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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHANNES DIEM,
EBERHARD PANTOW,
ULRICH MAUCHER,
PETER GESKES,
MARTIN KAEMMERER,
KLAUS IRMLER,
JENS HOLDENRIED, and
MICHAEL SCHMIDT

Appeal 2018-000784
Application 12/813,818
Technology Center 3700

Before JENNIFER D. BAHR, MICHAEL L. HOELTER, and
LEE L. STEPINA, *Administrative Patent Judges*.

HOELTER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

This is a decision on appeal, under 35 U.S.C. § 134(a), from the Examiner's final rejection of claims 1, 13, 14, 17–24, and 28–30. Final Act. 1 (Office Action Summary); Reply Br. 1. We have jurisdiction under 35 U.S.C. § 6(b). For the reasons explained below, we do not find error in the Examiner's rejection of these claims. Accordingly, we AFFIRM the Examiner's rejection.

THE CLAIMED SUBJECT MATTER

The disclosed subject matter “relates to a device for exchanging heat and to a motor vehicle with a device of this type.” Spec. ¶ 3. Apparatus claims 1, 14, and 24 are independent. Claim 1 is illustrative of the claims on appeal and is reproduced below.

1. A device for exchanging heat between a first medium and a second medium, the device comprising:
 - a plurality of plate pairs stacked one on top of another in a stacking direction;
 - a first flow space, through which a first medium is adapted to flow, arranged between two plates of at least one plate pair;
 - a second flow space, through which a second medium is adapted to flow, arranged between two plate pairs adjacent to one another;
 - a corrugated sheet, disposed in the first flow space, the corrugated sheet defining parallel coolant channels, the coolant channels being separated by individual partition walls, the coolant channels having closed ends and comprising connecting openings along the coolant channels for connecting adjacent coolant channels, the coolant channels forming a continuous, meandering coolant stretch,
 - wherein an orientation of the first flow space is different from an orientation of the second flow space,
 - wherein the plurality of plate pairs are stacked such that the first flow space and the second flow space are arranged wherein the second flow space is outermost, and
 - wherein a direction of flow of exhaust gas is parallel and opposite to a direction of flow of coolant.

REFERENCES RELIED ON BY THE EXAMINER

Abi-Akar et al.	US 2006/0124283 A1	June 15, 2006
Brost	US 7,631,688 B2	Dec. 15, 2009
Kawachi	JP 2003314975	Nov. 6, 2003

THE REJECTION ON APPEAL¹

Claims 1, 13, 14, 17–24, and 28–30 are rejected under 35 U.S.C. § 103(a) as unpatentable over Brost, Kawachi, and Abi-Akar.

ANALYSIS

Appellants argue all the claims (i.e., claims 1, 13, 14, 17–24, and 28–30) together, but also present additional separate arguments regarding independent claim 24. App. Br. 8–13. We select independent claims 1 and 24 for review, with the remaining claims (i.e., claims 13, 14, 17–23, and 28–30) standing or falling with their respective parent claim. *See* 37 C.F.R. § 41.37(c)(1)(iv). Our analysis of claims 1 and 24 follows.

With respect to both claims, the Examiner primarily relies on the teachings of Brost for disclosing their limitations (*see* Final Act. 4, 5, 10, 11), but relies on Kawachi for disclosing “a corrugated sheet (32) disposed in the flow space (Figs.)” with the sheet’s “coolant channels having closed ends (where the corrugated sheet abuts the plates; Fig. 5).” Final Act. 5; *see also id.* at 11. Additionally, the Examiner relies on Abi-Akar for also disclosing first and second flow spaces stating that it would have been obvious “to choose to arrange the second [exhaust] flow spaces outermost, as taught by Abi-Akar et al., in order to transfer as much heat as possible to the first fluid (coolant).” Final Act. 6; *see also id.* at 12.

¹ The rejection of all the claims under 35 U.S.C. § 112(a) “as failing to comply with the enablement requirement” (Final Act. 2) has been withdrawn. Ans. 2 (“It is noted that the claim amendments entered by the 4/10/17 Advisory Action overcame a 112 rejection.”).

