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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ALBERT VENINGER, JEFFREY MELMAN, CHRISTINE BLANCHARD, and BARRY SCHLEIN

Appeal 2019-003806
Application 12/742,031
Technology Center 3700

Before STEFAN STAICOVICI, JAMES P. CALVE, and ARTHUR M. PESLAK, *Administrative Patent Judges.*

PESLAK, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–5, 7–11, and 21. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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

CLAIMED SUBJECT MATTER

Appellant's invention relates to a gas turbine engine with reduced emissions. Spec. 1:4–6. Claim 1, reproduced below with italics added, is illustrative of the claimed subject matter:

> 1. A gas turbine engine having reduced emissions comprising:
>
> a compressor for providing pressurized air; and
>
> a diffusion combustor module including a fuel nozzle in communication with a combustion chamber comprising:
>
> an inner metal liner defining at least one combustion zone for burning a mixture of fuel and a first portion of the pressurized air, said inner metal liner having a wall with a hot side facing the at least one combustion zone and an oppositely faced cold side;
>
> a shroud affixed to said inner metal liner and circumscribing a portion of said inner liner, said shroud spaced from said cold side and forming an annulus there between for accepting a second portion of the pressurized air therein;
>
> a first plurality of bosses projecting radially outward into the annulus from the cold side of the inner metal liner toward the shroud, the first plurality of bosses having boss bores penetrating the boss and the inner metal liner, and a radially outer sealing surface;
>
> a first plurality of apertures penetrating the shroud, ones of the first plurality of apertures aligning with and corresponding to ones of the first plurality of bosses; and
>
> a plurality of heat transfer features disposed on said cold side of said inner metal liner wall for exchanging heat from said wall to the second portion of the pressurized air;
>
> wherein at operating temperatures said inner metal liner expands relative to the shroud such that each radially outer sealing surface of the first plurality of bosses seats against the shroud for the first portion of pressurized air to radially enter the at least one combustion zone, and to *prevent the second portion of the pressurized air in the annulus from radially entering the at least one combustion zone through the first*

plurality of bosses, maintaining flow of the second portion of the pressurized air within the annulus.

REFERENCE(S)

The prior art relied upon by the Examiner is:

Name	Reference	Date
Cramer	US 4,838,031	June 13, 1989
Pidcock	US 7,000,397 B2	Feb. 21, 2006
Green	US 7,007,482 B2	Mar. 7, 2006
Mandai	US 2003/0079461 A1	May 1, 2003
Glezer	US2005/0044857 A1	Mar. 3, 2005

REJECTIONS

1) The Examiner rejects claims 1, 2, and 4 under 35 U.S.C. § 103(a) as unpatentable over Pidcock and Mandai.
2) The Examiner rejects claims 7, 8, and 10 under 35 U.S.C. § 102(b) as being anticipated by Pidcock.
3) The Examiner rejects claim 5 under 35 U.S.C. § 103(a) as unpatentable over Pidcock, Mandai, and Green.
4) The Examiner rejects claim 11 under 35 U.S.C. § 103(a) as unpatentable over Pidcock and Green.
5) The Examiner rejects claims 1–4 and 21 under 35 U.S.C. § 103(a) as unpatentable over Glezer, Mandai, Cramer, and Pidcock.
6) The Examiner rejects claim 5 under 35 U.S.C. § 103(a) as unpatentable over Glezer, Mandai, Cramer, Pidcock, and Green.
7) The Examiner rejects claims 7–10 under 35 U.S.C. § 103(a) as unpatentable over Glezer, Cramer, and Pidcock.
8) The Examiner rejects claim 11 under 35 U.S.C. § 103(a) as unpatentable over Glezer, Cramer, Pidcock, and Green.

OPINION

Rejection 1: Claims 1, 2, and 4–Obviousness over Pidcock and Mandai

The Examiner finds that Pidcock discloses all of the limitations of claim 1 except the combustor being a diffusion combustor. Final Act. 4–5. The Examiner finds that Mandai discloses a diffusion combustor and concludes that it would have been obvious to one of ordinary skill in the art to modify Pidcock to provide diffusion combustion in Pidcock's gas turbine combustor as a "simple substitution of prior art elements according to known methods to yield predictable results." *Id.* at 5.

