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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MICHAEL A. FUTTERER, PETER HOPPE, JOSEF SINGER, and BLUHM HANSJOACHIM

Appeal 2010-006273
Application 11/816,461
Technology Center 3600

Before EDWARD A. BROWN, MICHAEL C. ASTORINO, and MICHAEL L. HOELTER, *Administrative Patent Judges*.

BROWN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the rejection of claims 14-32. App. Br. 4. Claims 1-13 have been cancelled. *Id*. We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

We reverse.

CLAIMED SUBJECT MATTER

Claims 14 and 24 are the independent claims on appeal. Claim 14, reproduced below, is illustrative of the appealed subject matter:

> 14. A head-end process for the reprocessing of reactor core material comprising fuel particles, the process comprising:
>
> arranging said reactor core material in a reactor containing a fluid, said reactor having a voltage discharge installation in said fluid;
>
> fragmenting said fuel particles into fragmentation products by applying voltage discharges through said fluid; and
>
> segregating said fragmentation products.

REJECTIONS

Appellants request review of the following rejections:

1. The rejection of claims 14-16, 18, 19, 21-26, and 29-32 under 35 U.S.C. § 103(a) as unpatentable over Masson, *HTGR Spent Fuels Processing: The CEA Investigation Program, 2nd Intl. Topical Meeting on High Temperature Reactor Technology* (2004) ("Masson") and Del Cul, *TRISO-Coated Fuel Processing to Support High Temperature Gas-Cooled Reactors*, Oak Ridge National Laboratory (2002) ("Del Cul").

2. The rejection of claims 17, 20, 27, and 28 under 35 U.S.C. § 103(a) as unpatentable over Masson, Del Cul, and Boettcher (US 3,669,832; iss. Jun. 13, 1972).

ANALYSIS

Rejection of claims 14-16, 18, 19, 21-26, and 29-32 – Masson and Del Cul

Claim 14 is directed to a head-end process for the reprocessing of reactor core material comprising the step of "fragmenting said fuel particles into fragmentation products *by applying voltage discharges through said fluid*." Emphasis added. The Examiner found Masson teaches fragmenting fuel particles into fragmentation products, but not by applying voltage discharges through the fluid. Ans. 5 (citing Masson, p. 1, para. 3, ll. 5-6, p. 6, sec. 2.2.3). The Examiner also found that Masson teaches that the matrix material is fragmented by applying voltage discharges through fluid. *Id.* (citing Masson, p. 5, sec. 2.2.2., ll. 14-17). The Examiner found that Del Cul teaches fragmenting fuel particles and coatings, by burning and/or crushing, after fragmenting the matrix. *Id.* (citing Del Cul, p. 13; Fig. 3.1). The Examiner concluded that it would have been obvious to one of ordinary skill in the art to attempt to fragment the fuel particles in the same manner as Masson teaches matrix fragmentation, "in order to recover the actinides while avoiding the disadvantages of alternative fragmentation methods (e.g. crushing, burning, grinding, etc.) such as large amounts of carbon dioxide production and incomplete break up of particle layers." *Id.*

Appellants contend that neither Masson nor Del Cul teaches fragmenting fuel particles via voltage discharges. App. Br. 13. Masson discloses processes for the removal of the kernel layers from fissile kernels coated with layers of carbon and silicon carbide by oxidation or by

carbochlorination of the layers. *See* Masson, Abstract. These kernels are dispersed in graphite. *Id.* Masson discloses dismantling the filler graphite by use of voltage discharges in the presence of water. *See* Masson, p. 5, sec. 2.2.2. Masson also discloses processes for removal of the kernel layers. *See* Masson, pp. 6-8, sec. 2.2.3. Masson discloses that processes for breaking the layers by mechanical grinding produce wear of the tools because of the abrasive character of silicon carbide, and that breaking of the layers by such mechanical means also entails liberation of fission products, making off-gases treatment necessary. *Id.* Masson states that "[f]or these reasons, oxidizing processes [seem] preferable to mechanical ones to favor a maximum desorption of the gaseous or volatile fission products in the off gases under the effect of the temperature." *Id.* Masson describes thermal processes (sec. 2.2.3.1) and pyrometallurgical processes (sec. 2.2.3.2) for this purpose. Accordingly, we agree with Appellants that while Masson teaches a high-voltage discharge technique for fragmentation of graphite matrix material, Masson teaches using a different process (i.e., oxidizing processes) for removing coatings from kernels of fuel particle fissile material. App. Br. 13. The Examiner did not identify any disclosure in Masson that the high-voltage discharge technique can also be used for removing coatings from the kernels.

