UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SEAN M. KELLY, MICHAEL T. FAVILLE,
and KEVIN R. KEEGAN

Appeal 2008-4475
Application 10/238,093
Technology Center 1700

Decided: November 25, 2008

Before BRADLEY R. GARRIS, ROMULO H. DELMENDO, and MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 the final rejection of claims 1-3, and 5-18. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We REVERSE.

INTRODUCTION

Claim 1 is illustrative:

1. A fuel cell system for generating electric power by combination of oxygen with hydrogen-containing fuel, comprising:

a) a plurality of individual fuel cells organized into at least one fuel cell stack assembly including a plurality of cathodes and anodes;

b) a reformer for reforming hydrocarbons to provide said fuel;

c) an air supply system for supplying said oxygen in the form of cathode air;

d) an integrated fuel/air manifold for receiving said fuel from said reformer, conveying said fuel to said anodes, and returning said fuel as tail gas from said anodes, and for receiving said cathode air from said air supply system, conveying said cathode air to said cathodes, and returning said cathode air from said cathodes;

e) a thermal enclosure for housing at least one of said fuel cells, said reformer, and said manifold in a hot zone therein; and

f) a structural enclosure for housing said thermal enclosure and for housing said air supply system in a cool zone outside of said thermal enclosure, said structural enclosure including at least one cooling air inlet vent and at least one cooling air outlet vent that allow cooling air to pass into and out of said cool zone, wherein said at least one inlet vent is disposed below said at least one outlet vent for allowing thermal convective cooling of said air supply system within said cool zone by said cooling air, wherein said cooling air is separate from said cathode air being provided by said air supply system and integrated fuel/air manifold to said cathodes.

The following prior art was applied by the Examiner:

Tocker	3,297,485	Jan. 10, 1967
Dowgiallo	3,398,018	Jun. 18, 1968
Elangovan	5,480,738	Jan. 2, 1996
Wilhoite	5,715,808	Feb. 10, 1998
Hsu	5,858,568	Jan. 12, 1999

Bloomfield	5,976,724	Nov. 2, 1999
Iio (as translated)	JP 12-315513	Nov. 14, 2000

The rejections on appeal as presented by the Examiner are as follows:

1. Claims 1-3, 5-9, and 14 are rejected under 35 U.S.C. § 103 as being unpatentable over Elangovan in view of Tocker, Dowgiallo, and Bloomfield.
2. Claims 10-13 are rejected under 35 U.S.C. § 103 as being unpatentable over Elangovan in view of Bloomfield, Tocker, Dowgiallo, and Hsu.
3. Claims 15 and 16 are rejected under 35 U.S.C. § 103 as being unpatentable over Elangovan in view of Bloomfield, Tocker, Dowgiallo, and Wilhoite.
4. Claims 17 and 18 are rejected under 35 U.S.C. § 103 as being unpatentable over Elangovan in view of Bloomfield, Tocker, Dowgiallo, and Iio.

Appellants argue independent claims 1, 13, and 14. Because Appellants argue the same claim feature with regard to each independent claim, we select and focus on claim 1 in our Decision.

The Examiner finds that Elangovan discloses all the features of claim 1 including, in relevant part, " a 'cool zone' containing the air supply with inlet and outlet vents and that the air is used to cool internal components of the system" (Ans. 3). The Examiner finds that Elangovan does not "teach that the air supplied to the cathode is separate from the air that is used for cooling the fuel cell" (Ans. 4). The Examiner finds that Bloomfield discloses one source of air for the cathode and a second air source for cooling the stack (Ans. 4). Based on these disclosures, the Examiner concludes that it would have been prima facie obvious "to include the separate supplies of air from Bloomfield in the system of Elangovan et al. in order to be capable of more accurately cooling the fuel cell stack by having a designated cooling air stream that is separately regulated by stack temperature" (Ans. 5).

