

The opinion in support of the decision being entered today  
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MANH-QUYNH CHU,  
PIERRE-LUC REYNAUD  
and MARC REYNAUD

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Appeal No. 2007-2566  
Application No. 10/243,873<sup>1</sup>  
Technology Center 3700

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Decided: August 28, 2007

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Before: TEDDY S. GRON, CAROL A. SPIEGEL and MARK NAGUMO,  
*Administrative Patent Judges.*

SPIEGEL, *Administrative Patent Judge.*

DECISION ON APPEAL

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<sup>1</sup> Application filed September 16, 2002. The application on appeal is said to be a continuation of Application 09/806,234, filed March 28, 2001, now abandoned, which is said to be a 371 of PCT/FR00/02183, filed July 28, 2000. PCT/FR00/02183 is said to claim benefit of French application 99/09900, filed July 30, 1999. The real party-in-interest is said to be Recherches Techniques Dentaires, Saint Egreve, France.

I. Introduction

Manh-Quynh Chu, Pierre-Luc Reynaud and Marc Reynaud (hereinafter "Appellants") seek our review under 35 U.S.C. § 134(a) (2002) of the Examiner's final rejection of claims 1-10, all of the claims pending in this Application. We have jurisdiction under 35 U.S.C. § 6(b) (2002). We AFFIRM.

A. The invention

Appellants' invention is directed to a dental retention pin, i.e., a "post" that can be anchored to the root of a tooth which has lost much of its structure in order to provide a support for a dental crown. Claim 1 is illustrative of the subject matter on appeal.

1. A dental retention pin made of composite material comprises a core of fibers embedded in a resin matrix, wherein the fibers, which have a refractive index (n), are radio-opaque, and a refractive index (n') of resin forming the resin matrix has a value within 0.15 of that of the fibers.

B. The rejections

The Examiner has rejected claims 1-10 under 35 U.S.C. § 103(a). The Examiner relied on the following prior art<sup>2</sup> as evidence of unpatentability:

Bowen	US 4,215,033	Jul. 29, 1980
Bachmann	US 6,224,377 B1	May 1, 2001 (filed Jun. 1, 1999)
Karmaker	US 6,345,984 B2	Feb. 12, 2002 (filed Jun. 25, 1999)

Bowen qualifies as prior art under 35 U.S.C. § 102(b). Bachmann and Karmaker qualify as prior art under 35 U.S.C. § 102(e).

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<sup>2</sup> No references to *et al.* are made in this opinion.

The rejections under review in this appeal are: Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as obvious over Bachmann in view of Bowen. Claims 3-10 stand rejected under 35 U.S.C. § 103(a) as obvious over Bachmann in view of Bowen and Karmaker. (Answer<sup>3</sup> 3.)

Appellants have separated the claims into two groups, i.e., claims 1-2 and claims 3-10 (Br.<sup>4</sup> 4-7). However, Appellants have not provided separate patentability arguments for any of claims 2-10. Therefore, we decide this appeal on the basis of claim 1. 37 CFR § 41.37(c)(1)(v).

## II. Findings of Fact (FF)

The following findings of fact are supported by a preponderance of the evidence of record. To the extent any "finding of fact" is a conclusion of law, it should be so treated.

### A. Appellants' specification

- [1] According to the specification, composite dental pins are replacing metal pins of the past which can corrode and become disconnected (Specification 1:7-16).
- [2] Composite pins comprising synthetic fibers embedded in a synthetic resin, e.g., an epoxy resin, are said to be mechanically strong but transparent to, and not easily visualized by, X-rays (Specification 1:13 to 2:8).
- [3] Photopolymerizable adhesives are said to be desirable, but problematic, to use to fix a dental pin to a root canal because of the difficulty in irradiating the bottom of the root canal with light

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<sup>3</sup> Examiner's Answer ("Answer") mailed February 27, 2006.

<sup>4</sup> Appeal Brief ("Br.") filed December 2, 2005.

