

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte CRAIG WILLOUGHBY  
and CAVAN MILLWARD*

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Appeal 2008-3579  
Application 10/472,642<sup>1</sup>  
Technology Center 1700

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Decided: June 27, 2008

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Before TEDDY S. GRON, ADRIENE LEPIANE HANLON, and  
CHUNG K. PAK, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from an Examiner's final rejection of claims 11-21, all of the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

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<sup>1</sup> Application for patent filed on September 18, 2003. The real party-in-interest is said to be Vesuvius Crucible Company, Wilmington, Delaware. Appeal Brief dated June 22, 2007 ("Br."), at 2.

The Examiner finally rejected claims 11-21 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Rothfuss et al.,<sup>2</sup> Fishler,<sup>3</sup> and Hanse et al.<sup>4</sup> Final 2-3.<sup>5</sup>

**B. ISSUE**

The sole issue on appeal is whether the Appellants have shown that the Examiner erred in concluding that copressing a non-porous refractory body with a porous refractory body when forming the purge plug of Rothfuss would have been obvious to one of ordinary skill in the art in view of the teachings in Fishler.

**C. GROUPING OF CLAIMS**

Claims 11, 17, and 21 are the only independent claims pending in the application. The Appellants do not argue the independent claims separately. Further, the Appellants indicate that the dependent claims stand or fall with their independent claims. Br. 5. Therefore, for purposes of this appeal, claims 12-21 stand or fall with the patentability of independent claim 11.

*See 37 C.F.R. § 41.37(c)(1)(vii) (2007).*

**D. FINDINGS OF FACT**

The following findings of fact are believed to be supported by a preponderance of the evidence. Additional findings of fact as necessary appear in the Analysis portion of the opinion.

**1. Claimed subject matter**

Claim 11 reads as follows:

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<sup>2</sup> US 5,160,478 issued to Rothfuss et al. on November 3, 1992 (“Rothfuss”).

<sup>3</sup> US 4,836,508 issued to Fishler on June 6, 1989.

<sup>4</sup> US 5,691,061 issued to Hanse et al. on November 25, 1997 (“Hanse”).

<sup>5</sup> Final Office Action mailed December 29, 2006.

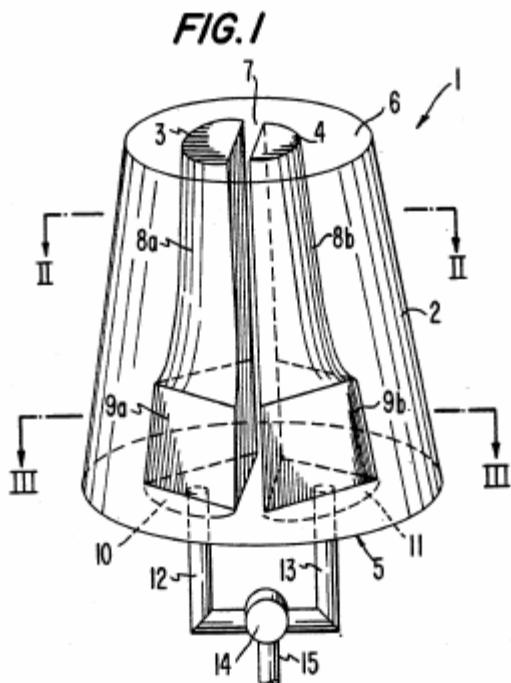
A purge plug adapted for use as part of a lining of a metallurgical vessel comprising:

- a) a porous refractory body having a molten metal-contacting surface;
- b) a non-porous refractory body copressed with the porous refractory body and substantially encasing the porous refractory body except at the molten metal-contacting surface; and
- c) a gas conduit adapted for conveying gas from a gas source to the porous body.

2. Rothfuss

The invention disclosed in Rothfuss relates to a gas flushing apparatus, or purge plug, for a metallurgical vessel. Rothfuss 1:7-8.

Rothfuss Figure 1 is reproduced below:



Rothfuss Figure 1 depicts a purge plug.

