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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NICK NOLCHEFF and JONG LEE

Appeal 2016-008576
Application 13/182,976
Technology Center 3700

Before JENNIFER D. BAHR, DANIEL S. SONG, and ARTHUR M. PESLAK, *Administrative Patent Judges*.

PESLAK, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Nick Nolcheff and Jong Lee ("Appellants") appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1, 3–15, 17, and 19–23.[1] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

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[1] According to Appellants, the real party in interest is Honeywell International Inc. Appeal Br. 3.

THE CLAIMED SUBJECT MATTER

Appellants' invention "relates to integrated secondary air flow systems of compressors in gas turbine engines." Spec. ¶ 2. Claims 1, 14, and 20 are independent. Claim 14, reproduced below, is illustrative of the claimed subject matter.

> 14. A gas turbine engine assembly, comprising:
> a compressor section comprising:
>
> a rotor platform;
>
> a rotor blade extending radially outwardly from the rotor platform, the rotor blade including a pressure sidewall and a circumferentially opposing suction sidewall extending in a radial direction between a root and a tip and in an axial direction between a leading edge and a trailing edge;
>
> a casing having an inner surface surrounding the tip and spaced radially outwardly from the tip to define a gap between the casing and the tip, the casing and the rotor platform defining a primary air flow path between the casing and the rotor platform to direct a primary air flow in a direct air in a downstream direction;
>
> an exhaust section fluidly coupled to the compressor section; and
>
> a secondary air flow system comprising
>
> a bleed inlet disposed in the inner surface of the casing downstream of the rotor blade and configured to remove secondary air flow from the primary air flow;
>
> an injection opening disposed in the inner surface of the casing upstream of the bleed inlet;
>
> an exhaust conduit fluidly coupled to the exhaust system;
>
> a plenum fluidly coupled to the bleed inlet, the injection opening, and the exhaust conduit,
>
> wherein the bleed inlet and plenum at least partially define a secondary air flow path for the secondary air flow such that a first portion of the secondary air flow is directed in

through the bleed inlet, through the plenum, and out through the injection opening and a second portion of the secondary air flow is directed in through the bleed inlet, through the plenum, and out through the exhaust conduit to the exhaust section, and

wherein the plenum is sized such that the secondary air flow has a flow rate of less than 0.05 Mach within the plenum; and

an impeller positioned downstream of the rotor blade and the casing, the bleed inlet being arranged upstream of the impeller.

REJECTIONS

1) Claims 14, 15, 17, and 19 are rejected under 35 U.S.C. § 103(a) as unpatentable over Guemmer '960 (US 2008/0232960 A1, published Sept. 25, 2008), Gummer '805[2], (US 2006/0104805 A1, published May 18, 2006), Guemmer '596 (US 2009/0252596 A1, published Oct. 8, 2009), and Walker (US 5,351,478, issued Oct. 4, 1994).
2) Claims 1 and 4–9 are rejected under 35 U.S.C. § 103(a) as unpatentable over Nolcheff (US 2010/0111688 A1, published May 6, 2010), Stratford (US 4,919,590, issued April 24, 1990), Walker, and Schaum (US 4,222,703, issued Sept. 16, 1980).
3) Claims 3 and 20 are rejected under 35 U.S.C. § 103(a) as unpatentable over Nolcheff, Stratford, Walker, Schaum, and Guemmer '596.

[2] The Examiner and Appellants refer to this reference as "Guemmer `805." For consistency, we refer to "Guemmer `805" herein.

4) Claims 10–13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Nolcheff, Stratford, Walker, Schaum, and Blais (US 5,477,673, issued Dec. 26, 1995).
5) Claim 21 is rejected under 35 U.S.C. § 103(a) as unpatentable over Nolcheff, Stratford, Walker, Schaum, Blais, and Guemmer '960.
6) Claim 22 is rejected under 35 U.S.C. § 103(a) as unpatentable over Nolcheff, Stratford, Walker, Schaum, Blais, and Cummings (US 2005/0106009 A1, published May 19, 2005).
7) Claim 23 is rejected under 35 U.S.C. § 103(a) as unpatentable over Nolcheff, Stratford, Walker, and Schaum.