Appellant first contends that Pidcock fails to disclose the limitation in claim 1 of preventing "a second portion of air in the annulus from entering the at least one combustion zone, **maintaining flow of the second portion of air within the annulus**" because Pidcock discloses "film cooling holes formed through the 'inner metal liner' which allows flow of a different portion of cooling air from the annulus into the combustion chamber, **directly contrary to the limitation of claim 1**." Appeal Br. 5–6. According to Appellant, the Examiner's rejection "eliminate[s] film cooling holes through the liner" of Pidcock and thereby renders Pidcock unsatisfactory for its intended purpose or improperly changes its principle of operation. *Id.* at 6.

The Examiner responds that the rejection did not suggest modifying Pidcock to eliminate film cooling holes from its liner. Ans. 4–5. The Examiner further responds that Appellant's argument concerning maintaining flow of the second portion of air within the annulus is based on an erroneous reading of the limitations of claim 1. *Id.* at 3–4. According to

the Examiner, claim 1 "does not require the inner liner to be free of cooling holes and does not require that all of the flow in the annulus remain in the annulus because . . . the 'maintaining' is specifically claimed *as a function of the seating between the boss and shroud, not as an overall function of the liner*." *Id.* at 3. The Examiner explains that "[w]hen the boss seats against the shroud in . . . Pidcock, the seating provides a seal which prevents air in the annulus from flowing through the seating into the combustion chamber, thereby maintaining air, at that particular location and time, in the annulus." *Id.* at 4. The Examiner further explains that although "some of the air may then flow elsewhere (i.e. downstream in the annulus or through the film cooling holes of the liner)," the claim does not require that "no air should exit the annulus through the liner." *Id.* Appellant's first contention is not persuasive for the following reasons.

The relevant limitation of claim 1 states "prevent the second portion of the pressurized air in the annulus from *radially entering the at least one combustion zone through the first plurality of bosses,* maintaining the flow of the second portion of the pressurized air within the annulus." Appeal Br. 16 (Claims App.) (emphasis added). We note that Appellant begins this argument by omitting the portion of claim 1 that we have italicized. *See* Appeal Br. 5.

Pidcock discloses a combustor liner with an inner wall 36, comprised of tiles 40, which the Examiner finds corresponds to the recited inner metal liner (Final Act. 4), and outer wall 38 which the Examiner finds corresponds to the recited shroud (*id.*), whereby cooling air flows in the gap between the two walls. Pidcock 4:34–44, Fig. 2. Pidcock also discloses that air enters into combustion chambers through mixing ports where the air is mixed with

fuel to control emissions. *Id.* at 4:53–57. Figure 6 of Pidcock is reproduced below:

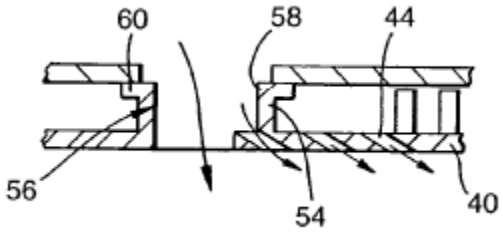

Figure 6 of Pidcock "is a diagrammatic cross section of a combustor wall structure." *Id.* at 3:42–43. In the Figure 6 embodiment, air flows into the combustion chamber through mixing port 56 which is formed by cylindrical wall 58 of boss 54. *Id.* at 5:25–27. Boss 54 comprises an annular flange 60, which the Examiner finds corresponds to the recited radially outer sealing surface (Final Act. 4), and which seats against the outer wall 38 at operating temperature. *Id.* In this embodiment, "a plurality of cooling holes 44, angled at about 30° to 40° to the general plane of the tile 40" generate a cooling film on the combustor wall. Pidcock 5:30–32. Contrary to Appellant's argument, the Examiner does not suggest removing these cooling holes in the Final Office Action. *See* Final Act. 3–5. Consequently, there are two portions of air shown in Figure 6 when annular flange 60 seals against the outer wall: the first portion entering the combustion chamber radially through mixing port 56 and the second portion in the annulus between the inner and outer walls which also flows through the cooling holes 44. In this configuration, we agree with the Examiner that the second portion of air does not enter the combustion zone through mixing port 56 when boss 54 seats against outer wall 38 and is maintained in the annulus between the two walls which is what claim 1 requires. Appellant's argument that the second portion flows into the combustion chamber through the

cooling holes is not persuasive because the argument is not commensurate in scope with claim 1. As the Examiner correctly notes, the claim does not preclude air in the annulus from flowing into the combustion chamber. The claim only requires that air from the annulus not flow into the combustion chamber "through the first plurality of bosses."

