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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/912,117	02/15/2016	Lexia Kironn	71422US02(15-274)	7854

52237 7590 01/15/2020

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EXAMINER	
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ART UNIT	PAPER NUMBER
3741	

MAIL DATE	DELIVERY MODE
01/15/2020	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LEXIA KIRONN, ROGER O. COFFEY, WENDELL V. TWELVES, GARY A. SCHIRTZINGER, JOE OTT, EVAN BUTCHER, and JOHN D. FRISH

Appeal 2019-005054
Application 14/912,117
Technology Center 3700

Before NATHAN A. ENGELS, ERIC C. JESCHKE, and FREDERICK C. LANEY, *Administrative Patent Judges*.

JESCHKE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant[1] seeks review, under 35 U.S.C. § 134(a), of the Examiner's decision, as set forth in the Final Office Action dated August 6, 2018, and as further explained in the Advisory Action dated November 8, 2018, rejecting claims 1–3, 6, 7, 9, 12–16, and 18–20. Claims 4, 5, 8, 10, 11, and 17 have

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. United Technologies Corporation ("Appellant") is the applicant under 37 C.F.R. § 1.46 and is identified as the real party in interest. Appeal Br. 2.

been canceled. Appeal Br. 4. We have jurisdiction under 35 U.S.C. § 6(b).

We *affirm in part*.

BACKGROUND

The disclosed subject matter "relates to a gas turbine engine and, more particularly, to a fuel injector system therefor and method of operation thereof." Spec. ¶ 2.[2] Claims 1, 6, and 19 are independent. Claim 1 is reproduced below, with emphasis added:

> 1. A fuel injector for a gas turbine engine, comprising:
>
> a strut;
>
> a fuel conduit within said strut;
>
> a cooling fluid circuit within said strut for communicating *airflow as a cooling fluid*;
>
> a diffuser case module;
>
> a fuel injector in communication with said fuel conduit; and
>
> *a support to mount said strut to said diffuser case module to radially locate said fuel injector within a combustion chamber*, said support comprising a cooling fluid inlet and a cooling fluid outlet in communication with said cooling fluid circuit, the cooling fluid inlet for receiving the airflow and the cooling fluid outlet for discharging the airflow.

[2] Citations to the Specification refer to the version filed on February 15, 2016, as modified on May, 21, 2018.

REFERENCES

Name	Reference	Date
Faulkner	US 4,483,137	Issued Nov. 20, 1984
Hicks	US 7,827,795 B2	Issued Nov. 9, 2010
Porte	US 7,926,261 B2	Issued Apr. 19, 2011
Lavie	US 2002/0073708 A1	Published June 20, 2002
Hebert	US 2007/0193272 A1	Published Aug. 23, 2007
Urban	US 2012/0070271 A1	Published Mar. 22, 2012
Lo	US 2013/0186102 A1	Published July 25, 2013

REJECTIONS[3]

1. Claims 1–3 stand rejected under 35 U.S.C. § 103 as unpatentable over Lavie, Faulkner, and Hebert.

2. Claims 6, 9, 12–15, 19, and 20 stand rejected under 35 U.S.C. § 103 as unpatentable over Lavie, Hicks, and Lo.

3. Claim 7 stands rejected under 35 U.S.C. § 103 as unpatentable over Lavie, Hicks, Lo, and Faulkner.

4. Claim 16 stands rejected under 35 U.S.C. § 103 as unpatentable over Lavie, Hicks, Lo, and Urban.

5. Claim 18 stands rejected under 35 U.S.C. § 103 as unpatentable over Lavie, Hicks, Lo, and Porte.

[3] The Examiner rejected claims 1–3 under 35 U.S.C. § 112 (b) as failing to particularly point out and distinctly claim the subject matter regarded as the invention. *See* Final Act. 2. In the Advisory Action, the Examiner stated that this rejection has been overcome. *See* Adv. Act. 1.