DISCUSSION

Rejection 1

Appellants argue claims 14 and 15 together. Appeal Br. 27–34. We select claim 14 as representative, and claim 15 stands or falls with claim 14. 37 C.F.R. § 41.37(c)(1)(v). We address claims 17 and 19 separately.

The Examiner finds that Guemmer '960 discloses many of the limitations of claim 14 but fails to "disclose the bleed inlet disposed in the inner surface of the casing, the injection opening disposed in the inner surface of the casing, an exhaust conduit configured to be fluidly coupled to the exhaust system, and the plenum is sized to limit the flow rate." Final Act. 4–5. The Examiner finds that Guemmer '805 discloses a bleed inlet disposed on the inner surface of the casing downstream of a blade, Guemmer '596 discloses an injection opening disposed on the inner surface of the casing, and Walker discloses an exhaust conduit configured to be fluidly coupled to an exhaust system and a portion of secondary air flow is directed

in through the plenum and out through the exhaust conduit. *Id.* at 5–6. With respect to the limitation that the plenum is sized to have a flow rate less than 0.05 Mach, the Examiner determines

> it is common practice for engineers in the art of gas turbines to size a flow component to limit the flow rate. Furthermore, there is no evidence that the claimed flow rates are critical and there are not unexpected effects or properties compared to other flow rates, and flow components appear to be able to be sized within the range. It would have been obvious to one having ordinary skill in the gas turbine art to further modify the engine of Guemmer ['960] by limiting the flow rate at the inlet and plenum as an engineering expedient for the purpose of reducing pressure losses at the inlet and plenum.

Id. at 7.

The Examiner concludes that it would have been obvious to modify Guemmer '960 to have

> a bleed inlet disposed in the inner . . . casing downstream of a blade, as taught by Guemmer '805, and by constructing the injection opening disposed in the inner surface of the casing configured to direct . . . air flow into a gap between the rotor blade and the casing, as taught by Guemmer '596 to substitute one known bleed inlet arrangement for another known bleed inlet arrangement to predictably enable bypass flow to enter the casing at a desired location, and to favorably influence radial gap flow.

Id. at 6.

The Examiner further concludes that it would have been obvious to further modify Guemmer '960 to provide "an exhaust conduit configured to be fluidly coupled to an exhaust system of the gas turbine engine" as taught by Walker so "that a portion of a secondary air flow is directed . . . through a bleed inlet, through the plenum, and out through the accessory conduit, to

utilize the bleed air from the compressor for cooling, deicing, and/or maintaining cabin pressure." *Id.* at 7.

a. The Exhaust Conduit Limitation

Appellants' first contention is that Walker's conduits "are not exhaust conduits" but rather "direct air to the de-icing system." Appeal Br. 27 (citing Walker 4:29–37). In connection with this contention, Appellants argue that "claim 14 positively recites 'an exhaust system' of a 'gas turbine engine assembly'" and one of ordinary skill "would never consider a de-icing system to be an exhaust system or a generic conduit to be an exhaust system." *Id.* at 28. The Examiner responds that "[c]laim 14 does not positively recite that the exhaust system is of the gas turbine engine, and the broadest reasonable interpretation of the claim includes exhaust systems of the compressor." Ans. 25. The Examiner notes that "Guemmer '960 discloses a bypass-flow directed away from the compressor section (Fig. 4d), however is silent about exhaust conduits and the exhaust system." *Id.* The Examiner also submits that Walker's conduits (46, 56) "are considered exhausting since these portions of compressor bleed air are diverted from the main flow to exit from the compressor section for uses outside . . . the compressor portion of the gas turbine, not since the conduits merely conduct flow." *Id.*

Claim 14 recites "a compressor section comprising . . . an exhaust section[3] fluidly coupled to the compressor section" and "an exhaust conduit

