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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte GREGG A. ZANK

_____

Appeal No.97-1293
Application No. 08/281,812

_____

ON BRIEF

_____

Before DOWNEY, WILLIAM F. SMITH and SPIEGEL, Administrative Patent Judges.

DOWNEY, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 USC § 134 from the final rejection of claims 1-10, all the

claims pending in the application.

Claim 1, the only independent claim, is illustrative of the subject matter on appeal and reads as follows:

A method of preparing a sintered titanium diboride body comprising:

(a) mixing components comprising titanium diboride powder and at least 10 % by weight preceramic organosilicon polymer to form a uniform mixture, wherein the preceramic organosilicon polymer is one which provides a char containing silicon and carbon and the carbon is present in at least a stoichiometric amount based on the silicon content;

forming the uniform mixture into a desired shape to obtain a handleable green body; and

sintering the handleable green body in an inert atmosphere at a temperature greater than 2000EC to obtain a sintered body with a density greater than about 4.0 g/cm^3.

The references relied upon by the examiner are:

Lukacs, III	(Lukacs)	5,190,709	Mar. 2, 1993
Yajima et al.	(Yajima)	4,289,720	Sept. 15, 1981

Claims 1-10 stand rejected under 35 USC § 103(a). As evidence of obviousness, the examiner relies on Lukacs and Yajima. We reverse.

Discussion

1. The claims

Claim 1 is directed to a method of preparing a sintered titanium diboride body comprising the steps of mixing titanium diboride powder and preceramic organosilicon polymer to form a uniform mixture, shaping the uniform mixture to obtain a handleable

green body, and sintering the handleable green body to form the sintered titanium diboride body. Claim 1 further limits the method as follows. The preceramic organosilicon polymer is at least 10 % by weight of the uniform mixture and must provide a char containing silicon and carbon in which carbon is present in at least a stoichiometric amount based on the silicon content. The sintering occurs in an inert atmosphere at a temperature greater than 2000EC. Finally, the sintered titanium diboride body also must have a density greater than about 4.0 g/cm^3.

2. The prior art

The examiner relied upon two references, Lukacs and Yajima, as evidence of obviousness. Both references are discussed below.

A. Lukacs (US 5,190,709).

With respect to the claimed invention, the reference teaches:

> A method of preparing a sintered ceramic comprising the steps of mixing ceramic powder and preceramic organosilicon polymer to form a uniform mixture, shaping the uniform mixture to obtain a handleable green body, and sintering the handleable green body in an inert atmosphere (e.g., nitrogen) to form the sintered material (col. 3, line 1, through col. 6, line 25).
>
> "Any ceramic powder" (col. 4, lines 61 and 62).
>
> Amounts of more than 10 wt% preceramic organosilicon polymer (Examples 1-5).

A "char" upon decomposition of the preceramic organosilicon polymer (col. 4, line 2).

The use of preceramic organosilicon polymers such as polyvinylmethylsiloxane, among others (col. 4, lines 40-51).[1]

Sintering temperatures as high as 1600EC (Example 2).

With respect to the claimed invention, the reference does not teach:

Titanium diboride, in particular, as the ceramic powder.

A char wherein "the carbon is present in a least a stoichiometric amount based on the silicon content".

Sintering temperatures greater than 2000EC.

A sintered body with a density greater than about 4.0 g/cm^3.

Yajima (US 4,289,720).

With respect to the claimed invention, the reference teaches:

A method of preparing a sintered ceramic body comprising the steps of mixing ceramic powder and preceramic organosilicon polymer to form a uniform mixture, shaping the uniform mixture to obtain a handleable green body, and

[1] By comparison, the present specification at p. 5, lines 3-14 indicates organopolysiloxane groups such as "MeViSiO" (i.e., methyl vinyl siloxane), among others, may be employed. Polymerization of that group by itself would produce polyvinylmethylsiloxane.

sintering the handleable green body in an inert atmosphere to form the sintered body (col. 8, lines 67 and 68; col. 9, lines 1-12 and 52-59; and col. 10, lines 1-39).

Titanium diboride as a ceramic powder, among 136 listed possibilities (col. 1, lines 17-22; Tables 1(a), (b), (c)).

Preceramic organosilicon polymer in the range of 0.05-20 wt% (col. 9, line 52, through col. 10, line 2).

Preceramic organosilicon polymer resulting in silicon and carbon, which in turn leads to the production of silicon carbide (SiC), after sintering (col. 9, lines 5-12). This teaching apparently meets the claim proviso that "the preceramic organosilicon polymer is one which provides a char containing silicon and carbon and the carbon is present in at least a stoichiometric amount based on the silicon content". As disclosed at p. 4, lines 17-20, of the present specification , the char must contain at least enough carbon to form SiC.

e. Preceramic organosilicon polymers made from monomers of dimethyl siloxane and diphenyl siloxane (col. 3, lines 18-39).[2]

f. Sintering temperatures up to 2000EC (col. 10, lines 23-39), a preferred maximum of 1,800EC (col. 9, line 3), and Example 10 with 1,900EC.

The highest bulk density in an example of 3.06 g/cm^3 for a sintered body (Example 3).

