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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ERIC CHAPOULAUD, CRAIG A. ANDREIKO, and MARK A. PAYNE[1]

Appeal 2014-007476
Application 13/329,613
Technology Center 3700

Before DEMETRA J. MILLS, ERIC B. GRIMES, and CHRISTOPHER G. PAULRAJ, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method of manufacturing an orthodontic appliance, which have been rejected as obvious and lacking adequate written description. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse both of the rejections on appeal.

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[1] Appellants identify the Real Party in Interest as Ormco Corporation. (Appeal Br. 3.)

STATEMENT OF THE CASE

Orthodontic treatment commonly involves positioning brackets on a patient's teeth and placing a guidewire in slots in the brackets. (Spec. ¶ 5.) "Brackets can be made . . . by printing the material of which the bracket is to be made, such as metal, plastic or ceramic. . . . This direct stereo lithographic printing eliminates the need to cast a custom mold for the appliance." (Spec. ¶ 98.)

"Methods of manufacture are known or are evolving by which materials, such as, for example, metal or ceramic, can be provided in powder form mixed with a binder. Such a material could then be deposited in a layer in the shape of the cross section of an appliance." (*Id.*) "[T]he binder can be removed by heat or solvent, leaving a bracket or other appliance or appliance part formed of the material in the three-dimensional shape of the orthodontic appliance." (*Id.*)

Claims 1–7, 9–14, and 18–22 are on appeal. Claims 1 and 10 are illustrative and read as follows (emphasis added):

1. A method of manufacturing an orthodontic appliance comprising:

producing digital data defining a dimension of an orthodontic appliance;

manufacturing the orthodontic appliance based on the digital data by a process that includes depositing a *mixture of metal powder and a binder, the mixture being provided in powder form*, in accordance with the digital data, in a plurality of layers, layer by layer, each layer constituting a two-dimensional cross section of the orthodontic appliance and each layer deposited being the mixture of metal powder and the binder, the layers being stacked in a third dimension; and

removing the binder to form the orthodontic appliance having dimensions defined by the digital data.

10. A method of manufacturing an orthodontic appliance comprising:

producing digital data defining a three-dimensional surface of an orthodontic appliance or component thereof;

manufacturing the orthodontic appliance or component thereof based on the digital data by a process that includes depositing a metal powder, in accordance with the digital data, layer by layer in a plurality of layers, each layer of the metal powder being in the shape of a two-dimensional cross section of the orthodontic appliance or component thereof, each layer then being sintered, the layers being stacked in a third dimension to define a thickness of the orthodontic appliance or component thereof;

wherein each layer of the metal powder is bonded to the preceding layer of the metal, and wherein *at least one cross section is deposited and then is sintered before all of the layers are deposited* to form the three-dimensional surface on the orthodontic appliance or component thereof;

thereby producing the orthodontic appliance or component thereof having a shape defined by the digital data.

The claims stand rejected as follows:

Claims 10–14 and 18–22 under 35 U.S.C. § 112, first paragraph, for lack of adequate written description (Ans. 4); and

Claims 1–7 and 9 under 35 U.S.C. § 103(a) as obvious based on Andreiko,[2] Brodkin,[3] and Vickery[4] (Ans. 4).[5]

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[2] Andreiko et al., US 5,431,562, issued July 11, 1995.
[3] Brodkin et al., US 6,322,728 B1, issued Nov. 27, 2001.
[4] Vickery, US 3,502,466, issued Mar. 24, 1970.
[5] In addition to the rejections summarized above, the Examiner also provisionally rejected the claims for obviousness-type double patenting based on the claims of application 10/868,311. (Office Action mailed Oct. 10, 2013, page 3; Ans. 3.) Appellants did not appeal this rejection. (*See* Appeal Br. 5–6; Reply Br. 2.)

I

The Examiner has rejected claims 10–14 and 18–22 as lacking adequate written description in the Specification. The Examiner finds that "[t]he disclosure as originally filed does not provide adequate support for the limitation that at least one cross-section/layer is sintered before all layers are deposited." (Ans. 4.)

Appellants argue that the disputed limitation is described in the Specification at ¶¶ 98 and 99. (Appeal Br. 7–9.)