DISCUSSION

Rejection 1 – Claims 1–3

A. Claim 1

For independent claim 1, the Examiner relied on Lavie for certain limitations but stated that "Lavie does not teach that the cooling fluid is an airflow or mounting the strut to a diffuser case module" as generally reflected in the claim language shown with emphasis above. Final Act. 3. The Examiner found, however, that "Faulkner teaches (Figures 1–7) a diffuser case module (34), wherein a strut (162) is mounted to the diffuser case module (34) by a support (142)." *Id.* at 4. According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify Lavie to include the connection of the strut and case as taught by Faulkner in order to secure the injector in place and keep compressor discharge air from escaping (Column 7, lines 1–6)." *Id.*

The Examiner stated that, "[a]lthough Lavie teaches (see Paragraph 0021) that the cooling fluid may be optionally independent and can include oil, water, or any other suitable fluid, Lavie [in view of] Faulkner does not teach that the cooling fluid is an airflow." Final Act. 4. The Examiner found, however, that "Hebert teaches (Figures 1–10) cooling a fuel injector (10) using air (via 124) as the cooling medium (see Figure 1)." *Id.* According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify Lavie [in view of] Faulkner to include the cooling medium as taught by Hebert in order to improve cooling of the heat shields (see abstract)." *Id.*

First, highlighting Figure 1 and paragraph 21 of Lavie, Appellant argues that Lavie "teaches only a closed circuit cooling fluid[,] which under

no proper interpretation could be an airflow as recited" in claim 1. Appeal Br. 9. Appellant contends that "Lavie teaches that the cooling fluid is a liquid such as oil or water[,] which further undermines the Examiner's proposed combination[,] which attempts to modify the teachings of both the primary and the secondary references to a non-closed circuit non-liquid cooling scheme." *Id.* at 11.

As to the nature of the cooling medium in Lavie, the Examiner responds by highlighting Lavie's disclosure that the relied-upon cooling circuit "is fed from feed source 10 by a cooling fluid which is optionally independent (such as oil, water, *or any other suitable fluid*)." Lavie ¶ 21 (emphasis added), *discussed at* Ans. 4–5. According to the Examiner, the "fluid" disclosed in Lavie "may be a liquid or a gas (such as air)." Ans. 5.

We are not apprised of error based on this aspect of Appellant's first argument. Although the Examiner provides certain evidence that the term "fluid" as used in Lavie may encompass gases (*see* Ans. 5), in the rejection here, the Examiner clearly relies on Hebert—not Lavie—as disclosing the recited use of "airflow as a cooling fluid." *See* Final Act. 4 ("Hebert teaches (Figures 1–10) cooling a fuel injector (10) using air (via 124) as the cooling medium (see Figure 1)."); Ans. 5 ("It is taught by Hebert that air (such as compressor discharge air) may be used as the cooling medium for cooling a fuel injector (see Figure 1 and Paragraph 0031 of Hebert)."). Thus, even if Lavie teaches the use of only *liquids* as the cooling medium, that does not undermine the rejection. *See In re Merck & Co.*, 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.").

Moreover, again assuming that Lavie teaches the use of only liquids as the cooling medium, we do not agree with Appellant's argument that the art "teach[es] away from airflow being used as a cooling fluid." Appeal Br. 10. Instead, Lavie teaches (at most) alternatives to the use of airflow. *See DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) ("A reference does not teach away . . . if it merely expresses a general preference for an alternative invention but does not 'criticize, discredit, or otherwise discourage' investigation into the invention claimed." (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed Cir. 2004))); *see also* Ans. 5 ("It is incorrect to determine that Lavie teaches away from the use of a gaseous cooling medium.").

Second, we turn to another aspect of the proposed modification: modifying Lavie from a *closed-loop* system[4] (using "fluid" as the cooling medium as discussed above) to an *open-loop* system (using air). *See* Ans. 6–7 (discussing this aspect of the proposed modification). Appellant contends that the proposed modification "would ruin the goal or function of not only the base reference but also the secondary reference." Appeal Br. 11.