Appellants initially focus on the claim 1 limitation, “wherein the second [exhaust] flow space is outermost,”² acknowledging the Examiner’s reliance on Abi-Akar as “mak[ing] up for the deficiencies of Brost,” and the above stated reason for their combination. App. Br. 9–10. However, Appellants assert that modifying Brost to have outermost exhaust flow “would change the entire structure and principle of operation of Brost.” App. Br. 10. Appellants explain that in Brost, “the coolant layers are the outermost layers so that they provide a cooling effect to the surrounded exhaust layers” and that reversing this arrangement (i.e., with the exhaust layers outermost) “would thus render Brost insufficient for its intended purpose.”³ App. Br. 10; *see also* Reply Br. 1, 2.

The Examiner disagrees, stating “[t]he purpose of Brost is to exchange heat” and that rearranging “the coolant and exhaust layers, which [Appellants have] not contested that Abi-Akar teaches, will not destroy any of these goals.” Ans. 4. This is because, as per the Examiner, the “coolant and exhaust fluids will still perform efficient heat exchange.” Ans. 4.

Brost is entitled “Flat Tube Heat Exchanger with Housing” and describes “[a] heat exchanger including a stack of flat tubes.” Brost Title, Abstract. Appellants do not explain how arranging the tubes as stated by the Examiner so that the exhaust tubes are outmost, would preclude heat exchange from occurring. In other words, Appellants do not explain how

² Claim 14 includes identical language whereas claim 24 includes the similar limitation, “wherein an outermost layer at each end of the exhaust gas evaporator comprises one of the exhaust gas layers.”

³ “Appellants maintain that the essential structure of the claimed invention is completely different from that of Brost.” Reply Br. 1.

making this modification would “render Brost insufficient for its intended purpose” of “exchang[ing] heat between the coolant and the exhaust layers.” Reply Br. 2; Ans. 4. Accordingly, we are not persuaded the Examiner has erred by concluding that it would have been obvious “to choose to arrange the second [exhaust] flow spaces outermost.”⁴ Final Act. 6, 12.

Claims 1 and 24 also recite a corrugated sheet having coolant channels with “the coolant channels having closed ends.” Appellants contend that Kawachi “fails to teach or suggest that the coolant channels have closed ends.” App. Br. 10. The Examiner disagrees and states that Kawachi’s channels “have closed ends (ends are closed where they abut against the plates that encase them (see Figs. 4–5).” Ans. 6. Indeed, a review of Figure 5 of Kawachi discloses elongated openings 33 that extend longitudinally along opposite sides of the corrugations thereby permitting fluid to travel in a serpentine manner through the corrugations. Hence, there is merit to the Examiner’s understanding of Kawachi that the ends of Kawachi’s channels “have closed ends” where the ends of the corrugations abut plates 21, 22. Ans. 6. Appellants fail to explain otherwise. As such, we are not persuaded the Examiner erred in relying on Kawachi for disclosing “coolant channels having closed ends” as recited.

Appellants also address the claim 1 limitation (acknowledged as “similarly recited in independent claims 14 and 24”) reciting “wherein a direction of flow of exhaust gas is parallel and opposite to a direction of

⁴ The Examiner also states that “the rearrangement of the fluid pathways, as taught by *Abi-Akar* . . . does not destroy any of the purposes of *Brost* [and that instead, *Brost*] merely offers an alternative optimization of the overall device . . . which are well-understood in the art.” Ans. 5.

flow of coolant.” App. Br. 11; *see also* Reply Br. 2. Appellants contend that Brost does not disclose this “parallel and opposite” limitation.⁵ App. Br. 11. Regarding the “parallel” component of this limitation, the Examiner relies on the left-to-right “general flow path” depicted in Figure 2 of Brost. Ans. 7. Indeed, although arrows 74 depict Brost’s coolant flow path as “meandering” as recited, the coolant, nevertheless, enters on the left and exits on the right. *See* Brost Fig. 2. Regarding the “opposite” component of this limitation, the Examiner relies on Brost’s disclosure that this flow path can be “for example, counter-current or co-current.” Ans. 6; Brost 5:20. As understood, both “counter-current” and “co-current” imply a “parallel” flow path, with the “counter-current” description being an example of an “opposite” flow path. *See* Ans. 6.