[3] Both Appellants and the Examiner treat this limitation of claim 14 as "an exhaust system" not "an exhaust section." *See* Appeal Br. 28; Ans. 25. This treatment is consistent with the later limitation in claim 14 of "an exhaust conduit fluidly coupled to *the* exhaust system." Appeal Br. 61 (Claims App.) (emphasis added).

fluidly coupled to the exhaust system." Appeal Br. 60–61 (Claims App.). We agree with the Examiner that claim 14 does not positively recite that the exhaust system is the exhaust system of the gas turbine engine. Rather, because it is recited as fluidly coupled to the compressor section, one of ordinary skill in the art would reasonably understand that it may be coupled to the compressor exhaust or the exhaust system of the gas turbine engine. This interpretation is consistent with Appellants' Specification which describes "exhaust system 290 coupled to the exhaust conduit 292 [which] may be the engine exhaust section 110 (FIG. 1) or merely a system or conduit which dumps the [bleed] air overboard the aircraft." Spec. ¶ 24, Figs. 1, 2. Walker discloses that "[b]leed air extracted from the compressor is typically channeled through the inner casing, gathered into a plenum formed between the inner and outer casings, and *exited through pipes in the outer compressor casing*." Walker 1:21–25. Walker further discloses that "bleed air **38** exits the low pressure turbine plenum **40** through a low pressure turbine outlet duct **56**." *Id.* at 4:43–44. This disclosure in Walker supports the Examiner's finding, by a preponderance of the evidence, that Walker discloses a conduit for exhausting or exiting the air from the compressor section. Appellants' argument that one of ordinary skill in the art would not consider these conduits to be "exhaust conduits" because the conduits are not the exhaust system of a gas turbine engine assembly is attorney argument, unsupported by evidence, and in any event, is not commensurate with the scope of claim 14. We, thus, are not persuaded by Appellants' first contention.

b. The Impeller Limitation

Appellants' second contention is that Guemmer '960 does not specifically disclose an impeller and, in the absence of an impeller, the combined references do not disclose "the . . . secondary air flow system with a bleed inlet positioned in between the exit stator and the impeller." Appeal Br. 28–29. The Examiner responds that "Guemmer '960 discloses a bypass flow in the splitter region (par. 34) upstream from the compressor stages of the gas turbine" and "[t]he high pressure compressor contains rotor stages downstream of the bleed inlet. The rotor which appears to be axial constitutes the impeller." Ans. 25. In the Reply Brief, Appellants admit that Guemmer '960 does in fact disclose an impeller in downstream compressor stages but argue that "[o]ne skilled in the art would not consider the 'impellers' in subsequent, downstream stages to have any impact on the relationships between the rotor blade, bleed inlet, casing, and impellers as recited in claim 14." Reply Br. 5. Appellants' second contention is not persuasive because the only relationship recited in claim 14 is that the impeller be "positioned downstream of the rotor blade and the casing." In addition, claim 14 does not require "a bleed inlet positioned in between the exit stator and the impeller." Appellants' second contention, is thus, not persuasive because it is not commensurate with the scope of claim 14.

c. *The Plenum Flow Rate Limitation*

Appellants' third contention is that the references do not disclose the limitation in claim 14 that the plenum is sized for "a flow rate of less than 0.05 Mach within the plenum." Appeal Br. 29. Appellants assert that "the exact ground of the rejection is not clear" because the Examiner "uses language that seems to reference various theories." *Id.* However, based on

the language used in the rejection, Appellants argue that "this is not a case of overlapping ranges in that not one of the prior art references discloses any ranges for the flow rate within the plenum," "this is not a case of optimization within prior art conditions because the Examiner has failed to define the relevant conditions and demonstrate that the conditions exist in the prior art," and "the Examiner has not established flow rates within the plenum as a results effective variable subject to optimization." *Id.* at 29–30. Appellants alternately contend that even if the Examiner met the initial burden, the Specification establishes criticality because "the plenum 270 is sized to provide the same supply pressure to exhaust conduit 292, accessory conduit 294, and/or injection openings 280 regardless of individual flow rates" enabling "the plenum 270 to service the injection slots 280, exhaust conduit 292, and accessory conduit 294 without substantial pressure losses in the plenum 270." *Id.* at 30 (citing Spec. ¶¶ 34–35). Appellants also argue that the references teach away from a plenum sizing that would result in a flow rate of less than 0.05 Mach. *Id.* at 31.