The Examiner responds: "Lavie does not teach any particular advantage of the cooling fluid being provided in a closed circuit or that it is necessary for the operation of the system of Lavie. The modification of Lavie to include air as the cooling fluid as suggested by Hebert would not

[4] For example, Figure 1 of Lavie shows cooling circuit feed source 10 at *both* the beginning and the end of the cooling loop. *See* Ans. 6 ("Lavie appears to show a closed-loop cooling circuit, with the cooling fluid exiting the feed source to be sent to the fuel injectors and returning to the feed source after cooling the fuel injectors.").

forego the benefits taught by Lavie." Ans. 6. The Examiner also states that because "it was recognized in the prior art that air would have been a suitable fluid for cooling the fuel injectors, the use of air as the cooling fluid would not render the prior art invention being modified unsatisfactory for its intended purpose." *Id.* at 5.

Where a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, the proposed modification may not have been obvious. *See In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984). Here, however, Appellant has not adequately explained *why* the proposed modification would render Lavie unsatisfactory for its intended purpose. *See* Ans. 5–6 ("Appellant has provided no persuasive evidence that the use of an airflow as the cooling fluid would result in a different outcome such as increasing coke formation at the fuel injectors."). Appellant has not shown error in the Examiner's finding that the modified device would *continue* to perform the intended purpose of Lavie: reducing coke formation on the fuel injector. *See* Ans. 6 (stating that "the intended purpose of Lavie to allow the injector to be used as high temperatures without reduction to performance or lifetime by reducing coke formation (see Paragraphs 0004–0005 and 0023)"), 5 (discussing disclosures in the record—Hicks, 1:28–37, 3:61–65—which show that air-based cooling systems reduce coking in fuel injectors).

Appellant also argues that that there is "simply no reason to modify" Lavie "to utilize an airflow as the cooling fluid" (Appeal Br. 10–11) and that there is "simply no motivation for anything but a closed circuit arrangement" (*id.* at 10). *See also* Reply Br. 2 ("[T]he Examiner starts with the closed

system, then suggests it is obvious to modify it into an open system, under routine skill in the art. This simply cannot be sustained.").

Although Appellant contends that the Examiner has failed to provide sufficient articulated reasoning as to the proposed modification at issue and engaged in hindsight reconstruction (Reply Br. 2), with this argument, Appellant does not substantively address the reasoning provided by the Examiner (Final Act. 4; Ans. 4–7). *See* Ans. 6–7 (discussing reasons to modify a closed-loop cooling circuit to an open-loop cooling circuit). We determine that the Examiner's reasoning supports a prima facie case of obviousness for claim 1. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). By not addressing the reasoning provided, Appellant has not shown error in the relevant findings or the conclusion as to obviousness, which we determine to be supported by rational underpinnings. *See id*. (discussing how, if an examiner presents a prima facie case, "the burden of coming forward with evidence or argument shifts to the applicant"); *see also In re Cree, Inc.*, 818 F.3d 694, 702 n.3 (Fed. Cir. 2016) (viewing an "impermissible hindsight" argument as "essentially a repackaging of the argument that there was insufficient evidence of a motivation to combine the references").

Third, Appellant contends that the Examiner's articulated reason to modify Lavie based on Faulkner "reinforces the closed circuit nature of Lavie and not only undermines usage of airflow as a cooling fluid but, in fact, teaches away from the cooling fluid being an airflow." Appeal Br. 10.

This argument does not apprise us of error because Appellant does not adequately explain how the disclosed benefit of the structural feature for which Faulkner is cited—securing the injector in place and keeping

compressor discharge air from escaping (*see* Final Act. 4 (citing Faulkner, 7:1–6))—would not be present in the modified device. As noted by the Examiner, preventing discharge air from escaping does not necessarily undermine the use of air as a cooling medium. *See* Ans. 5 (stating that "although Faulkner teaches that the purpose of support 142 is to secure the injector in place and keep compressor discharge air from escaping, this does not teach away from the use of compressor discharge air as the cooling fluid medium since Hebert shows a similar support (see the flange of the injector at 15 and 120f of Figure 1 of Hebert) which would prevent the escape of compressor discharge air to an outside of the engine casing C while at the same time allowing the compressor discharge air to enter the fuel injector (at 124) for cooling purposes (see Paragraphs 0031–0032)").

