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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL
AND APPEAL BOARD

Ex parte PAUL E. KRAJEWSKI and RAJA K. MISHRA

Appeal 2011-013252
Application 10/765,822
Technology Center 1700

Before LINDA M. GAUDETTE, MARK NAGUMO, 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 1-18 and 22-24. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

Appellants' invention is directed to bipolar plates for a fuel cell that are extruded to provide various flow channels within the plate (Spec. para. [0001]).

Claim 1 is illustrative:

> 1. A fuel cell comprising:
>
> a first metal bipolar plate including flow channels;
>
> a second metal bipolar plate including flow channels; and
>
> a membrane formed between the first and second bipolar plates, wherein the first and second bipolar plates are extruded bipolar plates where the flow channels are formed by an extrusion process.

Appellants appeal the following prior art rejections:

1. Claims 1-18 and 22-24 are rejected under 35 U.S.C. § 102(e), as being unpatentable over Nishida (US 6,893,765 B1 issued May 17, 2005).
2. Claims 1-7, 10-17, 22 and 23 are rejected under 35 U.S.C. § 102(e) as being unpatentable over Goebel (US 6,974,648 B2 issued Dec. 13, 2005).

REJECTIONS (1) and (2)

Appellants' arguments focus on limitations in independent claims 1, 11, and 22 (App. Br. 4-8, 9). Appellants further argue subject matter in independent claim 22 and dependent claims 7, 8, and 17 (*id.* at 8, 10).

ISSUES

1. Did the Examiner reversibly err in finding that Nishida's anode-side separator plate 21 and cathode-side separator plate 31 correspond to the bipolar plates required by claims 1, 11 and 22? We decide this issue in the negative.
2. Did the Examiner reversibly err in finding that Nishida's anode-side separator plate has recessed edges as required by claims 7, 8, 17, and 22? We decide this issue in the negative.
3. Did the Examiner reversibly err in finding that Goebel's flow channels 66 and 68 in bipolar plate 62 suffice to meet the claim limitation of an extruded bipolar plate? We decide this issue in the affirmative.

FINDINGS OF FACT AND ANALYSES

Issue (1): Claims 1, 11, and 22

The Examiner's findings and conclusions may be located on pages 4-6, and 8-11 of the Answer. Specifically, the Examiner finds that Nishida's anode-side separator plate 21 and cathode-side separator plate 31 have trapezoidal-shaped passages 23' and 33', respectively (Ans. 4). The Examiner finds that Nishida teaches that the plates 21 and 31 may be formed as a one-piece construction with one side serving as the anode separator and the other side serving as the cathode separator (*id.*; Nishida, col. 5, ll. 58-65). Following *In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985), the Examiner finds that the claim limitation "extruded bipolar plates where the flow channels are formed by an extrusion process" is a product-by-process limitation such that patentability is based upon only the structural features

imparted to the bipolar plate by the extrusion process (Ans. 4). The Examiner finds that the structure of Nishida's plates 21 and 31 are structurally indistinguishable from Appellants' claimed extruded bipolar plates (*id.*, citing Nishida col. 5, ll. 58-69 (disclosing that "it is also possible to construct the anode-side conductive separator plate and the cathode-side separator plate as one piece of separator plate so that one of the surfaces is an anode-side conductive separator plate and the other surface is a cathode-side conductive separator plate.")).

Appellants argue that Nishida's plates 21 and 31 are stamped, not extruded and the Examiner has not identified a teaching in Nishida of an extruded bipolar plate (App. Br. 5). Appellants dispute whether "extruded bipolar plate" is a product-by-process limitation because *Thorpe* concerned product claims that recite a process, unlike Appellants' claims (*id.* at 5-6). Appellants contend that even if the claims are product-by-process claims, the extrusion process does impart a distinctive structural characteristic to the plate because it limits the structure of the claimed bipolar plate (*id.* at 6). Appellants contend that unlike Nishida's channels, Appellants' trapezoidal-shaped flow channels shown in the Figure 3 embodiment described in paragraph [0019] of the Specification are used for flowing coolant, not fuel and oxidizing gases as in Nishida (*id.* at 7). Appellants contend that extruded bipolar plates have a different profile than stamped metal plates as evinced by Appellants' Figures 2 to 9 (Br. 5; Reply Br. 1-2).

As an initial matter, we agree with the Examiner that the claim limitations "extruded bipolar plates where the flow channels are formed by an extrusion process" in claims 1 and 11 and "an extruded bipolar plate" in claim 22 are product-by-process limitations in the product claims. The

disputed phrases clearly rely on the method of forming the bipolar plates (i.e., extrusion) to define its structure and thus are reasonably construed as product-by-process limitations. Appellants' argument that the holding in *Thorpe* does not apply is not persuasive. We now consider what structure of the bipolar plate is implied by the extrusion process.

Paragraph [0019] states:

> The die 12 and extrusion device 10 can form any desired design of flow channels within the bipolar plate for a particular fuel cell stack. The *only requirement* for the extrusion process is that the flow channels formed therein are *linear* because of the limitations of the extrusion process.

(Spec. para. [0019], emphasis added).

