

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* JEFFREY A. NIELSEN and VLADEK KASPERCHIK

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Appeal 2008-4477  
Application 10/340,474  
Technology Center 1700

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Decided: September 19, 2008

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Before TERRY J. OWENS, CATHERINE Q. TIMM, and  
JEFFREY T. SMITH, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1, 3-5, 7-20, 22-24, 45, and 46. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

## I. BACKGROUND

The invention relates to a solid freeform fabrication process. Claims 1 and 22 are most relevant to the disposition of this appeal:

1. A method of producing an object through solid freeform fabrication, said method comprising:
  - ejecting binder drops into a bed of powder build material to form a single layer of said object; and
  - ejecting binder drops of different volumes only at surface contours of said object.

22. A method of fabricating an object with a jetted polymer solid freeform fabrication system, said method comprising applying polymer drops of at least two different volumes to a powder in forming a single layer of said object, wherein said object is formed of a plurality of predetermined layer patterns with a volume of polymer drop applied being varied so as to increase the speed at which said object is fabricated while improving surface smoothness; and

wherein drops of a small volume are used at surface contours of said object.

On review are the Examiner's rejections of

1. claims 22-24 under 35 U.S.C. §112, ¶ 1 as lacking written descriptive support;
2. claims 1, 3-5, 7-20, 22-24, 45, and 46 under 35 U.S.C. § 103(a) as unpatentable over Rowe (US 2003/0099708 A1 pub. May 29, 2003 to Rowe et al.); and
3. claims 1, 3-5, 7-20, 22-24, 45, and 46, provisionally, under the judicially-created doctrine of non-statutory obviousness-type double patenting over claims 1-18 and 43-53 of copending Application No. 10/354,538.

## II. DISCUSSION

### *Written Descriptive Support for Claims 22-24*

The Examiner finds that there is no support in the originally filed Specification for the limitation in claim 22: “a volume of polymer drop applied being varied so as to increase the speed at which said object is fabricated while improving surface smoothness.” The Examiner finds that the Specification provides no nexus between varying the drop volume and an increase in fabrication speed (Ans. 5). The only nexus, according to the Examiner, is between speedy fabrication and large drop sizes (Ans. 9).

Appellants contend that the original Specification provides support at page 5, lines 15-20; page 5, line 25 to page 6, line 6 and in Figures 3a and 4b along with the descriptions of those figures (App. Br. 4-5). Appellants further contend that “a person of ordinary skill in the art would find that the step of varying polymer volume to increase fabrication speed would be inherent in the teaching of the specification that provides the nexus between speedy fabrication and large drop sizes.” (Reply Br. 2-3.)

The test for determining compliance with the written description requirement of 35 U.S.C. § 112, ¶ 1, is whether the disclosure of the application as originally filed would have reasonably conveyed to one of ordinary skill in the art that the inventor had possession at that time of the later claimed subject matter. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991). The subject matter of the claims need not be described identically or literally to satisfy the written description requirement of 35 U.S.C. § 112, ¶ 1. *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983). However, the description of the invention must be sufficiently clear that one of ordinary skill in the art would have recognized

from the disclosure that the applicants invented the later claimed subject matter. *In re Wertheim*, 541 F.2d 257, 262 (CCPA 1976). Whether a specification complies with the written description requirement of 35 U.S.C. § 112, ¶ 1, is a question of fact. *Gentry Gallery Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998); *In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996).

Therefore, the issue before us is: does the Specification reasonably convey to one of ordinary skill in the art that Appellants were in possession of a method in which the volume of the drop is varied so as to increase the speed of fabrication while improving surface smoothness?

We answer this question in the affirmative.

The following enumerated findings of fact (“FF”) are of particular relevance:

1. According to the Specification, using bigger drops of binder results in faster fabrication, but less detail and more roughness in the solid freeformed product (Spec. 2:5-10).
2. Using smaller drops produces a smoother surface finish and finer features in the object being fabricated, but also results in longer fabrication times (Spec. 2:18-19).
3. Appellants use a combination of smaller drops and larger drops to “retain the advantages of speedy fabrication with the use of large drop sizes, while adding the ability to create smoother surface finishes and more precise surface features by also using small drop sizes.” (Spec. 6:3-6.)