We agree with Appellants that the Specification shows possession of a process that includes the disputed limitation. "[T]he description requirement does not demand any particular form of disclosure, or that the specification recite the claimed invention *in haec verba*." *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (citation omitted). Rather, "the test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Id.* at 1351.

The Specification describes a method of making an orthodontic appliance in which metal mixed with a binder is deposited in layers and the binder is then removed. (Spec. ¶ 98.) "[A]fter all layers have been applied to produce the three-dimensional appliance, the material, which is metal, ceramic or other material, and which is relatively fragile with the binder removed, is then heated to just below its melting point, and sintered until it achieves the desired cohesion and density." (*Id.*) This embodiment does not include sintering before all the layers are deposited.

However, the Specification also states that "[o]ther techniques for producing the appliance in layers may be used." (*Id.* ¶ 99.) "Materials may, for example, be deposited in uniform layers, with *a cross section of the appliance then being bonded, such as for example, being sintered* with the use of a computer controlled laser." (*Id.*, emphasis added.)

Each layer of the appliance represents a cross section of the final product; thus, the above disclosure is reasonably understood to describe sintering each layer before the next layer of metal powder is deposited. We agree with Appellants that the Specification shows possession of a method in which "at least one cross section is deposited and then is sintered before all of the layers are deposited," as recited in claim 10. The rejection under 35 U.S.C. § 112, first paragraph, is reversed.

II

The Examiner has rejected claims 1–7 and 9 as obvious based on Andreiko, Brodkin, and Vickery. The Examiner finds that Andreiko discloses a method meeting most of the limitations of claim 1, except that it does not disclose layers that are a mixture of a metal powder and binder, removing the binder, or sintering. (Ans. 4–5.)

The Examiner finds that Brodkin discloses forming an orthodontic product made of ceramic in a layer-by-layer technique that involve placing a binder between the layers, then removing the binder and sintering. (*Id.* at 5.) The Examiner finds that Vickery discloses making a dental appliance by depositing a mixture of a metal powder and a binder. (*Id.* at 6.) The Examiner concludes that it would have been obvious to modify the method suggested by the combination of Andreiko and Brodkin "to include the

method step of Vickery, in order to provide a well known means of providing a dental article with fluidity and strength. Furthermore, mixing both elements together would be more efficient then depositing on[e] at a time as taught by Brodkin." (*Id.*)

Appellants argue that

> Brodkin describes depositing an unformed layer of loose powder and then selectively producing jets of a liquid binder at selected regions of that loose powder layer. The presence of loose powder, that is, powder left unbound by liquid binder, temporarily supports the formation of the restoration. The selectively bound areas ultimately constitute the restoration, which is produced when the unbound powder is removed. . . . Thus, it is the combination of loose powder and selectively bound powder that ultimately forms the restoration.

(Appeal Br. 14.)

Appellants argue that, by contrast, the

> putty-like mass of Vickery appears to be self-supporting and thus does not need any portion of unbound, loose powder for support. These different functions reasonably suggest that the putty-like mass of Vickery is not substitutable for either the powder or the binder or both the powder and the binder of Brodkin.

(*Id.* at 15.)

Appellants also argue that

> the process described in Brodkin is not compatible with the putty-like mass of Vickery. It is unknown from the record how substituting the putty-like mass of Vickery for the loose powder is even possible in the process of Brodkin because it is unknown whether the print head in Brodkin could even dispense or be made to dispense a putty-like mass.

(*Id.*)

We agree with Appellants that the Examiner has not shown that the claimed process would have been obvious based on Andreiko, Brodkin, and Vickery. Andreiko discloses a method of making an orthodontic bracket by, among other methods, stereo lithography. (Andreiko 32:44–51.)

Brodkin states that "dimensional printing and fused deposition modeling are preferred because both ceramic and resin-based composite dental restorations can be produced in solid (e.g. denture teeth) or multilayered form (e.g. crowns). Three-dimensional printing is most preferred for mass-production." (Brodkin 2:33–36.) Brodkin describes a method of using a three-dimensional printing apparatus having a powder distribution head and a binder deposition head. (*Id.* at 4:12–16.) "The powder material is dispensed in a confined region as the dispensing head is moved in discrete steps." (*Id.* at 4:17–19.)