Based upon this disclosure, we construe an extruded bipolar plate to have linear flow channels formed in the plate. The express language of the Specification and the example internal channel cross-sections shown in Figures 2 and 7-9 and 11 (square), 3 (trapezoidal), 4, 5, and 10 (circular, including different diameters), and 6 (sinusoidal), as well as the external channels shown in Figures 9-11 (rectangular) indicate that the "profile" of the channel is not particularly limited. Moreover, Appellants have not come forward with any credible evidence showing that stamped channels have cross sections that cannot be produced by extrusion. Finally, we note that Appellants have not responded to the Examiner's finding (Ans. 4, first paragraph, last sentence), that Nishida teaches one-piece separator plates.

We note further that while claim 11 requires flow channels "extending through the plate," and claim 22 requires "cooling fluid flow channels extending through a middle portion of [the anode and cathode side bipolar plates]," claim 1 is not limited to such "interior" channels. Thus, the

channels in claim 1 may be either channels "through" [interior to] the plate or "at one side" of the plate, as recited in claim 22 (and shown in Figures 8-11).

With this proper claim construction, Appellants' arguments fail to show harmful error in the Examiner's finding that Nishida teaches a structurally indistinguishable bipolar plate from Appellants' claimed extruded bipolar plate. Nishida's Figures 2, 3, and 4 show that grooves 23' and 33' between protruding ribs 33 and 23 are linear. Accordingly, Nishida's linear groove (i.e., channel) structure is indistinguishable from the extruded bipolar plate structure of the claims.

Issue (2): Claims 7, 8, 17, and 22

The Examiner finds, in relevant part, that Nishida teaches that the anode-side separator plates 21 and cathode-side separator plates 31 have recessed edges at the ends which recessed edges include insulating sheets 37 and 27 (Ans. 5).

Regarding claims 7, 17, and 22, Appellants argue that Nishida fails to teach a recess at each end of plates 21 and 31 (App. Br. 8).

The preponderance of the evidence favors the Examiner's finding of anticipation. Claims 7, 17, and 22 are broad in that they recite that the "bipolar plates include recessed edges" (claim 7), "bipolar plate . . .comprising recessed edges" (claim 17), or "a recess at each end of the anode side [or cathode side] bipolar plate" (claim 22). The claims do not recite particular dimensions for the recess. Appellants do not direct our attention to any definition of the term "recess" or "recessed edge." The Specification

while providing an example of a recessed edge (reference number 88 in Figures 10 and 11), does not provide a formal definition of recessed edge. Accordingly, we construe "recess" or "recessed edge" as "a receding or hollow place, as in a surface or wall."[1] Therefore the claims include a hollow place of any size or shape formed along the edge or end of the bipolar plates.

In light of this proper claim construction, Appellants' argument that Nishida does not teach recessed edges at each end of the plates does not explain why the hollow area formed at the edges of Nishida's plates into which insulation material 27 and 37 are placed cannot be considered a recessed edge or recess as found by the Examiner (Ans. 4-5).

Regarding claim 8, the Examiner finds that Nishida teaches recesses on the ends of the anode-side and cathode-side separator plates 21 and 31 that receive end plates 37 and 27 (Ans. 4-5).

Appellants argue that Nishida's element 37 and 27 are not end plates but rather are insulating sheets (App. Br. 8). However, Appellants do not direct us to any definition in the Specification of the term "end plates." We find that the insulating sheets 27 and 37 play a part in securing the bipolar plates and other fuel cell stack components together and so may be reasonably called "end plates" within the meaning of the claim 8. Appellants' mere argument fails to show harmful error in the Examiner's rejection.

[1] WEBSTER'S NEW WORLD COLLEGE DICTIONARY 1196 (4th ed. 2001).

Issue (3): Goebel Rejection

Appellants rely on same arguments made regarding Nishida in traversing the § 102 rejection over Goebel (App. Br. 9-10). As part of Appellants' arguments regarding Nishida, Appellants contend that an extruded bipolar plate will have a different profile than a stamped bipolar plate (App. Br. 5). Appellants argue further that the extrusion process imparts a different and distinct structure (*id.* at 9).

Our construction of the claims *supra* requires that the flow channels of the extruded bipolar plate be linear. The Examiner relies on Goebel's flow channels 66 and 68 as meeting the claim features (Ans. 6). However, Goebel discloses that the channels 66 and 68 are formed in a "serpentine" shape which, as shown in Figure 2, includes curved ends to the channels (Goebel, col. 3, ll. 62-65). As Goebel teaches the plate is formed into a shape having a plan serpentine profile. The Examiner has not explained, nor is it readily apparent, how such a serpentine profile could be formed by extrusion. Accordingly, we find that Goebel's channel structure is distinct from the claimed extruded bipolar plate where the flow channels are formed by an extrusion process. Indeed, Goebel discloses that the serpentine channels are formed by stamping (col. 4, ll. 17-19). Though the channel forming method is not limited by Goebel, Goebel does not disclose extrusion or an extruded channel structure within the meaning of the claims (col. 6, ll. 16-20). We reverse the Examiner's § 102 rejection over Goebel.

DECISION

The Examiner's decision is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136.

ORDER

AFFIRMED-IN-PART

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