In response, the Examiner asserts that "there is no criticality disclosed in the specification." Ans. 26. According to the Examiner, even though the prior art references do not disclose the flow rate recited in claim 14, the claimed subject matter is unpatentable because "the structure of the combination of the prior art appears to be the same" as the claimed subject matter, and consequently the claimed subject matter "would not perform differently than the combination of the prior art." *Id.*

As evident from their arguments, Appellants recognize that the Examiner's findings with respect to this claim limitation are based on one of ordinary skill in the art determining the optimum condition or working range

for the flow rate in the plenum. *See* Appeal Br. 29; Final Act. 7 ("it is common practice for engineers in the art of gas turbines to size a flow component to limit the flow rate . . . as an engineering expedient for the purpose of reducing pressure losses at the inlet and the plenum."). In a case, "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F. 2d 454, 456 (CCPA 1955). If the Examiner shows that the general conditions are disclosed in the prior art, Appellants have the burden to show the criticality of the claimed range of flow rates to establish patentability. *Id.* This rule is limited to cases in which the optimized variable is a "result-effective variable." *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977).

In this case, Walker discloses bleed air 38 flowing through a plenum 40. Walker 4:29–43, Fig. 1. Walker also discloses that a problem with existing bleed air systems is an increase in air velocity flowing through slots resulting in reduced heat transfer. *Id.* at 1:26–39. Appellants acknowledge that Walker discloses the general conditions of flow rate in the plenum. *See* Appeal Br. 31. Appellants also note that Guemmer '960 and Gummer '805 disclose throttling valves to control air flow in the plenum. *Id.* at 32. One of ordinary skill in the gas-turbine art would, thus, understand that Walker discloses the general conditions of air velocity or flow rate in a compressor plenum, and both Guemmer '960 and Guemmer '805 disclose that one of ordinary skill in the art would understand the need to control the flow rate in the plenum, albeit by the use of throttling valves, that is, flow rate is recognized in Walker as a result-effective variable. Thus, we agree with the Examiner that determining a working range for the flow rate in the plenum,

as recited in claim 14, would have been obvious to one of ordinary skill in the art unless Appellants can establish the criticality of the recited flow rate.

In connection with Appellants' claim of criticality, we note that claim 14, as originally filed in the present application, did not contain this limitation. *See* Claim 14 filed July 14, 2011. In support of its criticality argument, Appellants direct us to paragraphs 34 and 35 of the Specification. Paragraph 34 discloses generally sizing of the plenum but does not address the claim limitation at issue. *See* Spec. ¶ 34. Paragraph 35 of the Specification provides that "local air flows . . . may be greater than 0.05 Mach, although typically, the average Mach number is less than 0.05." Spec. ¶ 35. Paragraphs 34 and 35 of the Specification do not support Appellants' argument because they disclose the claimed range is merely a typical average flow rate which may be locally exceeded within the plenum. We, thus, agree with the Examiner that Appellants have not established criticality of the limitation in claim 14 "that the secondary air flow has a flow rate of less than 0.05 Mach within the plenum."