- radiation necessary for activating the adhesives (Specification 2:11 to 3:2).
- [4] Appellants' dental pin is said to be mechanically strong, opaque to X-rays and transparent to light radiation used to activate a photopolymerizable adhesive (Specification 3:6-11).
- [5] Appellants' dental pin is made of a composite comprising fibers embedded in a resin matrix, wherein the fibers are radio-opaque and the refractive index of the matrix resin is close to the refractive index of the fibers (Specification 3:12-16).
- [6] Preferably, the refractive indices of the fibers and of the resin differ within 0.15 (Specification 11-12, original claim 5).
- [7] If the refractive index of the resin is too low vis-à-vis that of the fibers, fillers such as amorphous silica or metal oxides may be added to the resin (Specification 3:19 - 4:3).
- [8] If the refractive index of the resin is too high vis-à-vis that of the fibers, the resin may be diluted in a solvent (Specification 4:3-5).
- [9] Alternatively, two different resins, preferably differing by more than 0.15 in their refractive indices, may be mixed to obtain a desired intermediate refractive index (Specification 4:6-13).
- [10] Example 1 is said to describe a dental pin made from (i) 64 % by volume alkaline resistant synthetic fibers containing 16% radio-opaque zirconium dioxide and having a refractive index of 1.562 and (ii) 36 % by volume modified epoxy resin matrix having a refractive index of 1.546 (Specification 5:6-20).

B. Bachmann

- [11] Bachmann discloses a radio-opaque dental retention post ("pin") composite comprising from 60 to 80 % by volume fiber containing between 10 and 30 % by weight zirconia, e.g., zirconium oxide, in an epoxy resin (Bachmann col. 1, l. 54 - col. 2, l. 8 and col. 2, ll. 19-22).
- [12] According to Bachmann, the fiber may be a glass fiber, a quartz fiber or a silica fiber (Bachmann col. 1, l. 57 - col. 2, l. 3).
- [13] Bachmann is silent as to refractive indices of the fibers and the resin matrix comprising the composite.

C. Bowen

- [14] Bowen discloses an inorganic, amorphous glass material for use in combination with an organic resin to provide a composite material for restorative or preventive dentistry, e.g., a composite dental filling material (Bowen col. 2, ll. 6-14 and 40-43).
- [15] "Within certain limitations, the present invention can be applied also to other reinforcing filler morphologies, such as for example flakes, fibers, rods, or large inserts" (Bowen col. 14, ll. 58-60).
- [16] The inorganic amorphous glass is said to be substantially transparent to visible light, opaque to X-rays and have a refractive index "close to the refractive indexes of organic resins found in aesthetic composite dental restoration materials" (Bowen col. 2, ll. 55-60).
- [17] The refractive index of composite resin polymers is said to be "commonly about  $n_D$  1.55, although higher and lower values are sometimes encountered" (Bowen col. 1, ll. 54-60).

[18] According to Bowen, the overall refractive index of glass materials to be used as dental filler material is "preferably between about 1.5 and 1.6" (Bowen col. 9, ll. 51-54).

[19] Embodiments of Bowen's glasses listed in Table 1 are said have refractive indices ranging from 1.459 to 1.614 (Bowen Table 1). Other findings of fact follow below.

### III. Obviousness

A claimed invention is not patentable if the subject matter of the claimed 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, 82 USPQ2d 1385 (2007); *Graham v. John Deere Co. of Kansas City*, 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 ordinary skill in the art, and (4) relevant objective evidence of obviousness or nonobviousness. *KSR*, 127 S. Ct. at 1734, 82 USPQ2d at 1389; *Graham*, 383 U.S. at 17-18.

#### A. The Examiner's position

The Examiner found that Bachmann differed from claim 1 in failing to disclose that the refractive index of the resin matrix was within 0.15 of the refractive index of the fibers (Answer 3). The Examiner "believed that Bowen teaches differences between the refractive indices of the fibers and the resin to be less than 0.15 (column 1 line 58, table 1)" (Answer 3). The Examiner concluded that it would have been obvious

to modify the showing of composite material of Bachmann et al. to have the refractive indices of Bowen in order to provide a dental composite

substantially transparent to light and opaque to x-rays that make an aesthetic restoration (column 2 line 59) as well as aid in diagnostic procedures to the dentist (column 1 line 62) in view of Bowen [Answer 3].