Appellants argue that the structural enclosure claim feature (f) is not taught or suggested by the prior art (App. Br. 8-9). Appellants contend that Examiner's findings that Elangovan does not teach a separate cooling air source for the fuel cell stack and that Bloomfield teaches a separate cooling air stream for cooling the fuel cell stack indicates that the Examiner has misunderstood (i.e., misconstrued) the claimed invention (App. Br. 9). Appellants argue that claim 1 clearly requires that the fuel cell system be structured such that the separate cooling air is used to cool the air supply system, not the fuel cell stack as the cited art discloses (App. Br. 9-12).

ISSUE

Did the Appellants show that the Examiner erred in determining that the combination of Elangovan in view of Bloomfield, Tocker, and Dowgiallo teaches or suggests a structural enclosure for housing an air supply system in a cool zone wherein cooling air separate from cathode air is provided via inlet and outlet vents to cool the air supply system as claimed? We answer this question in the affirmative.

PRINCIPLES OF LAW

The Examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). For a *prima facie* case of obviousness all the claim features must be taught or suggested by the applied prior art. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974).

FACTUAL FINDINGS (FF)

1. Claim 1, in relevant part, recites:

   > . . . *a structural enclosure* for housing said thermal enclosure and *for housing said air supply system in a cool zone* outside of said thermal enclosure, said structural enclosure including at least one cooling air inlet vent and at least one cooling air outlet vent that allow cooling air to pass into and out of the said cool zone, wherein said at least one inlet vent is disposed below said at least one outlet vent *for allowing thermal convective cooling of said air supply system within said cool zone by said cooling air, wherein said cooling air is separate from said cathode air being provided by said air supply system* and integrated fuel/air manifold to said cathodes.
   > (emphasis added) (Claim 1).

2. The Specification indicates that the "air supply system 900" supplies air to the fuel cells and that the air supply system is installed in structural enclosure 800 in the cool zone 816 (Spec. 4:6-8; 9:19-20; 11:6-15; Figure 12).

3. The Specification describes the "cool zone" as being a location within a structural enclosure for housing the "cool" components, such as an air supply system, as opposed to a "hot zone" where the "hot" components, such as the fuel cell stacks, are housed (Spec. 3: 28-29; 4:1-15).

4. The Examiner finds that Elangovan's module housing 42 is a structural support and insulating (Ans. 3).
5. The Examiner has not clearly identified what feature in Elangovan constitutes the air supply system in the "cool zone."
6. The portions of Elangovan cited by the Examiner as teaching a "cool zone containing an air supply" refer to air passages 38 and 40, and air plenum 28 for distribution of air to cool the fuel cell stack or provide oxidant to the fuel cell (Ans. 3-4 citing Elangovan col. 3, ll. 39-50 and col. 5, l. 31 to col. 6, l. 58).
7. The Examiner finds that Elangovan inherently discloses thermal convective cooling because:

   Elangovan is teaching a solid oxide fuel cell system that is contained within two separate containers one inside of another, wherein said system operates between 800°-1000° C and uses ambient air (ambient is defined as 20° C) to feed reactants to the fuel cell as well as cooling the entire system. Therefore because ambient air at 20° C (cooler gas) is being fed into the system operating at 800°-1000° C, convective cooling will inherently occur.
   (Ans. 8)

8. The Examiner finds that Elangovan does not disclose that the air supplied to the cathode is separate from the air that is used for cooling the fuel cell (Ans. 4).
9. Elangovan discloses a solid oxide fuel cell system having a module housing with air inlets 38 and air piping 40 to supply air to an air plenum 28 (col. 6, ll. 47-56).
10. Elangovan discloses that the air supplied to the plenum 28 flows outwardly through each of the air flow channels in the interconnectors between the electrolyte plates to supply reactants to the fuel cells (col. 3, ll. 48-50; col. 5, ll. 1-15).

11. The Examiner finds that Bloomfield discloses providing two separate sources of air supplied to a fuel cell system (Ans. 4).
12. Bloomfield discloses a fuel cell system which supplies air from a node 23 to the cathode section 130 (col. 4, ll. 11-12).
13. Bloomfield discloses that the coolant air 26 may enter a cooler 150 to further cool the fuel cell 100 (col. 4, ll. 25-27; Figure 2).
14. The Examiner cites to Tocker as disclosing to position a supply inlet vent below a supply outlet vent (Ans. 4).
15. The Examiner cites to Dowgiallo as disclosing use of a float valve in a fuel cell system (Ans. 4).