With respect to the claimed invention, the reference does not teach:

A sintering temperature "greater than 2000EC".

A sintered body with a density greater than about 4.0 g/cm^3.

The rejection and issues on appeal

The examiner rejected claims 1-10 under 35 USC § 103(a) as being unpatentable over Lukacs in view of Yajima. The examiner states, at pp. 4 and 5 of his November 27, 1996 Answer, that Lukacs teaches a method comprising the steps of mixing a ceramic powder and organosilicon polymer, such as polysiloxanes and polysilazanes, forming the mixture into a green body, and sintering the green body.

[2] Compare, p. 5, lines 11-14, of the present specification. Dimethyl siloxane is Me_2SiO and diphenyl siloxane is Ph_2SiO.

The examiner recognizes that Lukacs does not teach titanium diboride but points to Lucaks' teaching that "(a)ny ceramic powder can be used" (col. 4, lines 61-62) and cites Yajima to show a process of producing a similar composition with titanium diboride as the ceramic powder. The examiner explained at p. 5 of his Answer (paragraphs combined):

> It would have been obvious to one having ordinary skill in the art at the time of the invention to use titanium diboride, such as that taught by Yajima et al., in the process of Lukacs in view of this teaching to obtain a final product having the desired physical properties.

The examiner also states that the temperature and other parameters would have been obvious. At p. 5 of his Answer, he says:

> Determination of the specific sintering temperature, particle sizes and ingredient amounts would have been well within the realm of routine experimentation to one having ordinary skill in the art at the time of the invention. These parameters would have obviously been selected to optimize the process conditions (e.g. total process time) and/or the properties of the final product (e.g. strength).

The appellant argues at pp. 3-17 of his Appeal Brief that the examiner has failed to set forth a prima facie case of obviousness. According to the appellant, Lukacs and Yajima, individually or in combination, do not teach or suggest the claim limitations of sintering temperatures, polymer char characteristics, and density of the sintered body. The appellant further asserts that Yajima only teaches titanium diboride as one of 136 different ceramic powders and provides no guidance for one skilled in the art to pick out titanium diboride.

In response to appellant's arguments, the examiner maintains (pp. 6-16 of his Answer) that a prima facie case of obviousness has been made and the burden has shifted to the appellant to show that the instantly claimed subject matter is different from and unobvious over that taught by the reference, further noting that "arguments of counsel cannot take place of evidence in the record." The examiner determines that "the artisan would know [sic—would have known] that titanium diboride is desirable in specific applications due to its physical properties" and responds to the appellant's arguments with the statement that "one cannot show non-obviousness by attacking references individually where the rejections are based on combinations of references."

4. Opinion

We reverse the rejection of claims 1-10 under 35 USC ' 103 as obvious over Lukacs in view of Yajima. The examiner has the initial burden to establish a prima facie case of unpatentability. See In re Lowry, 32 F.3d 1579, 1584, 32 USPQ 2d 1031, 1035 (Fed. Cir. 1994); and In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ 2d 1443, 1444, (Fed. Cir. 1992). In our view, the examiner has not sustained his burden and therefore the burden of persuasion has not shifted to the appellant. See In re Rijckaert, 9 F. 3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

The claims at issue are directed to a method. As discussed above, neither Lukacs nor Yajima teaches a method with a step of sintering a handleable green body at a temperature "greater than 2000EC". To render a method claim obvious, the prior

art must teach or at least suggest the desirability of modifying the sintering step to go above 2000EC in temperature. See In re Brouwer, 77 F. 2d 422, 425, 37 USPQ2d 1663, 1666, (Fed. Cir. 1996). The examiner has not pointed to any teaching or suggestion in Lukacs on Yajima on the desirability of elevating the temperature for sintering above 2000EC .[3]

Instead, the examiner relies on In re Aller, 220 F. 2d 454, 456, 105 USPQ 233, 235 (CCPA 1955), in the paragraph bridging pp. 9 and 10 of his Answer, for the rule:

> Changes in temperature, concentrations, or other process conditions of an old process within the broad teaching of the prior art does not impart patentability in the absence of an unexpected result.

Such reliance is misplaced. In effect, the examiner labels the claimed invention as an "old process" and then extracts a per se rule from Aller that old processes are not patentable. The court made it clear in In re Ochiai, 71 F.3d 1565, 37 USPQ2d 1127 (Fed. Cir. 1995) that there are no per se rules when determining obviousness under 35 U.S.C. § 103. As stated in Ochiai, 71 F.3d at 1572, 37 USPQ2d at 1133:

> The use of per se rules, while undoubtedly less laborious than a searching comparison of the claimed invention-including all its limitations - with the teachings of the prior art, flouts section 103 and the fundamental case law applying it. Per se rules that eliminate the need for fact-specific analysis of claims and prior art may be administratively convenient for PTO examiners and the Board. Indeed, they have been sanctioned by the Board as well. But reliance on per se rules of obviousness is legally incorrect and must cease. Any such administrative

[3] In view of our finding on temperature, we do not find it necessary to discuss the other claim limitations vis-à-vis Lukacs and Yajima, namely, titanium diboride as the ceramic powder, char characteristics, and density.