Fourth, Appellant argues that "neither the primary nor secondary references disclose or suggest that the cooling fluid is an airflow." Appeal Br. 10. On the record here, however, Appellant has not shown error in the finding that Hebert discloses the use of airflow as a cooling medium for a fuel injector. *See* Final Act. 4 (discussing air inlet openings 124 shown in Figure 1 of Hebert); Ans. 5 ("It is taught by Hebert that air (such as compressor discharge air) may be used as the cooling medium for cooling a fuel injector (see Figure 1 and Paragraph 0031 of Hebert)."); *see also* Hebert ¶¶ 31–32 (discussing how air from air inlet openings 124 improve cooling of the heat shields). For these reasons, we sustain the rejection of claim 1.

B. Claim 2

For the additional limitations in claim 2, the Examiner relied on Lavie, stating that it "further teaches (Figures 1–7) wherein the cooling fluid

circuit (202, 204) at least partially surrounds (see Figure 2) the fuel conduit (170)." Final Act. 4.

Referring to an annotated version of Figure 2 of Lavie provided by the Examiner (*see* Final Act. 4), Appellant argues that "the Examiner is apparently arbitrarily defining an exhaust plenum, an intake plenum, and a barrier in Lavie[,] which simply has no support in the specification." Appeal Br. 11. Appellant asserts that "Lavie, as consistent with the closed circuit arrangement, simply does not fairly disclose or suggest an exhaust or intake plenum as purported by the Examiner." *Id*. at 13 (reproducing Lavie ¶ 27).

The version of Figure 2 of Lavie provided by the Examiner includes annotations identifying an "exhaust plenum," "intake plenum," and a "barrier." *See* Final Act. 4. These terms, however, are not recited in claim 2; instead they are recited in claim 6. Regardless, the *text* of the rejection clearly identifies elements 202 and 204 in Lavie as the "cooling fluid circuit" in claim 2 and element 170 as the "fuel conduit." *Id.* Appellant has not addressed, or shown error, in these mappings by the Examiner.

Further, for the reasons noted, we see no error in the Examiner's reliance on the figures, rather than the text, of Lavie as to these features. *See* Ans. 7 (discussing *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972) (stating that figures in prior art may be relied on for aspects shown with "great particularity"); *In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979) ("[A] drawing in a utility patent can be cited against the claims of a utility patent application even though the feature shown in the drawing was unintended or unexplained in the specification of the reference patent.")). For these reasons, we sustain the rejection of claim 2.

C. Claim 3

For the additional limitations in claim 3, the Examiner relied on Lavie, stating that it "further teaches (Figures 1–7) wherein the cooling fluid circuit (202, 204) defines a helix (see Figure 1) around the fuel conduit (170)." Final Act. 5.

Appellant reproduces paragraph 26 of Lavie and states that "Examiner may be referring to helical channels 184[,] which form the primary swirler 148 but simply have nothing whatsoever to do with the cooling circuit as discussed above." Appeal Br. 14.

With this argument, Appellant does not address the rejection as articulated. Here, the Examiner did not rely on element 184 as the recited "helix"; rather, the Examiner cited Figure 1 (which does not even depict element 184). *See* Ans. 9 ("It is unclear how Appellant could conclude from the Examiner's statement that the helix is referring to element 184, since element 184 is not shown in Figure 1 of Lavie."). The record supports the Examiner's position that "the claimed helix feature is clearly shown in Figure 1, where the helix extends around the fuel conduit (see the helical shape of the circuit surrounding the fuel conduit from 144 shown in Figure 1)." *Id.* Moreover, for the same reasons discussed above (as to claim 2), we see no error in relying on the figures, rather than the text, of Lavie. For these reasons, we sustain the rejection of claim 3.