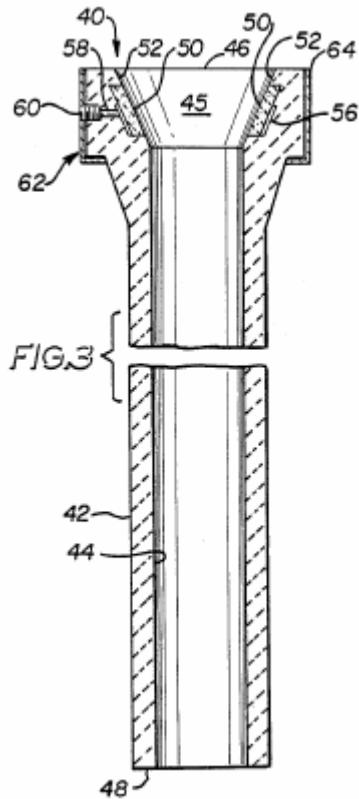
The purge plug comprises a body 2 and a pair of gas-permeable portions 3, 4 extending through the body 2. The body 2 is preferably formed of a ceramic material which is not permeable to gas, and the gas-permeable portions 3, 4 are preferably formed of a porous ceramic material. Rothfuss 3:9-18.

A gas connection means is provided at the bottom end 5 of the purge plug and includes a pair of gas distribution chambers 10, 11 mounted adjacent the bottom ends of the gas-permeable portions 3 and 4, respectively. Rothfuss 3:49-53.

In operation, gas flows through gas-permeable portions 3, 4 and into molten metal contained in the metallurgical vessel. Rothfuss 3:66-4:9, 4:25-29.

3. Fishler

Fishler discloses a ceramic pouring tube, commonly referred to as a ladle shroud. Fishler 1:8-12. Fishler Figure 3 is reproduced below:



Fishler Figure 3 depicts a ladle shroud.

The ladle shroud 40 comprises a body portion 42 of a dense, non-porous refractory material and a bore 44 through which flows molten metal. Fishler 5:18-25. A porous ring 50 is preformed from a refractory material similar to the shroud body material. The porous ring 50 is copressed as a green preform with the shroud body 42 and then fired as a unitary piece to form the finished ladle shroud 40. Fishler 5:52-55. An open gas channel or manifold 56 is formed during firing around a portion of the interface between the porous ring 50 and body 42 to permit entry of an inert gas to the porous ring. Fishler 6:52-55.

Fishler discloses that in the prior art, the porous ring is usually inserted into the ladle shroud body after both pieces (ring and shroud body) have been completely finished, and the porous ring is cemented into place.

Fishler discloses that gas leakage can occur with this arrangement. Fishler 2:18-28.

Fishler discloses that porous ring inserts and shroud bodies made from different refractory grain mixtures can also cause gas leakage as well as thermal expansion and bonding problems. Fishler 5:7-15.

Fishler discloses that a porous ring copressed with the shroud body offers improved bonding between the porous ring and the body. Fishler 2:32-43.

Fishler also discloses that copressing the ladle shroud with the porous ring seals against gas leakage, especially at its upper edge 54. *See, e.g.,* Fishler 5:52-64.

#### E. PRINCIPLES OF LAW

A claimed invention is not patentable if the subject matter of the invention would have been obvious to a person having ordinary skill in the art at the time the invention was made. 35 U.S.C. § 103(a); *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727 (2007); *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

Facts relevant to a determination of obviousness include (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objective evidence of obviousness or non-obviousness. *KSR*, 127 S. Ct. at 1734; *Graham*, 383 U.S. at 17-18.

One of ordinary skill in the art is presumed to have skills apart from what the prior art references expressly disclose. *See In re Sovish*, 769 F.2d 738, 743 (Fed. Cir. 1985). A person of ordinary skill is also a person of ordinary creativity, not an automaton. *KSR*, 127 S. Ct. at 1742.

Where a rejection is based on a combination of references, one cannot show non-obviousness by attacking the references individually. *In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

“[T]he motivation in the prior art to combine the references does not have to be identical to that of the applicant to establish obviousness.” *In re Kemps*, 97 F.3d 1427, 1430 (Fed. Cir. 1996).