> convenience is simply inconsistent with section 103, which, according to Graham [v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)] and its progeny, entitles an applicant to issuance of an otherwise proper patent unless the PTO establishes that the invention as claimed in the application is obvious over cited prior art, based on the specific comparison of that prior art with claim limitations. We once again hold today that our precedents do not establish any per se rules of obviousness, just as those precedents themselves expressly declined to create such rules. Any conflicts as may be perceived to exist derive from an impermissible effort to extract per se rules from decisions that disavow precisely such extraction.

To paraphrase the court in Ochiai, at 71 F.3d at 1570, 37 USPQ2d at 1132, "there are not [Aller] obviousness rejections . . . but rather only section 103 obviousness rejections."

The facts in the record must support the legal conclusion of obviousness. As set forth in In re Cofer, 354 F.2d 664, 667, 148 USPQ 268, 271 (CCPA 1966):

> Necessarily, it is facts appearing in the record, rather than prior decisions in and of themselves, which must support the legal conclusion of obviousness under 35 U.S.C. 103. Merely stating that a compound or composition is obvious, without adequate factual support, is not sufficient.

Hence, a simple statement that it would have been obvious to optimize the method conditions and properties of the final product is insufficient to establish a prima facie case of obviousness. See In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977).

While Aller contains language about optimizing ranges the prior art reference in that case was an article describing one experiment, apparently without disclosing any ranges. See In re Aller, supra, 220 F.2d at 456, 105 USPQ at 235. Here, by contrast, both Lukacs and Yajima disclose several examples with sintering temperatures, and further, Yajima teaches a range of sintering temperatures up to 2000EC. Yajima expressly teaches a range of temperatures and the examiner has provided no evidence for optimizing the

temperature outside of that range. Prior art references must be considered in their entireties, i.e., as a whole, including portions that would lead away from the claimed invention. See W.L. Gore & Associates, Inc. v. Garlock, 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed. Cir. 1983), cert. den., 469 U.S. 851 (1984). It would not have been obvious to exceed the parameters taught for a process in the prior art. See In re Sebek, 465 F.2d 904, 906, 175 USPQ 93, 95 (CCPA 1972).

The examiner alleges in the paragraph bridging pp. 9 and 10 of his Answer (parenthetical added):

> With respect to the specific temperatures recited in the examples (of Lukacs), the examiner submits that these sintering temperatures do not teach away from the combinations of references in that the examples are directed to the production of silicon nitride which has a low sintering temperature than titanium diboride. Silicon nitride sublimes at 1899EC and thus would not be sintered above this temperature. Titanium diboride, on the other hand, melts at 2593EC and thus would require a higher sintering temperature than silicon nitride. Thus there is nothing unexpected in the selection of this higher temperature.

The examiner's allegation is untenable. The examiner fails to provide any evidence to show a correlation between the temperatures for sintering and subliming silicon nitride and the temperatures for sintering and melting titanium diboride. To the contrary, Example 1 for Yajima shows a sintering temperature of 1700E for silicon carbide, which Table 1(a) shows as having a melting point of 2400EC, and Example 4 in Yajima employs a sintering temperature of 1600EC for tetraboron carbide, which the same table shows as having a melting point of 2450EC. The sintering temperatures of

Yajima's ceramic powders are considerably lower than their melting temperatures. Hence, the examiner failed to provide a basis to conclude that the melting point of titanium diboride would suggest a sintering temperature above 2000EC. In addition, the examiner failed to provide evidence or sufficient reasoning as to why sintering temperatures outside those taught by Lukacs and Yajima would constitute result-effective variables. See In re Yates, 663 F.2d 1054, 1056, 211 USPQ 1149, 1151 (CCPA 1981). Cf., In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

The examiner also takes a position which is inconsistent with any such suggestion to modify the sintering temperature. Yajima teaches a sintering temperature of up to 2000EC (col. 10, lines 23-39), which is closer to the claimed temperature than the 1600EC of Example 2 in Lukacs, yet the Examiner states at p. 13, para. 4 of his Answer:

> The combination of references as set forth by the examiner does not contemplate the use of the process conditions of Yajima et al."

Taken at face value, the examiner's statement would not lend support for extending the temperature from 1600EC, as taught in Lukacs, up to 2000EC, as taught in Yajima. If the examiner is unwilling to rely on the teachings of Yajima to go from 1600EC up to 2000EC, it is unclear on the record why one skilled in the art would go above 2000EC.

On this record, the examiner has not established from the teachings of Lukacs and Yajima that to one of ordinary skill in the art would have found the claimed process obvious at the time the invention was made. Accordingly, we reverse the rejection of claims 1-10.

REVERSED

MARY F. DOWNEY	)
Administrative Patent Judge	)
	)
	)
	) BOARD OF PATENT
WILLIAM F. SMITH	)
Administrative Patent Judge	) APPEALS AND
	)
	) INTERFERENCES
	)
CAROL A. SPIEGEL	)
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Appeal no. 97-1293
Application no. 08/281,812

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