Rejection 2 – Claims 6, 9, 12–15, 19, and 20

A. Claim 6

For independent claim 6, the Examiner relied on Lavie for certain limitations but stated that "Lavie does not teach that the cooling fluid is an airflow" and "does not teach an inlet scoop to direct a portion of airflow into

the inlet passage of the heat exchanger." Final Act. 5. The Examiner found, however, that "Hicks teaches (Figures 1–3) the use of bypass airflow to cool a fuel injector assembly (see figure 3)." *Id.* According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify Lavie to include the use of air as the cooling medium as taught by Hicks in order to transfer thermal energy from the fuel injector assembly to the nacelle air (Column 5, lines 15–25)." *Id.* at 5–6.

The Examiner also found that "Lo teaches (Figures 1–6) an inlet scoop (214) to direct a portion of bypass airflow into the inlet passage of the heat exchanger (see Figure 2)." Final Act. 6. According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify Lavie [in view of] Hicks to include the source of the cooling air as taught by Lo in order to selectively supply a fan air flow to a heat exchanger (Paragraph 0024)." *Id.*

First, Appellant relies on the arguments provided as to Rejection 1. *See* Appeal Br. 14. To the extent the arguments as to Rejection 1 can be applied to Rejection 2, we are not apprised of error for the same reasons discussed above.

Second, Appellant argues that "the numerous additional references being utilized by the Examiner further supports Appellant's contention that the Examiner is utilizing improper hindsight reasoning in an attempt to recreate Appellant's device." Appeal Br. 14–15. As noted by the Examiner, "a large number of references in a rejection does not[,] without more, weigh against the obviousness of the claimed invention." Ans. 9 (citing *In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991)).

Third, Appellant contends that "there is simply no proper motivation to combine Lo with the primary and secondary references other than that disclosed by Appellant." Appeal Br. 16. In support, Appellant highlights that the relied-upon airflow in Lo "is directed to a heat exchanger[,] which is completely separate from the combustor" such that "Lo has simply no relationship whatsoever with regard to the fuel system." *Id.* at 15–16.

Although Appellant is correct that Lo, *alone*, does not disclose the use of airflow to cool "fuel injectors" as generally required by claim 6, the Examiner relied on the *combination* of Lavie, Hicks, and Lo to address this requirement. *See Merck*, 800 F.2d at 1097. As noted by the Examiner, with this argument "Appellant appear[s] to be neglecting the teachings of Hicks" relied on (Ans. 9)—i.e., disclosing "the use of a bypass airflow to cool a fuel injector assembly (see figure 3)" (Final Act. 5). The record supports the Examiner's position that the *combination* of Lavie, Hicks, and Lo would provide a "bypass airflow [that] can be used to cool the fuel." Ans. 9.

Moreover, although Appellant contends that the Examiner has failed to provide sufficient articulated reasoning with regard to Lo (Appeal Br. 16), Appellant does not substantively address the reasoning provided by the Examiner as to the proposed modification (Final Act. 5–6; Ans. 9). We determine that the Examiner's reasoning supports a prima facie case of obviousness for claim 6. *See Oetiker*, 977 F.2d at 1445. By not addressing the reasoning provided, Appellant has not shown error in the relevant findings or the conclusion as to obviousness, which we determine to be supported by rational underpinnings. *See id.* For these reasons, we sustain the rejection of claim 6.

B. Claims 9[5] and 12–15

Claim 9 recites that the "cooling fluid manifold is a circular internal split manifold." Appeal Br. 25 (Claims App.). For this additional limitation, the Examiner relied on Lavie, stating that it "teaches (Figures 1–7) wherein the cooling fluid manifold (see Figures 1–2) is a circular internal split manifold (202 and 204 are annular ducts separated by tubular element 200 and the barrier annotated above)." Final Act. 6 (referring to the annotated version of Figure 2 of Lavie on Final Act. 4).