From the findings enumerated above, it appears that Appellants are claiming what they have invented, albeit in different language than that used

in the Specification. The Specification reasonably conveys that varying the drop size (using large drops and small drops (FF 3)) increases the fabrication speed (due to the presence of the large drops (FF 1, 3)) while also improving surface smoothness (due to the presence of the small drops (FF 2, 3)). The difference in the claim language is not such that there is a lack of written or written descriptive support within the meaning of 35 U.S.C. § 112, ¶ 1.

*Obviousness over Rowe*

Turning to the rejection of claims 1, 3-5, 7-20, 22-24, 45, and 46 as obvious over Rowe, Appellants contend that Rowe does not teach or suggest “ejecting binder drops of different volumes only at the surface contours of said object” as recited in claim 1, “wherein drops of a small volume are used at the surface contours of the object” as recited in claim 17, nor teach “wherein drops of a small volume are used at the surface contours of said object” as recited in claim 22 (App. Br. 10). According to Appellants, Rowe only suggests varying the drop volume to achieve a concentration gradient of active pharmaceutical ingredients (API), not varying drop volume at surface contours of a fabricated object (App. Br. 10-11).

The Examiner acknowledges that Rowe does not explicitly teach ejecting drops of material of different volumes at surface contours of the object, but concludes that such ejection of drops would have been obvious “in order to manufacture an object having desired characteristics and/or features.” (Ans. 6). According to the Examiner, Rowe teaches that the enclosing region (outer layer surrounding the API-containing core) may contain essentially no API, and that both the enclosing and core regions may

be manufactured by variable drop volume printing (Ans. 9-10 *noting* Rowe, ¶ 67).

Appellants reply that “[u]sing a different drop volume of an enclosing region as disclosed in *Rowe et al.* means that the entire surface of the enclosing region would be made with a different drop volume than the interior in order to effect its purpose (*e.g.*, for controlling time release of API)” and “[t]his does not teach or suggest using a different drop volume only at surface contours of, *e.g.*, the enclosing region.” (Reply Br. 3-4.)

The issue is: have Appellants demonstrated that the Examiner reversibly erred in determining that Rowe would have suggested to one of ordinary skill in the art “ejecting binder drops of different volumes only *at the surface contours* of said object” as required by claim 1, or “wherein drops of a small volume are used *at surface contours* of the object” as required in claims 17 and 22 (emphasis added)?

In order to answer the above question, we must first consider the meaning and scope of the claims, particularly, the meaning of “surface contours” of an object. “[A]s an initial matter, the PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification.” *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

The following Findings of Fact (FF) are relevant:

4. The Specification does not provide a definition for “surface contours.” (Spec. in its entirety.)

5. The claims use “surface” as an adjective modifying “contours.”
6. “Contour” in its ordinary and accustomed meaning refers to “the outline of a figure or body; the edge or line that defines or bounds a shape or object.” Dictionary.com Unabridged (v 1.1, 2006). Random House, Inc. <http://dictionary.reference.com/browse/contour> (accessed: September 09, 2008); *see also* Webster’s New Collegiate Dictionary (1976) (“an outline esp. of a curving or irregular figure: shape.”).
7. “Surface” in its ordinary and accustomed meaning as an adjective means “of, on, or pertaining to the surface; external.” Dictionary.com Unabridged (v 1.1, 2006). Random House, Inc. <http://dictionary.reference.com/browse/surface> (accessed: September 09, 2008); *see also* Webster’s New Collegiate Dictionary (1976) (“of, located on, or designed for use at the surface of something.”).
8. The Specification differentiates between interior layers and the “outer contours or surfaces” of the object stating that, “[i]n some embodiments, the interspersion of various sized drops of binder and/or ink is only performed at *outer contours or surfaces* of the object (300), and/or the edges of each layer (302). As the bulk volume of the object (300) will be interior and inaccessible, it is not necessary to smooth each individual interior layer (302). Therefore, preferably only the *outer contours* and/or edges of the object (300) are formed using the smaller volume drops (305).” (Spec. 9:8-13 (emphasis added); *see also* Spec 5:15-29.)

Appellants do not provide a definition for “surface contours” (FF 4), but rather use the words in accordance with their ordinary and customary meaning (FF 6-8). Therefore, applying the broadest reasonable

interpretation consistent with the Specification, we determine that “surface contours” as used in the claims refers to the outline of the object fabricated by solid freeform fabrication, in other words, the external surface of the object.