With respect to Appellants' argument that the references teach away from a plenum sized to have a flow rate of less than 0.05 Mach, we note that a prior art reference does not teach away from the claimed subject matter unless the prior art reference also criticizes, discredits, or otherwise discourages the solution claimed. *See Crocs, Inc. v. U.S. International Trade Commission*, 598 F.3d 1294, 1308 (Fed. Cir. 2010) (Prior art taught away by specifically discouraging use of foam straps); *In re Fulton*, 391 F. 3d 1195, 1201 (Fed. Cir. 2004). Appellants do not direct us to any disclosure in Guemmer '960, Guemmer '805, Guemmer '596, or Walker (Appeal Br. 31) that criticizes, discredits, or otherwise would discourage one

of ordinary skill in the art from sizing a plenum with a flow rate of less than 0.05 Mach. Appellants refer to Walker's disclosure of requiring the air flow in the plenum to have a "high rate" of speed. *Id.* However, Appellants do not provide any evidence or technical reasoning to evaluate whether Walker's high rate of speed is substantially different than the recited flow rate of less than 0.05 Mach. We, thus, are not persuaded that the references teach away from this claim limitation.

For all the foregoing reasons, we are not persuaded by Appellants' third contention.

D. The Bleed Inlet Limitation

Appellants' fourth contention is that the references, as combined in the rejection, do not result in *positioning* the bleed inlet as recited in claim 14. Appeal Br. 31. Appellants argue that the position of the bleed inlet in combination with the plenum structure provides "the most overall efficient system" as opposed to "the delivery of the secondary air flow in conventional system [which] varies greatly with respect to engine operation and/or active throttling is required to control air flow." *Id.* at 31–32. Appellants then argue that Guemmer '960, Guemmer '805, Guemmer '596, and Walker fail to provide the same advantage as the recited bleed inlet. *Id.* at 32. Appellants note that Guemmer '960 discloses a bleed inlet within the stator, does not supply an accessory system, and uses a throttle valve within the plenum to manage flow. *Id.* Appellants note that Guemmer '805 removes secondary air but uses a throttle valve similar to Guemmer '960 to control flow in the plenum. *Id.* Appellants note that Walker discloses "bleed holes" that are sized to increase air flow speed which, according to Appellants, does not provide a "stable source." *Id.*

The Examiner responds that Guemmer '805 discloses the recited structure of the bleed inlet. Ans. 28.In the Final Office Action, the Examiner finds that "Guemmer '805 discloses a bleed inlet disposed in the inner surface of the casing downstream of a blade (at 13, Fig. 2)." Final Act. 5. Appellants do not dispute this finding. *See* Appeal Br. 23–24, 27–34. Guemmer '805 identifies element 7 as a rotor. Guemmer '805, ¶5. Figure 2 of Guemmer '805 illustrates that the bleed inlet identified by the Examiner in the rejection is downstream of rotor blade 7. Consequently, the Examiner's finding is supported by the disclosure of Guemmer '805. *Id.* at Fig. 2. The other items noted by Appellants are of no import to the Examiner's finding regarding the position of the bleed inlet. Appellants' argument is an attack on the references individually, while the rejection is based on the combined teachings of the references. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (One cannot show nonobviousenss by attacking references individually when the rejection is based on a combination of references.) We are, thus, not persuaded by Appellants' fourth contention.

E. Appellants' Argument Against the Combination of References

Appellants' fifth contention is that the rejection is based on impermissible hindsight, and the Examiner fails to provide any reason for combining the plenum systems of the prior art references "into a single plenum fluidly coupled to the bleed inlet, injection opening, and exhaust conduit." Appeal Br. 32. Appellants then argue that "the Examiner's line of reasoning ignores the most important aspect of Walker . . . , i.e., Walker discloses different plenums for different purposes." *Id.* at 33. Appellants also argue that Walker discloses removing bleed air from the compressor

"immediately upstream of the rotor 13 at bleed inlet 42" which is "depicted in Guemmer '596 as being the injection opening 10." *Id.*

Appellants' argument concerning the position of Walker's bleed inlet does not apprise us of error because, as the Examiner correctly notes, the rejection does not rely on Walker for the placement of the bleed inlet. *See* Final Act. 5. With respect to Appellants' argument that Walker discloses more than one plenum, the Examiner relies only on plenum 40 in the rejection. *Id.* at 6. This argument is not persuasive because the Examiner does not propose to bodily incorporate the structure of Walker, including more than one plenum, into the modified structure of Guemmer '960. *See In re Keller*, 642 F.2d at 425 ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art."); *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973) ("Combining the teachings of references does not involve an ability to combine their specific structures."). While Walker may utilize more than one plenum, we are not persuaded that a person of ordinary skill would view Walker as teaching against utilization of a common plenum for injection opening, and exhaust conduit. Indeed, the prior art already discloses that it was known in the art to use a common plenum in providing multiple flows. *See* Guemmer '960, Fig. 4d; Walker, Fig. 1.