Appellant argues that, with this finding, "[t]he Examiner appears to be referencing the fuel injector itself"—i.e., a "single fuel injector." Appeal Br. 16, 17. According to Appellant, "under no reasonable interpretation could passages in [a] single fuel injector be considered a manifold as recited" because "Appellant specifically recites that the cooling fluid manifold is in communication with each of the multiple of fuel injectors, thus obviating and refuting the Examiner's proposed interpretation." *Id.* at 17.

The Examiner provides a definition of "manifold" from dictionary.com—"a chamber or pipe with a number of inlets or outlets used to collect or distribute a fluid"—and takes the position that elements 202 and 204 within each injector in Lavie meets the claim language at issue because those structures are "used to collect or distribute a fluid (collecting a fluid

[5] Claim 9 currently depends from canceled claim 8. Prior to being canceled, however, claim 8 depended from independent claim 6. *See* Claims, at 17 (filed Feb. 15, 2016). For purposes of this Appeal and to promote efficient prosecution, we treat claim 9 as depending from claim 6. Upon return of this application to the Examining Corps, the Examiner and Appellant should address the improper dependency of claim 9.

from feed source 10 and distributing it through an outer surface of the fuel injector, as shown in Figures 1–2)." Ans. 9–10.

The record does not support the Examiner's position. The structures identified as the "manifold" in claim 9 (elements 202 and 204) are features *within each individual fuel injector* in Lavie. *See* Lavie ¶ 14 (describing Figure 2 as "a detailed view on a very large scale of a terminal portion of *a main injector*" (emphasis added)), ¶ 27 (discussing "first annular duct 202" and "second annular duct 204" in tube 200). In contrast, as noted by Appellant, claim 6, from which claim 9 depends, recites not only "a multiple of fuel injectors in communication with said combustor" but also that the required "cooling fluid manifold [is] *in communication with each of said multiple of fuel injectors*." Appeal Br. 24 (Claims App.) (emphasis added). Even assuming that elements 202 and 204 in each injector did satisfy the proposed construction for "manifold," the Examiner has not adequately explained how those structures—present in *each* fuel injector—are also "in communication with" all of the *other* fuel injectors, as required by claim 6, and thereby claim 9. For these reasons, we do not sustain the rejection of claim 9, or the rejection of claims 12–15[6], which depend from claim 9.

D. Claim 19

For independent claim 19, the Examiner relied on Lavie for certain limitations, but stated that "Lavie does not teach that the cooling fluid is an

[6] Claim 13 currently depends from canceled claim 11. Prior to being canceled, however, claim 11 depended from claim 9. *See* Claims, at 17 (filed Feb. 15, 2016). For purposes of this Appeal and to promote efficient prosecution, we treat claim 13 as depending from claim 9. Upon return of this application to the Examining Corps, the Examiner and Appellant should address the improper dependency of claim 13.

airflow that is discharged overboard after performing heat exchange with the fuel injector." Final Act. 8. The Examiner found, however, that "Hicks teaches (Figures 1–3) the use of bypass airflow to cool a fuel injector assembly (see figure 3)." *Id.* According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify Lavie to include the use of air as the cooling medium as taught by Hicks in order to transfer thermal energy from the fuel injector assembly to the nacelle air (Column 5, lines 15–25)." *Id.*

The Examiner also found that "Lo teaches (Figures 1–6) an inlet scoop (214) to direct a portion of bypass airflow into the inlet passage of the heat exchanger (see Figure 2) and discharging the airflow overboard (via 122, see Figure 2) downstream of the heat exchanger (see Figure 2)." Final Act. 8. According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify Lavie [in view of] Hicks to include the source of the cooling air as taught by Lo in order to selectively supply a fan air flow to a heat exchanger (Paragraph 0024)." *Id.*

Appellant argues that "none of the cited references disclose airflow to and from a fuel injector, let alone from the strut." Appeal Br. 18. According to Appellant, Lo "does not correct this deficiency as Lo, as discussed above, also does not provide a strut associated with a fuel injector, thus highlighting the Examiner's strained combination." *Id.*