Appellant's second contention is that "film cooling the inner surface (hot side) of the inner wall as shown by Pidcock greatly reduces the thermal mass of the liner as compared to non-film cooled liners" which "minimizes relative thermal expansion between the 'inner liner' and 'shroud' due to the nearly non[-]existent thermal differential." Appeal Br. 8. According to Appellant, this purported reduction in thermal differential would not allow the inner liner to expand relative to the shroud and the bosses to seat against the shroud as recited in claim 1 and would complicate the assembly of the device recited in claim 1. *Id.* The Examiner responds that "Pidcock does not teach what the differential is" and in any event, "[t]he liner is exposed to combustion gases and thus greater heat, and therefore expands relative to the shroud (which is exposed to much cooler air)." Ans. 5, 8. This contention is not persuasive because it is attorney argument not supported by persuasive evidence that Pidcock's film cooled combustor would have reduced thermal mass and minimal thermal expansion.

We have considered all of Appellant's contentions and determine that Appellant does not apprise us of Examiner error. Therefore, we sustain the rejection of claim 1. Appellant does not make any separate arguments for the patentability of dependent claims 2 and 4. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of claims 2 and 4.

Rejection 2: Claims 7, 8, and 10–Anticipation by Pidcock

In arguing for the patentability of claim 7, Appellant relies on substantially the same contentions as for Rejection 1. *See* Appeal Br. 11–13. In particular, Appellant contends that the Examiner improperly modified Pidcock to remove the film cooling holes which "would entirely undermine operation of the disclosure." Appeal Br. 12. This contention is not persuasive because the Examiner did not modify Pidcock to remove the cooling holes. *See* Final Act. 2–3. Appellant also repeats the contention that Pidcock "reduces the differential between a 'hot' and 'cold' side and virtually eliminates relative thermal expansion between the 'inner liner' and 'shroud." Appeal Br. 13. As discussed above, in connection with Rejection 1, this contention is not persuasive because it is not supported by persuasive evidence. Therefore, we sustain the rejection of claim 7. Appellant does not make any separate argument for the patentability of dependent claims 8 and 10. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of claims 8 and 10.

Rejection 3: Claim 5–Obviousness over Pidcock, Mandai, and Green

Appellant does not argue for the patentability of claim 5, which depends from claim 1, over the combined teachings of Pidcock, Mandai, and Green. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of claim 5.

Rejection 4: Claim 11–Obviousness over Pidcock and Green

Appellant does not argue for the patentability of claim 11, which depends from claim 7, over the combined teachings of Pidcock and Green. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of claim 11.

Rejection 5: Claims 1–4 and 21–Obviousness over Glezer, Mandai, Cramer and Pidcock

The Examiner finds that Glezer discloses most of the limitations of claim 1 except for a diffusion combustor, the inner liner being metal, and the recited first plurality of bosses which, *inter alia*, "seat[s] against the shroud for the first portion of pressurized air to radially enter the at least one combustion zone." Final Act. 6–7. The Examiner relies on Mandai to disclose a diffusion combustor, Cramer for disclosing "mixing ports in order to provide air for mixing in the combustion zone," and Pidcock for disclosing the plurality of bosses and a metal inner liner. *Id.* at 7.

Appellant first contends that "Cramer teaches an internally cooled liner separate from [the] other parts (e.g., 'housing 22' or 'chamber wall 25')." Appeal Br. 10. The Examiner responds that even though Cramer teaches "an internally cooled liner (as opposed to a liner and a shroud), the structure is the same" because it discloses "two walls with an annulus between them and air ports which allow a portion of the air into the combustion zone." Ans. 6–7 (citing Cramer, Fig. 2, ports 28). The Examiner further notes that in any event the rejection relies on Glezer to teach the shroud and liner and Cramer to "teach that it was well known in the art to provide mixing ports in order to provide air for mixing in the combustion zone." *Id.* at 7. Appellant's first contention is not persuasive because it is not responsive to the rejection which relies on Glezer for disclosure of the liner and shroud. *See* Final Act. 6–7.