F. Conclusion Regarding Claim 14

We have considered all of Appellants' contentions and determine that Appellants fail to persuasively apprise us of error in the Examiner's factual findings or rationale, quoted above, for the combination of Guemmer '960,

Guemmer '805, Guemmer '596, and Walker, which we determine to be reasonable and supported by rational underpinnings. *See KSR Intern. Co. v Teleflex Inc.*, 550 U.S. 398, 416 (2007) ("[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."). Further, Appellants' hindsight argument is of no import where the Examiner has stated a rationale for each modification that we determine are each supported adequately by sufficient facts. *See In re Cree*, 818 F.3d 694, 702, n.3 (Fed. Cir. 2016). We, thus, sustain the rejection of claim 14. Claim 15 falls with claim 14.

G. Claim 17

Claim 17 depends from claim 14 and further requires "an accessory system fluidly coupled to the compressor" and "an accessory conduit extending between the plenum and the accessory system . . . wherein the plenum is sized such that a distance between the accessory conduit and the bleed inlet is greater than twice a width of the bleed inlet." Appeal Br. 61–62 (Claims App.).

The Examiner finds that Guemmer '960 as modified by Walker discloses the subject matter of claim 17 but that the limitation regarding the distance in the plenum between the accessory conduit and the bleed inlet is not specifically disclosed. Final Act. 7–8. Nonetheless, the Examiner finds that the claimed ratio is not critical and, similar to claim 14, concludes that it would have been obvious to one of ordinary skill in the art to determine this ratio "as an engineering expedient for the purpose of reducing pressure losses within the secondary flow system associated with the interference of openings located in proximity with each other." *Id.* at 8.

Appellants contend that the rejection of claim 17 is inconsistent with the rejection of claim 14 because "the Examiner cites the de-icing system of Walker as an exhaust system" in the rejection of claim 14, and "the Examiner cites the de-icing system of Walker as an accessory system" in the rejection of claim 17. Appeal Br. 35. Appellants also contend that "it is unclear how and why the cited references could be considered to establish any relationship between 1) distance between the accessory conduit and . . . bleed inlet, and 2) the width of the bleed inlet, particularly a relationship that requires the first value to be twice that of the second." *Id.*

The Examiner responds that Walker discloses two different systems where "one system, such as the de-icing system (associated with bleed port 46), is the exhaust system and the other system (associated with outlet 56) is the accessory system." Ans. 29. For the following reasons, we sustain the rejection of claim 17.

Walker discloses two outlets for bleed air, i.e., 46 and 56. Walker, Figure 1. Exit port 46 is "for use when the anti-icing function is needed" and "bleed air exits the low pressure turbine plenum **40** through a low pressure turbine outlet duct **56**." *Id.* at 4:35–36, 42–43. Thus, the Examiner's finding that Walker discloses two systems, one for de-icing and one for exhaust is supported by a preponderance of the evidence. Further, Appellants do not persuasively explain why Walker's outlets 46 and 56 do not correspond to the accessory conduit required by claim 17 and the exhaust conduit required by claim 14 from which claim 17 depends. Further, Appellants' argument regarding the plenum size is substantially similar to the argument regarding flow rate in the plenum in claim 14. For reasons similar to those stated above in connection with claim 14, Appellants do not persuade us that one

of ordinary skill in the art would not have found it obvious to, or would not have been able to, determine the working range for the plenum size as recited in claim 17. Further, unlike claim 14, Appellants do not argue that the working range for the plenum size recited in claim 17 is critical to the claimed invention.