We are not apprised of error based on this argument for reasons similar to those discussed in the context of Appellant's third argument addressing claim 6. Although Appellant is correct that Lo, *alone*, does not disclose the airflow through "a strut of each of a multiple of fuel injectors"

as required by claim 19, the Examiner relied on the *combination* of Lavie, Hicks, and Lo to address this requirements. *See Merck*, 800 F.2d at 1097. As discussed above, here, the Examiner relied on Lavie as to "communicating a cooling fluid (via 202, 201) through a strut (160) of each of a multiple of fuel injectors (14, 16)" and Hicks as to "the use of bypass airflow to cool a fuel injector assembly (see figure 3)." Final Act. 8. The record supports the Examiner's position that the *combination* of Lavie, Hicks, and Lo would satisfy the limitations at issue. For these reasons, we sustain the rejection of claim 19.

E. Claim 20

For the additional limitation in claim 20, the Examiner relied on Lo, stating that it "teaches (Figures 1–6) communicating bypass air (via 214; see Paragraph 0024) as the cooling fluid (see Figure 2)." Final Act. 8.

Appellant argues that claim 20 "specifically recites bypass air as the airflow[,] which is necessarily the airflow within a fan nacelle downstream of a fan." Appeal Br. 18. According to Appellant, "Lo simply does not provide the architecture to correct the Examiner's admitted deficiency of the primary and secondary references." *Id.* at 19.

This argument does not apprise us of error. In the paragraph cited by the Examiner, Lo describes the relied-upon bypass airflow as coming from "fan air bypass duct 122." Lo ¶ 24; *see also* Lo, Fig. 2. Moreover, as shown in cited Figures 1 and 2 of Lo, the identified bypass airflow is downstream of fan 118 and within outer fan duct 124. *See* Lo ¶ 20 (describing these features). Appellant has not adequately explained why the identified airflow is not a "bypass airflow" as recited, even under Appellant's own proposed construction. For these reasons, we sustain the rejection of claim 20.

Rejection 3 – Claim 7

For the additional limitations in claim 7, the Examiner relied on Faulkner, stating that it "teaches (Figures 1–7) a support (142) operable to mount the struts (162) of the multiple fuel injectors (114) to a diffuser case module (34)." Final Act. 9. According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention "to modify "Lavie [in view of] Hicks and Lo to include[] Faulkner's supports [to] attach the injectors to a diffuser case module in order to keep compressor discharge air from escaping through the joint between the combustor case and the mounting flange (Column 7, lines 1–6)." *Id.*

Appellant argues that "Faulkner, although directed to a gas turbine engine, is not directed to an aerospace engine, but an industrial gas turbine." Appeal Br. 19. According to Appellant, "[a]side from this architectural distinction, Faulkner simply does not disclose or suggest a diffuser case module as typical of an aerospace engine and yet adds still another architecture which in this case is utilized for introducing a liquid coolant into a combustor of the engine." *Id.* at 19–20. Appellant argues that "there is simply no proper motivation to combine Faulkner other than the teachings of Appellant's invention." *Id.* at 20.

We are not apprised of error based on this argument. Even assuming that the preamble of claim 7 *is* limiting, that preamble recites a "gas turbine engine," which Appellant acknowledges Faulkner discloses. Appeal Br. 19. Further, to the extent that Appellant is asserting that the identified features of Faulkner would not or could not be used to modify Lavie in view of Hicks and Lo, Appellant has not adequately explained why the alleged differences undermine the factual findings or reasoning relied on to support the

conclusion of obviousness, when considering the modified device as proposed by the Examiner. *See* Final Act. 9; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) ("[F]amiliar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle."); *see also* Ans. 11 ("Appellant has not provided any evidence that Faulkner would not be capable of being incorporated in the system of Lavie aside from the engine of Lavie being directed for aerospace applications and the engine of Faulkner being directed to industrial applications."). For these reasons, we sustain the rejection of claim 7.

Rejection 4 – Claim 16

Claim 16 depends from claim 9. Appeal Br. 26 (Claims App.). The Examiner's added reliance on Urban does not remedy the deficiencies in the rejection based on Lavie, Hicks, and Lo, discussed above, regarding claim 9 (*see supra* Rejection 2, § B). Thus, for the same reasons discussed above, we do not sustain the rejection of claim 16.

