appellant’s

arguments identify any *specific* error in the Examiner's factual findings that underlie the Examiner's articulated reasons for combining the relied-upon disclosures of the applied prior art references.

We, accordingly, sustain the Examiner's rejection of claims 15, 16, and 20 under 35 U.S.C. § 103(a).

### CONCLUSION

Claims	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
8-10, 12, 14-16, 20	103(a)	Gevelber, Strock, Moreau, Siniaguine	8-10, 12, 14-16, 20	

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