

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROGER R. LESIEUR

Appeal No. 2002-0249
Application 09/321,390¹

ON BRIEF

Before PAK, WARREN, and DELMENDO, Administrative Patent Judges.
PAK, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from
the examiner's refusal to allow claims 1 through 7, 9 through 19,

¹ Application for patent filed May 27, 1999.

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21 and 22, which are all of the claims pending in the above-identified application.

APPEALED SUBJECT MATTER

According to the appellant (the specification, page 2), it is known in the art that the reduction of the size and weight of an autothermal reformer assembly is desirable. In order to decrease the size and weight of the autothermal reformer assembly, it is also known in the art to focus on the design of the shapes and/or configurations of catalysts. See the specification, pages 2 and 3.

The subject matter on appeal is directed to an autothermal reformer assembly "which employs an open cell foam catalyst bed that reduces the size and weight of the reformer assembly." See the specification, page 1. The open cell foam catalyst bed also "provides an enhanced catalyst and heat transfer surface area... and ... an enhanced gas mixing and distribution flow path." See the specification, page 3. Details of the appealed subject matter are illustrated in representative claims 1, 13, 19 and 22 which are reproduced below:

1. A hydrocarbon fuel gas autothermal reformer assembly comprising:

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a) a monolithic open cell foam catalyst bed, said catalyst bed including an inlet end and an outlet end, an inlet portion of said catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas so as to raise the temperature of said catalyst bed while inhibiting carbon deposition in catalyzed cells of said foam;

b) a fuel gas inlet passage, said fuel gas inlet passage being disposed in heat exchange relationship with a processed fuel gas stream disposed in an outlet passage from said catalyst bed whereby heat will be transferred to said fuel gas inlet passage from the processed fuel gas stream;

c) an air inlet passage, said air inlet passage being disposed in heat exchange relationship with the processed fuel gas stream whereby heat from the processed fuel gas stream will be transferred to said air inlet passage; and

d) a fuel gas reforming catalyst deposited in said foam catalyst bed.

13. The autothermal reformer assembly of claim 1 wherein said foam catalyst bed includes a metal support selected from the group consisting of stainless steel, nickel alloys and iron-aluminum alloys.

19. A hydrocarbon fuel gas autothermal reformer assembly comprising:

a) a cylindrical monolithic open cell foam catalyst bed, said catalyst bed including an inlet end and an outlet end;

b) a fuel gas/steam mixture inlet passage; and

c) a fuel gas reforming catalyst deposited in said cylindrical foam catalyst bed.

22. A hydrocarbon fuel gas autothermal reformer assembly comprising a monolithic open cell foam catalyst bed, said catalyst bed including an inlet end and an outlet end, an inlet portion of said catalyst bed being provided with a noble metal-promoted catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F thereby enabling start

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up to the reformer assembly while inhibiting carbon deposition in catalyzed cells of said foam catalyst bed.

PRIOR ART

The examiner relies on the following prior art references²:

Narumiya et al. (Narumiya)	4,308,233	Dec. 29, 1981
Setzer et al. (Setzer '484)	4,415,484	Nov. 15, 1983
Setzer et al. (Setzer '578)	4,451,578	May 29, 1984
Sheller	5,384,099	Jan. 24, 1995
Bhattacharyya et al. (Bhatta)	5,498,370	Mar. 12, 1996
Clawson (Published International Application)	WO 98/08771	Mar. 5, 1998

REJECTION

The appealed claims stand rejected as follows:

- 1) Claims 1 through 7, 9 through 18 and 21 through 22 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the appellant regards as his invention;

² We note that the examiner has referred to U.S. Patent 5,110,780 issued to Peters on May 5, 1992 (Peters) at page 15 of the Answer. However, Peters is not among the references relied upon by the examiner in his Section 103 rejections. *In re Hoch*, 428 F.2d 1341, 1342 n.3, 166 USPQ 406, 407 n.3 (CCPA 1970) ("[w]here a reference is relied on to support a rejection, whether or not in 'a minor capacity,' there would appear to be no excuse for not positively including the reference in the statement of the rejection"). Therefore, we will not consider it in evaluating the examiner's Section 103 rejections.

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- 2) Claim 19 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson and Narumiya;
- 3) Claims 1 through 6, 9 through 12 and 16 through 18 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya and Setzer '484;
- 4) Claims 13 through 15 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya, Setzer '484 and Sheller;
- 5) Claims 1, 7 and 21 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya and Setzer '578; and
- 6) Claim 22 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Setzer '578 and Narumiya.

OPINION

We have carefully reviewed the claims, specification and prior art, including all of the arguments advanced by both the examiner and the appellant in support of their respective positions. This review has led us to conclude that only the examiner's Section 103 rejections drawn to claims 1 through 7, 9 through 12, 16 through 19, 21 and 22 are well founded.