Rejection 5 – Claim 18

For the additional limitations of claim 18, the Examiner relied on Porte, stating that it "teaches (Figure 4) an exhaust (at 26) from an exhaust passage (25) located through a core nacelle (at 10) axially downstream of a throat region (see Figure 4) between the core nacelle (at 10) and a fan nacelle (at 4)." Final Act. 10. According to the Examiner, it would have been obvious for one of ordinary skill in the art at the time of the invention to modify Lavie, Hicks, and Lo "to include the source of the cooling air as

taught by Porte in order to use the cold bypass stream to cool a fluid of the core engine (Column 4, lines 49–60)." *Id.*

Appellant argues that "none of the cited references, either alone or in combination, suggest th[e] specific location" recited. Appeal Br. 21. According to Appellant, Porte instead discloses "that the exhaust 24 is from a heat exchanger 18 and exhaust *downstream of the fan nacelle 2*. Thus, the exhaust is simply not downstream of a throat region between said core nacelle and a fan nacelle as recited . . . ." *Id.* (emphasis added).

We are not apprised of error based on this argument. Appellant implicitly asserts that claim 18 does not encompass an "an exhaust from an exhaust passage" located further downstream of the downstream end of the fan nacelle. Under this proposed construction, Porte would not disclose the additional limitations in claim 18 because the identified "exhaust" (at element 26) emits downstream of the downstream end of the identified "fan nacelle" (element 1).[7]

Under this view, Appellant implicitly proposes that "between said core nacelle and a fan nacelle" in claim 18 describes the location of the "exhaust from said exhaust passage." We disagree with that view. Instead, we understand that phrase to define the "throat region" that immediately precedes it—i.e., as a "throat region between said core nacelle and a fan nacelle." This aligns with the description of throat region 206 in Figure 7 and with the Examiner's definition of "throat region" in the Answer. *See* Spec. ¶ 59; Ans. 12 (stating that "the throat region is an area where the

[7] In the Answer, the Examiner identifies elements 1 and 4 as the "fan nacelle. Porte identifies element 1 as a "hollow nacelle." Porte, 3:10–16.

cross-sectional distance between the fan nacelle and the core nacelle is at a minimum"). Appellant did not address the Examiner's definition in the Reply Brief.

With this understanding of the phrase "between said core nacelle and a fan nacelle," claim 18 provides two requirements for the location of the "exhaust from said exhaust passage": (1) that it be located "through a core nacelle" and (2) that it be located "axially downstream of a throat region between said core nacelle and a fan nacelle." Appellant does not challenge the Examiner's findings as to those two requirements (Final Act. 10; Ans. 12), which we determine to be supported by the record.

Although the additional feature argued by Appellant is shown in Figures 5–7, it is not required by claim 18. *See Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1306–07 (Fed. Cir. 2003) (stating that "the mere fact that the patent drawings depict a particular embodiment of the patent does not operate to limit the claims to that specific configuration"). For these reasons, we sustain the rejection of claim 18.

CONCLUSION

We *affirm in part* the Examiner's rejection of claims 1–3, 6, 7, 9, 12–16, and 18–20. Specifically, we (1) *affirm* the decision to reject claims 1–3, 6, 7, and 18–20 under 35 U.S.C. § 103(a) and (2) *reverse* the decision to reject claims 9 and 12–16 under 35 U.S.C. § 103(a).

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1–3	103	Lavie, Faulkner, Hebert	1–3	
6, 9, 12–15, 19, 20	103	Lavie, Hicks, Lo	6, 19, 20	9, 12–15
7	103	Lavie, Hicks, Lo, Faulkner	7	
16	103	Lavie, Hicks, Lo, Urban		16
18	103	Lavie, Hicks, Lo, Porte	18	
Overall Outcome			1–3, 6, 7, 18–20	9, 12–16

TIME PERIOD FOR RESPONSE

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

AFFIRMED-IN-PART