For all the foregoing reasons, we sustain the rejection of claim 17.

H. Claim 19

Claim 19 depends from claim 17 and requires the accessory conduit to be "spaced from the exhaust accessory conduit at a distance at least three time greater than" the diameter of the accessory conduit. Appeal Br. 62 (Claims App.). The Examiner finds that Guemmer '960 as modified does not specifically disclose "a particular spacing relative to the outlets." Final Act. 8. Nonetheless, similar to claim 14, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to further modify Guemmer '960 as recited in claim 19 "as an engineering expedient for the purpose of utilizing a known cross section to transport the fluids, and to reduce pressure losses within the secondary flow system associated with the interference of constrictions located in proximity with each other." *Id.* at 9.

Appellants argue that "it is unclear how and why the cited references could be considered to establish any relationship between 1) distance between the accessory conduit and the exhaust conduit, and 2) the diameter of the accessory conduit, particularly a relationship that requires the first value to be three times that of the second." Appeal Br. 34–35.

Appellants' argument regarding the spacing of the exhaust conduit and accessory conduit is substantially similar to the argument regarding flow rate in the plenum in claim 14. For similar reasons to those stated above in

connection with claim 14, Appellants do not persuade us that one of ordinary skill in the art would not have found it obvious to, or would not have been able to, determine the working range for this spacing as recited in claim 19. Further, unlike claim 14, Appellants do not argue that the spacing between the exhaust conduit and accessory conduit recited in claim 1 is critical to the claimed invention.

For all the foregoing reasons, we sustain the rejection of claim 19.

Rejection 2

The Examiner finds that Nolcheff discloses many of the limitations of claim 1 except

> a rotor platform, an accessory conduit configured to be fluidly coupled to an accessory of the gas turbine engine, a second portion of the secondary airflow is directed in through the bleed inlet, through the plenum, and out through the accessory conduit, and the bleed inlet being arranged between the exit stator and the impeller.

Final Act. 9–10.

The Examiner finds that Stratford discloses a rotor platform, Walker discloses an accessory conduit fluidly coupled to an accessory system and a portion of secondary air flow directed through a plenum and out the accessory conduit, and Schaum discloses a bleed inlet arranged between an exit stator and an impeller. *Id.* at 10–11. The Examiner concludes it would have been obvious to one of ordinary skill in the art to modify Nolcheff's compressor with Stratford's rotor platform "to form a smooth continuation to the radially outer surface of the rotor which defines the inner boundary of the flow path of the air through the compressor," providing an accessory conduit as taught by Walker "such that a portion of the secondary air flow is

directed in through a bleed inlet, through the plenum and out through the accessory conduit" so as to "utilize the bleed air from the compressor for cooling, deicing, and/or maintaining cabin pressure," and arranging the bleed inlet between the exit stator and the impeller as taught by Schaum "to reduce the work done to the air by the stage." *Id.* at 11–12.

Appellants contend that one of ordinary skill in the art would not modify the bleed inlet of Nolcheff based on the teachings of Schaum. Appeal Br. 39. Appellants argue that the bleed inlet in Nolcheff is within the impeller 208 and the fluid extracted through the bleed inlet is recirculated and re-injected at a point upstream of the impeller in order to "increase[s] the efficiency of the impeller 103." *Id.* (citing Nolcheff ¶ 23). Appellants submit that modifying the location of Nolcheff's bleed inlet to a point upstream of the impeller, as taught by Schaum, would result in a non-functional bleed inlet because Nolcheff's injection inlet is located at the same point. *Id.*

In the Answer, the Examiner notes that Schaum teaches a bleed inlet upstream of the diffuser "to reduce the work done to the bleed air by that stage" and thus Nolcheff would realize "an advantage to reducing work done on the bleed air" if Nolcheff's bleed inlet is *moved* "to a more upstream position" as taught by Schaum. Ans. 30–31. For the following reasons, we do not sustain the rejection of claim 1.