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Accordingly, we affirm only those Section 103 rejections for substantially the reasons set forth in the Answer and below.

35 U.S.C. § 112, Second Paragraph

As the court stated in *In re Moore*, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971), the determination of whether the claims of an application satisfy the requirements of the second paragraph of Section 112 is

merely to determine whether the claims do, in fact, set out and circumscribe a particular area with a **reasonable** degree of precision and particularity. It is here where the definiteness of language employed must be analyzed -- not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art. [Emphasis ours; footnote omitted.]

The purpose of the second paragraph of Section 112 is to basically insure, with a **reasonable** degree of particularity, an **adequate** notification of the metes and bounds of what is being claimed. See *In re Hammack*, 427 F.2d 1378, 1382, 166 USPQ 204, 208 (CCPA 1970).

Here, the examiner criticizes the use of the terminology "the fuel gas" and "the processed fuel gas stream," but does not explain why one of ordinary skill in the art would not understand

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the scope of the claimed autothermal reformer assembly under the Moore test. See the Answer, pages 4, 5 and 16. The examiner simply ignores the teachings of the application disclosure in determining the metes and bounds of the claims on appeal. *Id.* It then follows that the examiner on this record fails to carry the burden of establishing a *prima facie* case of unpatentability. Accordingly, we reverse the examiner's decision rejecting claims 1 through 7, 9 through 18, 21 and 22 under 35 U.S.C. § 112, second paragraph, as being indefinite.

35 U.S.C. § 103

Under 35 U.S.C. § 103, to establish a *prima facie* case of obviousness, there must be some objective teachings or suggestions in the applied prior art references and/or knowledge generally available to a person having ordinary skill in the art that would have led such person to arrive at the claimed subject matter. See generally *In re Oetiker*, 977 F.2d 1443, 1447-48, 24 USPQ2d 1443, 1446-47 (Fed. Cir. 1992) (*Nies, J., concurring*); *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991). In evaluating the prior art references for suggestions, it is proper to take into account not only the specific teachings therein, but also the inferences which one skilled in the art

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would reasonably be expected to draw therefrom. *See In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968). Moreover, the knowledge generally available to a person having ordinary skill in the art would include the appellant's admission regarding what was known in the art at the time of the appellant's invention. *See In re Nomiya*, 509 F.2d 566, 570-71, 184 USPQ 607, 611-12 (CCPA 1975) (the admitted prior art in an applicant's specification may be used in determining the patentability of a claimed invention); *See also In re Davis*, 305 F.2d 501, 503, 134 USPQ 256, 258 (CCPA 1962).

CLAIM 19

With the above precedents in mind, we turn first to the examiner's rejection of claim 19 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson and Narumiya. We observe that the appellant does not dispute the examiner's finding that Clawson discloses an autothermal reformer assembly corresponding to the claimed autothermal reformer assembly except for its failure to disclose the claimed open cell foam catalyst bed. Compare the Answer, page 5, with the Brief, pages 13-14.

The dispositive question is, therefore, whether it would have been obvious to employ the claimed open cell foam catalyst bed as the catalyst bed of the autothermal reformer assembly described in Clawson. On this record, we answer this question in the affirmative.

We find that Clawson requires that its reforming catalytic materials, such as noble metals, be deposited onto a support and that the reforming zone resulting therefrom be sufficiently porous. See page 16, line 23 to page 17, line 7; page 19, line 29 to page 20, line 7; and page 22, line 20 to page 23, line 2. Although Clawson does not specifically mention using an open cell foam support to form a reforming catalyst, we observe that it is known in the art to focus on the shapes and/or configurations of reforming catalysts to form an autothermal reforming assembly having reduced size and weight as indicated *supra*.

We find that Narumiya teaches using an open cell foam support together with a reforming catalytic material, such as a noble metal catalyst layer, to reduce the weight and size of a purification device. See column 2, lines 45-65, column 3, lines 15-46 and column 4, lines 27-49. We find that these open cell foam catalysts also provide properties useful for and advantageous to the reforming zone of the autothermal reformer

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assembly, such as decreasing pressure loss, improving high heat resistance, small heat capacity and maximum conversion of unreacted gases and enhancing porosity. See column 1, lines 40-47 and column 2, lines 35-44.

Given the above teachings, we determine that one of ordinary skill in the art would have been led to employ the claimed open cell foam catalyst bed taught in Narumiya in the reforming zone of the autothermal reformer assembly described in Clawson, motivated by a reasonable expectation of successfully reducing the size and weight of the assembly and enhancing the heat transfer, gas mixing and distribution, and gas conversion during the autothermal reforming process.