Appellant next contends that because Cramer's combustion chamber liner 42 is ceramic that it would not have been obvious to a skilled artisan to substitute "a metal layer for ceramic layer 42, as Cramer specifically calls

for the thermal resistance properties of ceramics in order to withstand intense heat in the combustion chamber." Appeal Br. 10. The Examiner responds that the rejection does not rely on modifying Cramer's ceramic layer to be metal but instead relies on Cramer to teach mixing ports. Ans. 7. This contention is also not persuasive because it not responsive to the rejection which does not modify the material of Cramer's ceramic layer 42 but rather relies on Pidcock's disclosure of a metal liner to cure the lack of explicit disclosure of Glezer's liner being metal. *See* Final Act. 6–7.

Appellant next contends "that adding a fourth reference, Pidcock, to the mix further complicates the basis of the rejection and requires a significant level of hindsight." Appeal Br. 11. According to Appellant, because "it would not have occurred to a skilled artisan how to combine the other three references in the manner alleged by the Examiner, adding Pidcock would also complicate the thermal expansion aspect of the purported rejection." *Id.* Appellant relies on the argument from Rejection 1 that "Pidcock necessarily reduce[s] the relative thermal differential between the hot and cold side of the liner." *Id.* The Examiner responds that one of ordinary skill in the art after reading Pidcock "would understand to provide a boss which extends outward from the liner and abuts the shroud, and that such addition would allow air to flow from outside the shroud into the combustion zone," and "the relative thermal differential would still be present in Pidcock due to the inner liner being subject to [the higher] combustion temperatures." Ans. 8. This contention is not persuasive for the following reasons.

We note that Appellant does not dispute any of the Examiner's factual findings. *See* Appeal Br. 9–11. Nor does Appellant specifically dispute any

of the reasons stated by the Examiner for combining the disclosures of the references. *See id.* As noted above in connection with Rejection 1, we are not persuaded by Appellant's contentions concerning the Pidcock thermal differential issue. For these reasons, we are not persuaded by this contention because Appellant does not apprise us of error in the Examiner's factual findings or reasons for combining the references which are supported by a rational underpinning. *See* 37 C.F.R. § 41.37 (c)(iv) (Appellant "shall explain why the Examiner erred.")

We have considered all of Appellant's contentions and determine that Appellant does not apprise us of Examiner error. Therefore, we sustain the rejection of claim 1. Appellant does not make any separate arguments for the patentability of dependent claims 2–4 and 21. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of those claims.

Rejection 6: Claim 5–Obviousness over Glezer, Mandai, Cramer, Pidcock, and Green

Appellant does not argue for the patentability of claim 5, which depends from claim 1, over the combined teachings of Glezer, Mandai, Cramer, Pidcock, and Green. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of claim 5.

Rejection 7: Claims 7–10–Obviousness over Glezer, Cramer, and Pidcock

In arguing for the patentability of claim 7, Appellant repeats the contention from Rejection 5 that the rejection improperly changes the material of Cramer from ceramic to metal. Appeal Br. 13–14. This contention is not persuasive for the same reasons discussed above in connection with Rejection 5. Appellant then repeats essentially the same

arguments from Rejection 5 against the combination of references. *See id.* at 14. This contention is also not persuasive for the same reasons discussed above in connection with Rejection 5. Therefore, we sustain the rejection of claim 7. Appellant does not argue for the patentability of claims 8–10, which depend from claim 7. Therefore, we summarily sustain the rejection of claims 8–10.

Rejection 8: Claim 11–Obviousness over Glezer, Cramer, Pidcock, and Green

Appellant does not argue for the patentability of claim 11, which depends from claim 7, over the combined teachings of Glezer, Cramer, Pidcock and Green. Appeal Br. 4–5. Therefore, we summarily sustain the rejection of claim 11.

CONCLUSION

The Examiner's rejections are affirmed.

More specifically,

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 2, 4	103(a)	Pidcock, Mandai	1, 2, 4	
7, 8, 10	102(b)	Pidcock	7, 8, 10	
5	103(a)	Pidcock, Mandai, Green	5	
11	103(a)	Pidcock, Green	11	
1–4, 21	103(a)	Glezer, Mandai, Cramer, Pidcock	1–4, 21	
5	103(a)	Glezer, Mandai, Cramer, Pidcock, Green	5	

7–10	103(a)	Glezer, Cramer, Pidcock	7–10	
11	103	Glezer, Cramer, Pidcock, Green	11	
Overall Outcome			1–5, 7–11, 21	

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) (2018).

AFFIRMED