The Examiner finds that Nolcheff's opening 228 corresponds to the recited bleed inlet. Final Act. 10. Nolcheff's "opening **228** allows the air to circulate from within . . . impeller **208** through a plenum **230**." Nolcheff ¶ 22, Fig. 2. The air "travels from the opening **228** and through the plenum **230** toward the transition duct **244** and then returns to the impeller **208** via

the impeller leading edge **218** along a first recirculation pathway **234**." *Id.* Nolcheff discloses that "this mode of recirculation . . . increases the efficiency of the impeller." *Id.* ¶ 23. Nolcheff also discloses that "this type of recirculation for the purpose of increasing compressor efficiency is highly novel." *Id.*

In the rejection, the Examiner modifies the location of Nolcheff's opening 228 to a more upstream point between the exit stator and the impeller. Ans. 30–31; *see also* Final Act. 11 ("Nolcheff . . . lacks the bleed inlet in front of the impeller."). However, modifying Nolcheff to relocate opening 228 in front of the impeller would preclude Nolcheff's recirculation of air from the impeller through opening 228, through the plenum, and into the leading edge of the impeller. The Examiner does not explain how moving opening 228 in front of the impeller would have been accomplished without obviating Nolcheff's recirculation flow and the consequent increase in compressor efficiency. The rejection, thus, undermines the basis of Nolcheff's invention, and changes the principle of operation of Nolcheff. Accordingly, the rejection does not render claim 1 unpatentable. *See In re Ratti*, 270 F.2d 810, 813 (CCPA 1959). We, thus, do not sustain the rejection of claim 1 and claims 4–9 which depend from claim 1.

Rejection 3

Claim 3, which depends from claim 1, is rejected based on the combination of Nolcheff, Stratford, Walker, and Schaum, with additional disclosure from Guemmer '596. Final Act. 14. The Examiner does not rely on the additional disclosure from Guemmer '596 to cure the deficiencies in the rejection of claim 1 discussed above in connection with Rejection 2. We, therefore, do not sustain the rejection of claim 3 for the same reasons.

Independent claim 20 contains the same limitation as claim 1 of "the bleed inlet being arranged between the exit stator and impeller." Appeal Br. 62 (Claims App.). The Examiner relies on the same findings and reasoning based on Nolcheff and Schaum as for claim 1 to establish this limitation. Final Act. 14–17. The Examiner does not rely on the additional disclosure from Guemmer '596 to cure the deficiencies in the rejection of claim 1 discussed above in connection with Rejection 2. *Id.* at 17–18. We, therefore, do not sustain the rejection of claim 20 for the same reasons.

Rejections 4–6

Claims 10–13, 21, and 22 depend directly or indirectly from claim 1. Appeal Br. 59–60, 64 (Claims App.). The Examiner rejects these claims based on the combination of Nolcheff, Stratford, Walker, and Schaum, with additional disclosure from Blais, Guemmer '960, and Cummings. Final Act. 19–23. The Examiner does not rely on the additional disclosure from Blais, Gummer '960, and Cummings to cure the deficiencies in the rejection of claim 1 discussed above in connection with Rejection 2. *Id.* We, therefore, do not sustain the rejection of claims 10–13, 21, and 22 for the same reasons.

Rejection 7

Claim 23 depends from claim 14 and requires, *inter alia*, "the bleed inlet is arranged between the exit stator and the impeller." Appeal Br. 59 (Claims App.). The Examiner rejects claim 23 based on the combined teachings of Nolcheff, Stratford, Walker, and Schaum. Final Act. 23–26. This rejection relies on Nolcheff as modified by Schaum to establish the limitation of the bleed inlet "arranged between the exit stator and the impeller." *Id.* at 25–26. We, thus, do not sustain the rejection of claim 23

for the same reasons stated in connection with the rejection of claim 1 in Rejection 2.

DECISION

The Examiner's decision rejecting claims 14, 15, 17, and 19 is affirmed.

The Examiner's decision rejection claims 1, 3–13, and 21–23 is reversed.

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