In reaching this determination, we recognize that Narumiya is directed to a purification device, rather than an autothermal reformer assembly as argued by the appellant. However, as indicated *supra*, the appellant acknowledges that it is known in the autothermal reforming art that reducing the size and weight of an autothermal reformer assembly via selecting particular catalyst shapes and/or configurations is desirable. Thus, from our perspective, one of ordinary skill in the art interested in reducing the size and weight of an autothermal reformer assembly would have looked to the teachings of Narumiya to accomplish the

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same. *See, e.g., In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979) (a prior art reference is considered from an analogous art if it is reasonably pertinent to the particular problem with which the inventors were involved). This is especially true in this situation since Naurmiya teaches a noble metal deposited open cell foam support having properties appropriate and advantageous to the reforming zone of the autothermal reforming assembly of the type described in Clawson. Accordingly, we affirm the examiner's decision rejecting claim 19 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson and Narumiya.

CLAIMS 1-6, 9-12 AND 16-18

We turn next to the examiner's rejection of claims 1 through 6, 9 through 12 and 16 through 18 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya and Setzer '484.³ Much of the relevant disclosures of Clawson

³ The appellant appears to have grouped the claims on appeal as follows (Brief, page 3 and Reply Brief, page 1):
Group I-Claims 2-6, 9-12 and 16-18; and
Group II-Claim 1.

However, the appellant has provided no substantive arguments regarding the separate patentability of any of claims 2-6, 9-12 and 16-18 consistent with the requirements of 37 CFR § 1.192(c)
(continued...)

and Narumiya are discussed above. We find that Clawson also discloses reforming catalysts corresponding to those disclosed at pages 3 and 4 of the appellant's specification. Thus, it is reasonable to conclude that Clawson's reforming catalysts, like the appellant's catalysts, are capable of combusting a portion of the fuel gas during an autothermal reforming process to raise the temperature of a catalyst bed while, at the same time, inhibiting carbon deposition therein. On this record, the appellant has not demonstrated that the reforming catalysts described in Clawson are not capable of performing the claimed functions. See, e.g., *In re Schreiber*, 128 F.3d 1473, 1478, 44 USPQ2d 1429, 1432 (Fed. Cir. 1997); *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977).

To the extent that Clawson's reforming catalysts are not capable of performing the above functions during the autothermal

³(...continued)
(7) (2001). See the Brief, pages 14-16. Therefore, for purposes of this appeal, we select claim 1 and determine the propriety of the examiner's rejection based on this claim alone. See *In re McDaniel*, 293 F.3d 1379, 1383, 63 USPQ2d 1462, 1465 (Fed. Cir. 2002) ("If the brief fails to meet either requirement [of 37 CFR § 1.192(c)(7)(2001)] the Board is free to select a single claim from each group of claims subject to a common ground of rejection as representative of all claims in that group and to decide the appeal of that rejection based solely on the selected representative claim.").

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reforming process, we concur with the examiner that there is ample suggestion to use the claimed catalysts in the autothermal reforming assembly of Clawson. See the Answer, page 7. The appellant has not challenged the examiner's findings and conclusions regarding obviousness of using the reforming catalysts taught in Setzer '484 (corresponding to that recited in claims 1 and 7) in the autothermal reforming assembly of Clawson. Compare the Answer, page 7, with the appellant's Brief and Reply Brief in their entirety.

The appellant argues that Clawson does not disclose a fuel gas inlet passage disposed "in heat exchange relationship" with a processed fuel gas stream in an outlet passage from a catalyst bed as required by claim 1. We do not agree.

We initially note that in so arguing, the appellant fails to give words in the claims on appeal the broadest reasonable interpretation in light of the specification. See, e.g., *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997). We also note that the appellant's argument fails to take into account the transitional phrase "comprising" in claim 1 on appeal, which permits the presence of catalysts in a fuel inlet passage. *In re Baxter*, 656 F.2d 679, 686-87, 210 USPQ 795, 802-03 (CCPA 1981). When the claimed fuel inlet passage is properly

interpreted consistent with the above precedents, we determine that it encompasses the fuel inlet passage (208) of the autothermal reforming assembly described in Clawson since the fuel inlet passage (208) is "in heat exchange relationship" with a processed fuel gas stream (the processed fuel gas stream indirectly heats a gas stream in a passage (218), which in turn indirectly heats a fuel stream in the fuel inlet passage (208)). See Figure 3.

Even were we interpret the claimed fuel inlet passage in the manner suggested by the appellant, we determine that the heavy fuel inlet (246) and/or the helical tub (232) described in Clawson meet the claimed fuel inlet passage limitation since they convey a heavy fuel and are in "heat exchange relationship" with a processed fuel gas stream. See Clawson, page 21, line 28 to page 22, line 8, together with Figure 3.