With the above claim interpretation in mind, we turn to the teachings of Rowe. The following further Findings of Facts (FF) are relevant:

9. Rowe describes a process of manufacturing biomedical articles such as oral dosage forms by three-dimensional printing (3DP) (Rowe, ¶¶ 3, 6, and 24).
10. Three-dimensional printing (3DP) allows for controlled placement of substances within the dosage form. Complex release profiles are possible. (Rowe, ¶ 6.)
11. In the 3DP process, drops of a binder liquid are dispensed by a printhead onto a layer of powder by a technique similar to ink-jet printing to join the powder particles together. The process is repeated layer-by-layer to build the three-dimensional object (Rowe, ¶ 7).
12. The binder can be dispensed onto powder to create a non-uniform distribution of concentration of API such as a gradient of concentration or an area devoid of API. “For example, the region containing essentially no API may be in the form of an enclosing region that on all side surrounds the API-containing region.” (Rowe, ¶ 67.)
13. The enclosing region may serve to control time release or isolate the interior from the outside world (Rowe, ¶ 67).
14. “For gradients, the suspension can be dispensed with variable drop volume.” (Rowe, ¶ 67; see also ¶ 59.)

Turning first to claim 1, we note that this claim requires “ejecting binder drops of *different volumes* only at the surface contours of said object.” (emphasis added.) We take this to mean that the only place binder drops of different volumes are ejected is at those areas of the layers forming the external surface of the object. It follows then that the drops ejected to form the interior portions or core of the object must have the same volume.

We cannot agree with the Examiner that Rowe teaches or suggests ejecting different volumes only at the surface contours. This would require two different sized drops ejected around peripheries of layers and/or on external layers only. The Examiner does not point to any portion of Rowe teaching or suggesting the use of two different drop volumes to form only the surface contours, i.e., the external surfaces of the object.

However, claims 17 and 22 are not limited to using different drop volumes only at surface contours. These claims require the use of drops of a small volume at surface contours. As pointed out by the Examiner, Rowe describes a layer-by-layer 3DP process ejecting binder drops with variable drop volume to form a gradient of concentration of API within the object (dosage form) (FF 9, 11, 12). Rowe also suggests ejecting drops so that an enclosing region essentially without API is built around a core region containing API (FF 12). Rowe, therefore, suggests gradients that control time release by having less API in the outer regions and more API in the core and further suggests using small drops on the outer region (surface contour) and larger drops to form the interior region to obtain the desired concentration gradient and controlled release profile.

With respect to claims 17 and 22, in determining that there was an apparent reason to use drops of a small volume at surface contours of the

object (dosage form of Rowe), the Examiner correctly took into account the teachings of the prior art reference, the effects of the demands on those in the pharmaceutical arts to obtain particular concentration gradients and time release profiles in dosage forms, and the background knowledge of the ordinary artisan as evidenced by Rowe. *See KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1727, 1740-41 (2007) (“Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”).

Appellants have demonstrated that the Examiner reversibly erred in determining that Rowe would have suggested to one of ordinary skill in the art “ejecting binder drops of different volumes only at the surface contours of said object” as required by claim 1, but have not demonstrated that the Examiner reversibly erred in determining that Rowe would have suggested a process “wherein drops of a small volume are used at surface contours of the object” as required in claims 17 and 22. Therefore, we do not sustain the obviousness rejection of claims 1, 3-5, 7-16, 45, and 46 over Rowe. However, we sustain the obviousness rejection of claims 17-20 and 22-24 over Rowe.

#### *Obviousness-type Double Patenting*

Appellants do not present any arguments directed to the rejection of claims 1, 3-5, 7-20, 22-24, 45, and 46 as provisionally rejected on the ground of non-statutory obviousness-type double patenting over claims 1-18

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and 43-53 of copending Application 10/354,538 maintained by the Examiner. We, therefore, summarily sustain this rejection.

### III. CONCLUSION

In summary, we sustain the rejection of claims 17-20 and 22-24 under 35 U.S.C. § 103(a), and sustain the provisional obviousness-type double patenting rejection of claims 1, 3-5, 7-20, 22-24, 45, and 46, but do not sustain the rejection of claims 1, 3-5, 7-16, 45, and 46 under 35 U.S.C. §103(a), nor do we sustain the rejection of claims 22-24 under 35 U.S.C. § 112, ¶ 1.

### IV. DECISION

The decision of the Examiner is affirmed.

### V. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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HEWLETT PACKARD COMPANY  
P.O. BOX 272400, 3404 E. HARMONY ROAD  
INTELLECTUAL PROPERTY ADMINISTRATION  
FORT COLLINS, CO 80527-2400