"An ink jet print head . . . is also driven . . . to follow the motion of the powder head and to selectively produce jets of a liquid binder material at selected regions thereby causing the powdered material at such regions to become bonded." (*Id.* at 4:28–33.) "The powder/binder layer forming process is repeated so as to build up the restoration, layer by layer." (*Id.* at 4:38–39.) "[O]nce the desired final shaped configuration is achieved and the layering process is complete, . . . the loose, unbounded [sic] powder particles are removed using a suitable technique, such as ultrasonic cleaning, to leave a finished restoration. (*Id.* at 4:41–49.)

Brodkin states that "[w]hile the binder solution must have a relatively high binder content, the viscosity thereof should be low enough so as to be able to flow through the printing head for deposit into the powder material."

(*Id.* at 5:4–8.) Thus, Brodkin discloses a method in which a layer of a powdered material, which can be metal (*id.* at 5:51–52), is deposited and then a layer of a liquid binder is applied to selected regions of the powder. Brodkin does not disclose depositing layers of a mixture of powder and binder. The Examiner cites Vickery as disclosing this limitation.

Vickery describes a method of making metallic dental prostheses in which a "powdered metal is first mixed with a binder to form a putty or paste, the paste thereafter formed into the desired shape, and the shape then heated whereby the binder is driven off." (Vickery 1:27–28, 61–64.) More specifically, "a putty-like mass is provided comprising very finely divided metallic particles mixed with a binder which, while permitting a degree of fluidity, also is capable of providing strength of construction up to the point at which sintering and bonding of the particles takes place." (*Id.* at 1:66–71.) "The putty is carved or sculptured with an appropriate instrument to the required contours," then dried and heated to drive off the binder and sinter the metallic particles. (*Id.* at 2:3–9.)

We agree with Appellants that the Examiner has not provided an adequate basis for concluding that it would have been obvious to modify Brodkin's method for production of dental restorations by using a mixture of metal powder and binder, such as the putty-like material of Vickery. Brodkin's method is based on depositing a layer of metal powder and then spraying a liquid binder from an ink-jet print head onto selected parts of the powder layer. Brodkin expressly cautions that the liquid binder must have a "viscosity . . . low enough so as to be able to flow through the printing head for deposit into the powder material." (Brodkin 5:6–8.)

The Examiner has not pointed to evidence showing that a putty-like material would have a viscosity low enough to flow through an ink-jet print head, or evidence showing that it would have been obvious to modify Brodkin's dental restoration method to accommodate a material with a viscosity comparable to that of Vickery's putty-like material. The Examiner responds that Appellants "ha[ve] not provided any evidence to how the mixture of Vickery cannot be done in the process of Brodkin." (Ans. 7.) However, that evidence is provided by Brodkin itself, in its guidance regarding the viscosity required for a binder to be used in its process.

The Examiner also finds that "after further review, the limitation of a metal powder as a binder is already disclosed by Brodkin (column 5, lines 45-54)." (*Id.* at 7–8.) Appellants argue that Brodkin's disclosure of a "metallic binder" refers to a "a binder usable with a metal powder and deposited in accordance with the separate application of powder and binder per Brodkin." (Reply Br. 8.)

We agree with Appellants that Brodkin's description of its process focuses on liquid binders but, even if Brodkin were read to describe the use of a powdered binder in its process, the resulting process would still involve the sequential application of metal powder and binder, rather than simultaneous deposit as required by the claims on appeal.

"An examiner bears the initial burden of presenting a prima facie case of obviousness." *In re Huai-Hung Kao*, 639 F.3d 1057, 1066 (Fed. Cir. 2011). Because that burden has not been carried here, we reverse the rejection of claims 1–7 and 9 under 35 U.S.C. § 103(a).

SUMMARY

We reverse the rejection of claims 10–14 and 18–22 under 35 U.S.C. § 112, first paragraph.

We reverse the rejection of claims 1–7 and 9 under 35 U.S.C. § 103(a).

The claims remain rejected for obviousness-type double patenting because that rejection was not appealed.

REVERSED