The only other argument raised by the appellant is directed to obviousness of using the monolithic open cell foam catalytic support taught in Narumiya in the autothermal reforming assembly described in Clawson. However, we are not persuaded by this argument since, for the reasons set forth *supra*, the use of the claimed monolithic open cell foam catalyst in the autothermal reforming assembly described in Clawson would have been obvious to one of ordinary skill in the art.

In view of the foregoing, we affirm the examiner's decision rejecting claims 1 through 6, 9 through 12 and 16 through 18 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya and Setzer '484.

CLAIMS 13-15

We turn next to the examiner's rejection of claims 13 through 15 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya, Setzer '484 and Sheller. The relevant disclosures of Clawson, Narumiya and Setzer '484 are discussed above.

The dispositive question here is whether Sheller provides sufficient suggestion or motivation to employ the particular material recited in claim 13 to form the claimed monolithic open cell foam support useful for an autothermal reforming process. We answer this question in the negative for the reasons well articulated by the appellant at page 16 of the Brief. Consequently, we reverse the examiner's decision rejecting claims 13 through 15 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya, Setzer '484 and Sheller.

CLAIMS 1, 7 and 21

We turn next to the examiner's rejection of claims 1, 7 and 21 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya and Setzer '578. For the reasons indicated *supra*, we determine that the subject matter recited in claim 1 would have been obvious to one of ordinary skill in the art in view of the combined teachings of Clawson and Narumiya, with or without the teachings of Setzer '578. Setzer '578, like Setzer '484, discloses reforming catalysts which correspond to those embraced by claims 1 and 7.

Having determined that the subject matter recited in claim 1 would have been obvious to one of ordinary skill in the art in view of the applied prior art references for the reasons indicated above, we affirm the examiner's decision rejecting claims 1, 7 and 21 under 35 U.S.C. § 103 inasmuch as the appellant states that "[c]laims 1, 7 [and] 21...stand or fall together."⁴ See the Reply Brief, page 1.

Even were we to consider the subject matter of claim 21 separately from claims 1 and 7 as requested by the appellant at

⁴ See 37 CFR § 1.192(c)(7)(2001); *McDaniel*, 293 F.3d at 1383, 63 USPQ2d at 1465.

page 3 of the Brief⁵, we do not reach a different result. We find that Clawson, like the claimed invention, employs noble metal-promoted reforming catalysts in its autothermal reforming assembly. See, e.g., pages 16-17 and 19-20. Thus, it is reasonable to conclude that Clawson's reforming catalysts, like the appellant's catalysts, are "operable to combust a portion of the fuel gas at a temperature of about 500°F thereby enabling start up of the reformer assembly while inhibiting carbon deposition..." On this record, the appellant has not demonstrated that the reforming catalysts described in Clawson are not capable of performing the claimed functions. See, e.g., *Schreiber*, 128 F.3d at 1478, 44 USPQ2d at 1432; *Best*, 562 F.2d at 1255, 195 USPQ at 433-34.

In view of the foregoing, we affirm the examiner's decision rejecting claims 1, 7 and 21 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Clawson, Narumiya and Setzer '578.

⁵ We note that the appellant states that the erroneous grouping of the claims in the Brief is corrected by the Reply Brief. See the Reply Brief, page 1.

CLAIM 22

We turn next to the examiner's rejection of claim 22 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Setzer '578 and Narumiya. We find that Setzer '578 does not teach using the claimed noble metal-promoted catalyst in its autothermal reformer assembly. The examiner, however, takes official notice that the use of the claimed noble metal-promoted catalysts in an autothermal reformer assembly is well known. See the Answer, page 15. The appellant does not challenge the official notice taken by the examiner. See the Brief and the Reply Brief in their entirety. Nor does the appellant challenge the examiner's determination regarding obviousness of using the claimed noble metal promoted catalyst in the autothermal reforming assembly of the type taught by Setzer '578. The appellant argues that the conventional noble metal promoted catalyst does not impart the claimed functions. Accordingly, for the reasons indicated supra, we are constrained to affirm the examiner's decision rejecting claim 22 under 35 U.S.C. § 103 as unpatentable over the combined disclosures of Setzer '578 and Narumiya.

CONCLUSION

In summary, we affirm the examiner's decision rejecting claims 1 through 7, 9 through 12, 16 through 19, 21 and 22 under 35 U.S.C. § 103 and reverse the examiner's decision rejecting claims 13 through 15 under 35 U.S.C. § 103. We also reverse the examiner's decision rejecting claims 1 through 7, 9 through 18 and 21 through 22 under 35 U.S.C. § 112, second paragraph.

TIME PERIOD

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

CHUNG K. PAK)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
CHARLES F. WARREN)	APPEALS AND
Administrative Patent Judge)	INTERFERENCES
)	
)	
ROMULO H. DELMENDO)	
Administrative Patent Judge)	

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WILLIAM W JONES
6 JUNIPER LANE
MADISON CT 06443

CKP:dal