Appellants disagree stating that Brost “does not establish a counter-current or co-current flow principle” because “Brost does not intend to establish any specific flow principle.” Reply Br. 3 (referencing Brost 5:16–20). Brost states:

The arrows 74 illustrate the flow path, although it should be understood that the indicated flow path is merely an example for illustration, and is not intended to establish a specific flow principle, for example, counter-current or co-current.

Brost 5:16–20. As can be seen, Brost states that the illustrated exemplary flow path (*see* Brost Fig. 2) “is not intended to establish a specific flow principal,” because it is to be understood that other flow principles are possible. Nevertheless, Brost expressly discloses two such possibilities, i.e.,

⁵ Appellants also assert “that one of ordinary skill in the art would not have modified Brost to arrive at the claimed invention because doing so would change the entire structure and principle of operation of Brost.” Reply Br. 2.

“counter-current or co-current” flow principles. Thus, regarding the disclosed “counter-current” flow principle, Appellants’ arguments are not persuasive that Brost fails to teach flow paths that are both “parallel and opposite” as claimed.

Appellants also contend that Brost’s flow path “is perpendicular” and thus not “parallel and opposite” as recited. App. Br. 12. However, although Brost’s flow path “meanders” the same as Appellants’ flow path, such “meandering” does not alter the Examiner’s finding that “the overall flow path along the heat exchanging surfaces being parallel” with each other (whether travelling counter-currently or co-currently). Ans. 7 (referencing Brost Fig. 2).

Specifically regarding claim 24, Appellants emphasize that this claim recites the exhaust channels and the coolant layers as “having entirely flat outer surfaces,” with the exhaust channels also “being devoid of any obstructions” therein. App. Br. 12. Appellants contend, Brost’s “layers are not entirely flat” because Brost’s “tubes 10 have cross-sectional widening portions 24 formed in each tube.” App. Br. 12; Reply Br. 3; *see also* Brost Figs. Appellants further contend that “Brost fails to teach or suggest the exhaust gas channels being devoid of any obstructions within the exhaust gas channels.” App. Br. 12; Reply Br. 3.

Regarding the limitation directed to “having entirely flat outer surfaces,” the Examiner explains, the “widening 24 that [Appellants] states he intended this limitation to target are only optional; see Col. 3:39–52[.]” Final Act. 11; *see also* Ans. 8. There is merit to the Examiner’s finding that widening 24 are optional because Brost states:

It should also be understood, however, that while arranging an additional part between the flat tubes **10** may be used to form the channels instead of the cross-sectional widening **24** is feasible, but in the most preferred form of this invention the cross-sectional widening is used for this function.

Brost 3:41–46. Hence, while the use of widenings **24** is “the most preferred,” it is also possible to employ “an additional part between the flat tubes **10**” for such purposes. Thus, Appellants’ reliance on widenings **24** as causing Brost’s tubes to fail the “entirely flat” limitation is not persuasive in view of Brost’s teaching of optionally being able to employ “an additional part between the flat tubes **10**” instead of widenings **24**.

Regarding the limitation directed to “being devoid of any obstructions,” the Examiner also identifies where Brost teaches that “there are no obstructions within the exhaust gas channels” and that “inserts **80** are optional.” Final Act. 11; Ans. 8 (both referencing Brost 5:51–59). This referenced passage states, “[i]t should also be understood that the present invention could also be used with heat exchangers in which such inserts and/or bypasses are not present in the tubes.” Brost 5:51–53. Appellants do not argue otherwise. *See* Reply Br. 3–4.

Accordingly, and based on the record presented, we are not persuaded of Examiner error. Consequently, we sustain the Examiner’s rejection of claims 1, 13, 14, 17–24, and 28–30 as being obvious over Brost, Kawachi, and Abi-Akar.

DECISION

The Examiner’s rejections of claims 1, 13, 14, 17–24, and 28–30 is affirmed.

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

AFFIRMED