B. Appellants' position

Appellants argue that Bowen does not disclose any values for the refractive index of resin, i.e., that Bowen's recitation of "about  $n_D$  1.55" at column 1, lines 58-59, refers to the refractive index of Bowen's glass (Br. 4). Appellants further argue that there is no motivation to combine Bachmann and Bowen because Bowen teaches that the relative refractive indices of the fiber and the resin are considered when aesthetics of the composite material are a concern and the pin of Bachmann is not visible because it is covered (Br. 5).

C. Discussion

Patentability determinations are fact-intensive. Facts relevant to a determination of obviousness include determining the scope and content of the prior art. Claim 1 recites, in relevant part, a dental composite material comprising fibers embedded in a resin matrix wherein the composite resin has a refractive index within 0.15 of the refractive index of the fibers. Appellants argue that Bowen fails to disclose any values for refractive indices of resins used to form the resin matrix of a dental composite (Br. 4). Specifically, Appellants contend that the disclosure at column 1, lines 58-59, of Bowen does not refer to the refractive index of composite resins (Br. 4). We disagree.

[20] At column 1, lines 54-60, Bowen discloses:

Essential features of the filler for composite materials, where aesthetics of the composite

restoration is important, include transparency and a *refractive index* in the vicinity of *that of the composite resin polymer*. *This index of refraction* is commonly about  $n_D$  1.55, although higher and lower values are sometimes encountered.  
[Emphasis added.]

A careful reading of Bowen indicates that the index of refraction being referred to at column 1, lines 58-59, is that of the composite resin polymer (FF 17). This disclosure combined with Bowen's disclosure that its glass material is "preferably between about 1.5 and 1.6" (FF 18; Bowen col. 9, ll. 51-54) teaches a difference in relative refractive indices of  $\sim \pm 0.05$ . Moreover, the Examiner expressly pointed out that the refractive indices disclosed at column 1, line 58, and in Table 1 of Bowen differed by less than 0.15, as required by claim 1 (Answer 3). Appellants have not pointed to any evidence of record establishing that one of ordinary skill in the art would have understood the disclosure of Bowen at column 1, lines 54-60, as not referring to the refractive index of dental composite resins, contrary to the Examiner's position. Therefore, Appellants' first argument is not persuasive of reversible Examiner error.

Appellants' remaining argument that there is no motivation to combine the teachings of Bachmann and Bowen because Bachmann is not concerned with aesthetics is also unpersuasive of reversible Examiner error. The Examiner responds that Bachmann is concerned with aesthetics since dental crowns are visible structures supported by dental pins and Bachmann is silent as to whether the dental pin would or would not be visible when covered by a dental restorative (Answer 5-6). In other words, the Examiner's position, as we understand it, is that a dental pin (post) showing through a restorative cover, such as dental crown, would not be aesthetically

pleasing. Appellants have not pointed to any evidence of record establishing that one of ordinary skill in the art would have understood that a dental pin comprising a composite of radio-opaque fibers embedded in a resin matrix would necessarily not be visible through a dental restorative, particularly where the composite is open to inclusion of other materials. In short, the Examiner has provided a reason for making the combination, which we find credible and which Appellants have not substantively challenged, i.e., "to make an aesthetic restoration . . . as well as aid in diagnostic procedures to the dentist" (Answer 3). Appellants have not come forward with evidence to the contrary.

Therefore, based on the foregoing, we affirm the rejections of claims 1-10 under § 103(a).

#### CONCLUSION

In summary, the decision of the Examiner to reject (i) claims 1 and 2 under 35 U.S.C. § 103(a) as obvious over Bachmann in view of Bowen; and, (ii) claims 3-10 under 35 U.S.C. § 103(a) as obvious over Bachmann in view of Bowen and Karmaker is affirmed.

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

AFFIRMED

Appeal 2007-2566  
Application 10/243,873

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