Appellants contend that graphite and fuel particles have quite different physical properties, including density, modulus of elasticity, fracture toughness, and electrical resistance, and that due to these differences, one of ordinary skill in the art would have no motivation or reasonable expectation of success in using voltage discharge for fragmentation of fuel particles. App. Br. 14, *see also* App. Br. 17. Appellants also contend that although the

fragmenting of fuel particles was a known problem, and some mechanical and oxidizing processes were known solutions, the prior art as a whole does not mention fragmenting fuel particles using the voltage discharge technique. App. Br. 15. Appellants correctly contend that Masson discloses this problem and the voltage discharge fragmentation technique, but does not mention that this technique could be the solution to the problem. App. Br. 17.

We agree with Appellants that the Examiner did not provide any evidence that modifying Masson's process of removing kernel layers by substituting the claimed fragmenting of fuel particles by applying voltage discharges through fluid would produce a predictable result, with a reasonable expectation of success. App. Br. 15-16. Although Masson teaches fragmenting graphite filler using voltage discharges, Masson does not teach that this same process could be successfully used for fragmenting the kernels. The Examiner stated that "[o]ne of ordinary skill in the art would expect that if voltage discharges are capable of fragmenting graphite, they would also be capable of fragmenting a harder material if the voltage was significantly increased." Ans. 15-16. The Examiner did not, however, provide evidence to support this position. In addition, Appellants point out that Masson teaches that breaking the SiC layer (of fuel particles) is particularly difficult. Reply Br. 4-5 (citing Masson, p. 1, last two lines; p. 3, sec. 1, last three lines). Appellants contend that Masson, despite having knowledge of the voltage fragmentation technique, failed to recognize this technique as a suitable process for fragmenting fuel particles.

The Examiner also states that "Masson prefers to remove the fuel particle coatings using an oxidation [technique], *instead of voltage*

discharge, to avoid expensive off gases treatment (page 6, paragraph 2, lines 6-7." Ans. 18. However, Masson actually states that "oxidizing processes [seem] preferable to mechanical ones." Appellants correctly contend that Masson does not specifically state that oxidizing techniques are preferable to using "voltage discharge." Reply Br. 5. We agree with Appellants that Masson's description of "mechanical ones" appears to refer to mechanical processes developed in the 1960s to 1970, and Masson specifically mentions "mechanical grinding." Reply Br. 6; *see also* Masson, p. 6, sec. 2.2.3. We also agree with Appellants that even if using a voltage discharge were interpreted as a "mechanical process," Masson does not provide any indication that voltage discharge may be a potentially successful mechanical process for fragmenting fuel particles. Reply Br. 4.

Appellants acknowledge that Del Cul discloses at least one process with a first process step comprising crushing graphite fuel blocks, and another step of crushing SiC coatings of fuel particles. App. Br. 16 (citing Del Cul, p. 13, fig. 3.1). The Examiner did not identify any disclosure in Del Cul that the voltage discharge technique can be used for fragmenting fuel particles. We agree with Appellants that the disclosure of these crushing processes does not teach or suggest modifying Masson's process to include the claimed "fragmenting" step for fuel particles (*id.*; *see also* Reply Br. 6), much less that such modification would produce a predictable result, with a reasonable expectation of success.

In view of the record before us, we do not sustain the rejection of claim 14, and its dependent claims 15, 16, 18, 19, and 21-23.

Claim 24 is directed to a head-end process for the reprocessing of reactor core material comprising matrix materials and fuel particles, and

recites "applying first voltage discharges through said first volume of fluid so as to primarily fragment said matrix material, thereby obtaining fragmentation products," and "applying second voltage discharges through said second volume of fluid so as to fragment said coatings." The Examiner's findings and conclusions for the rejection of claim 24 (Ans. 8-9) are similar to those discussed *supra* in relation to the rejection of claim 14. Accordingly, we also do not sustain the rejection of claim 24, and its dependent claims 25, 26, and 29-32.

Rejection of claims 17, 20, 27, and 28 – Masson, Del Cul, and Boettcher

Claims 17 and 20 depend from claim 14, and claims 27 and 28 depend from claim 24. The Examiner relied on Boettcher for disclosure relating to the use of sieving. Ans. 10-11. As such, the Examiner's application of Boettcher does not cure the deficiencies of the Examiner's rejection of claims 14 and 24, as discussed *supra*. We do not sustain the rejection of claims 17, 20, 27, and 28.

DECISION

The Examiner's decision rejecting claims 14-32 is REVERSED.

REVERSED

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