ANALYSIS

We begin our analysis by construing the disputed “structural enclosure” feature of claim 1. The plain language of the claim 1 “structural enclosure” feature recites that the structural enclosure houses an air supply system within a cool zone and the structural enclosure has an inlet vent positioned below an outlet vent to allow thermal convective cooling of the air supply system within said cool zone by cooling air that is separate from the air supplied to the cathode (FF 1). The Specification describes that a “cool zone” is a zone within the structural enclosure that is cooler than another zone within the structural enclosure used to house the higher temperature components such as the fuel cell stacks (FF 3). In accordance with its plain meaning, we construe the “structural enclosure” feature of claim 1 as requiring a structural enclosure structured to house an air supply system within a cooler area of the structural enclosure and the enclosure is structured to supply cooling air that is separate from the cathode air to the cooler area via an inlet vent positioned below an outlet vent.

Because the relevant portion of the disputed "structural enclosure" feature (i.e., the structural enclosure having a cool zone to house an air supply system and the air to cool the air supply system being separate from the cathode air) was determined by the Examiner to be taught or suggested by the combination of Elangovan and Bloomfield, we do not focus on the combination of Tocker or Dowgiallo with Elangovan. Tocker and Dowgiallo were cited for their disclosures of other claimed features (FF 14, 15).

The Examiner's explanation of the rejection appears to indicate that Elangovan's module housing 42 constitutes the "structural enclosure" as claimed and that Elangovan's air passages 38 and 40 in the walls of the structural enclosure constitute an "air supply system" (FF 4 and 5). The Examiner further explains that because Elangovan's fuel cell system operates at high temperatures (i.e., 800° to 1000° C) the cooler ambient air at 20° C would inherently cool by convection the fuel cell system (FF 6).

However, we find that Elangovan discloses module housing 42 having air passages 38 and 40 for feeding coolant and cathode air to the fuel cell stacks (FF 11). In other words, Elangovan's module housing 42 is structured to supply cathode oxidant and cooling air to the fuel cell stacks, not cooling air to the air supply system as claimed. The Examiner's explanation regarding the inherency of the convective cooling appears to be directed to Elangovan's cooling of the fuel cell stacks, not the air supply system.

Even if Elangovan's air passages 38 and 40 were to be construed as an air supply system as appears to be the Examiner's position, we do not find that the module 42 is structured to permit a source of cooling air to cool the air passages 38 and 40 separate from the cathode air being provided by the air supply system. Rather, if a separate source of cooling air would have been combined with Elangovan's module 42, the air would flow through passages 38 and 40 and to the fuel cell stacks 14 and 16 to serve as cathode air per Elangovan's teachings (FF 10). In other words, a separate air source combined with Elangovan's module housing would have provided the same air to both the air passages 38, 41 (i.e., the air supply system) and the fuel cell stacks 14 and 16.

Moreover, the teachings of Bloomfield would not have suggested a separate cooling air source for the air supply system (i.e., the air passages 38 and 40 of Elangovan). Rather, Bloomfield plainly discloses that the fuel cells system is structured such that the separate cooling air source is for cooling the fuel cell stacks, not cooling an air supply system (FF 13).

For the above reasons, we determine that the Examiner has not established how the combination of Bloomfield and Elangovan would have taught or suggested the claim feature of a structural enclosure which is structured to provide thermal convective cooling of an air supply system with cooling air separate from the cathode air.

DECISION

We reverse the Examiner's rejection of claims 1-3, 5-9, and 14 under § 103 over Elangovan in view of Tocker, Dowgiallo, and Bloomfield.

We reverse the Examiner's rejection of claims 10-13 under 35 U.S.C. § 103 over Elangovan in view of Tocker, Dowgiallo, Bloomfield, and Hsu.

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We reverse the Examiner's rejection of claims 17 and 18 under 35 U.S.C. § 103 over Elangovan in view of Tocker, Dowgiallo, Bloomfield, and Iio.

REVERSED

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