#### F. ANALYSIS

The Examiner found that the difference between the purge plug disclosed in Rothfuss and the claimed purge plug is that the non-porous refractory body 2 in Rothfuss is not copressed with the porous refractory body 3, 4 as recited in claim 11. Ans. 3.

The Examiner found that Fishler discloses a refractory article comprising a non-porous refractory body copressed with a porous refractory body. The Examiner found that Fishler discloses that copressing improves the overall bonding of the assembly and reduces undesirable gas leakage and separation of the porous and non-porous components during operation. Ans. 3-4.

The Examiner concluded that it would have been obvious to one of ordinary skill in the art to copress the non-porous refractory body 2 with the porous refractory body 3, 4 disclosed in Rothfuss to improve the bond between the components and reduce gas leakage and component separation. Ans. 4.

The Appellants argue that the ladle shroud disclosed in Fishler is not analogous art. Br. 9. Therefore, the Appellants argue there is no motivation or suggestion to combine the teachings of Rothfuss and Fishler.<sup>6</sup> Br. 11.

As for the motivation to combine the teachings of Rothfuss and Fishler, *KSR*, 127 S. Ct. at 1740 is instructive:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson's-Black Rock* are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

In this case, the purge plug disclosed in Rothfuss comprises a non-porous refractory body 2 that is not copressed with a porous refractory body 3, 4. Fishler discloses that when a non-porous refractory body is not copressed with a porous refractory body gas leakage can occur, especially when the bodies are made from different refractory grain mixtures. Fishler 2:25-28, 5:8-15. Fishler discloses that copressing improves the bond

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<sup>6</sup> The Appellants also argue that there is no motivation or suggestion to combine the teachings of Rothfuss, Fishler, and Hanse. The Examiner relies on Hanse to establish that isostatic copressing of components from granular form is desirable over copressing two pre-made forms. Ans. 4. This teaching in Hanse does not relate to the subject matter of claim 11. Therefore, it is not necessary to address the teachings of Hanse or any arguments relating thereto in this opinion.

between the two materials and seals against gas leakage. *See, e.g.*, Fishler 2:32-43, 5:52-64.

Based on the teachings of Fishler, we find that one of ordinary skill in the art would have been aware that bond separation and gas leakage may occur at the interface between the porous refractory body 3, 4 and the non-porous refractory body 2 in Rothfuss. Based on the teachings of Fishler, we further find that one of ordinary skill would have expected to solve these problems by copressing the non-porous refractory body with the porous refractory body. Thus, we find that Fishler provides sufficient motivation to combine the teachings of Rothfuss and Fishler.

The Appellants argue that Rothfuss reports gas leakage from the purge plug, but despite recognizing this problem discloses inferior solutions. Br. 9-10.

The test for obviousness is not what the individual references teach. Rather, the test is what the *combined* teachings of the references would have suggested to one of ordinary skill in the art. *Keller*, 642 F.2d at 426. Thus, it is of no moment that Rothfuss does not propose the solution disclosed in Fishler. Moreover, we find that the disclosure of inferior solutions to the gas leakage problem in Rothfuss would have provided one of ordinary skill in the art with additional motivation to solve the problem more effectively, e.g., by Fisher's copressing.

For the reasons set forth above, the Appellants have not shown that the Examiner erred in concluding that copressing a non-porous refractory body with a porous refractory body when forming the purge plug of Rothfuss would have been obvious to one of ordinary skill in the art in view of the teachings in Fishler.

Finally, the Appellants generally argue that “the cited art does not teach, explicitly or implicitly, the method of manufacturing the invention, that is, hydraulic pressing instead of isostatic pressing or casting, changes in composition and granulometry, or a can-less purge plug.” Br. 11.

The Appellants do not point to any claims that expressly recite these features or point to any express claim language. Therefore, this argument is not persuasive of reversible error.

G. DECISION

The rejection of claims 11-21 under 35 U.S.C. § 103(a) as being unpatentable over the combined teachings of Rothfuss, Fishler, and Hanse is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a) (2008).

AFFIRMED

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