



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/165,085	01/27/2014	Sameh S. Wanis	NGC-00143(006224-0030)	4732
64728	7590	10/08/2019	EXAMINER	
SHUMAKER, LOOP & KENDRICK, LLP NORTHROP GRUMMAN CORPORATION 42690 WOODWARD AVENUE SUITE 300 BLOOMFIELD HILLS, MI 48304			HENKEL, DANIELLE B	
			ART UNIT	PAPER NUMBER
			1799	
			NOTIFICATION DATE	DELIVERY MODE
			10/08/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

CCARDINALE@shumaker.com
cgolupski@shumaker.com
tlopez@shumaker.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SAMEH S. WANIS

Appeal 2019-000811
Application 14/165,085
Technology Center 1700

Before JEFFREY T. SMITH, LINDA M. GAUDETTE, and LILAN REN,
Administrative Patent Judges.

GAUDETTE, *Administrative Patent Judge.*

DECISION ON APPEAL¹

The Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner’s decision finally rejecting claims 1–15.³

We AFFIRM.

¹ This Decision includes citations to the following documents: Specification filed January 27, 2014 (“Spec.”); Final Office Action dated April 6, 2018 (“Final”); Appeal Brief filed May 17, 2018 (“Appeal Br.”); Examiner’s Answer dated October 2, 2018 (“Ans.”); and Reply Brief filed November 8, 2018 (“Reply Br.”).

² We use the word “Appellant” to refer to the “Applicant” as defined in 37 C.F.R. § 1.42(a). The Appellant is Northrop Grumman Systems Corporation, also identified as the real party in interest. Appeal Br. 3.

³ We have jurisdiction under 35 U.S.C. § 6(b).

CLAIMED SUBJECT MATTER

“Th[e] invention relates . . . to a system . . . for providing tissue regeneration without the use of scaffolds and . . . that employs acoustic fields to confine human cells into sheets and electric fields to form cell assemblies into chains for vascularization.” Spec. ¶ 1. The invention is said to “solve[] two major problems in tissue engineering and generation, namely, the elimination of a physical scaffold, and increasing the speed of the alignment of individual cells into the desired three-dimensional geometry.” *Id.* ¶ 19. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A system for regenerating tissue, said system comprising:
 - a vessel including a base portion at a first end and a reflector at a second end, said vessel containing a fluid suitable for enhancing tissue generation; and
 - an acoustic transducer in the base portion, said acoustic transducer being configured to provide an acoustic signal which, based on a length of the vessel and interaction with the reflector, generates standing acoustic fields in the vessel, said standing acoustic fields substantially confining cells within the fluid into at least one cell sheet to cause the cells to generate an extracellular matrix and subsequently the tissue, *where the acoustic signal includes multiple field frequencies* enabling collection of individual cells and the at least one cell sheet into one or more three-dimensional surfaces.

Appeal Br. 19 (Claims Appendix).

REFERENCES

The Examiner relies on the following prior art as evidence of unpatentability:

Stuckart
Brcka

US 5,164,094
US 2013/0192990 A1

Nov. 17, 1992
Aug. 1, 2013

REJECTIONS

1. Claims 1–15 are rejected under 35 U.S.C. § 112(a) or 35 U.S.C. § 112 (pre-AIA), first paragraph. Final 2.
2. Claims 1–15 are rejected under 35 U.S.C. § 103 as unpatentable over Brcka in view of Stuckart. Final 4.

OPINION

The Examiner rejected claims 1–15 under 35 U.S.C. § 112 for failure to comply with the written description requirement, and under 35 U.S.C. § 103 as obvious. For the reasons stated in the Final Office Action, the Answer, and below, we sustain both grounds of rejection.

Rejection under 35 U.S.C. § 112

The Appellant filed an amendment on January 9, 2017, amending independent claim 1 to include the limitation “where the acoustic signal includes multiple field frequencies enabling collection of individual cells and the at least one cell sheet into one or more three-dimensional surfaces,” and amending independent claim 10 to include the limitation “where the acoustic signal includes multiple field frequencies enabling collection of individual cells and the plurality of cell sheets into a plurality of three-dimensional surfaces.” The Examiner determined that the phrase “where the acoustic signal includes multiple field frequencies” in each of amended claims 1 and 10 lacks written descriptive support, because “[n]owhere in the specification is it clearly stated that the multiple field frequencies are part of

one single acoustic signal alone[,] . . . nor is it clear how the transducer is configured to create such a signal.” Final 2–3.

The Appellant contends that Specification paragraph 18 provides written descriptive support for the claim phrase “where the acoustic signal includes multiple field frequencies” (claims 1, 10). Appeal Br. 7–8. In particular, the Appellant relies on the following disclosure:

The use of multiple field frequencies enables the collection of individual cells into specific three-dimensional surfaces and movement of the formed tissue can be provided at lower frequencies. Thus, both the individual cells and formed tissue are manipulated using the field-induced forces. This enables multiple surfaces to be brought together for multi-cell type tissues to be formed.

Spec. ¶ 18; *see* Appeal Br. 8. The Appellant additionally cites Specification paragraphs 15, 16, and 20–22 as providing written descriptive support. *See* Appeal Br. 8–10.

In response, the Examiner argues that “the [S]pecification does not provide any clear support for how the ‘multiple field frequencies’ are attributed to the acoustic signal alone.” Ans. 4. The Examiner explains that Specification paragraph 17 describes the use of both acoustic fields and electric fields, “[t]hereby giving examples of multiple types of fields that can be used in combination, and this combination explains how there would be the multiple field frequencies recited in the following paragraph [0018].” Ans. 3. The Examiner further asserts that Specification paragraphs 20–22 “only refer to the frequency of the acoustic transducer in the singular.” Ans. 3.

In the Reply Brief, the Appellant argues that one of ordinary skill in the art would understand that Specification paragraph 18’s description of

“multiple field frequencies enabl[ing] the collection of individual cells into specific three-dimensional surfaces” relates to the acoustic signal because Specification paragraphs 15, 16, and 20–23 clarify that forming sheets of cells is related to the transducer’s acoustic signal, whereas cell adhesion, not shaping, is related to the use of electric fields. Reply Br. 2.

We have reviewed the cited disclosure in the Specification, but are not persuaded of error in the Examiner’s rejection of claims 1–15 as failing to comply with the written description requirement. Although the Specification describes the use of higher frequency electric fields to increase the speed of the cell adhesion process, the Specification clearly suggests that an electric field is not used solely for this purpose. *See* Spec. ¶ 16 (“Higher frequency electric fields (optical fields), such as those produced by lasers, *may be used* to increase the speed of the cell adhesion process without affecting the cell assembly.” (emphasis added)). For example, the Specification discloses that “[a]coustic and *electric forces can be used to manipulate cells* in a solution *and shape them* into predetermined geometries. . . . Cells will collect into predetermined shapes by controlling the field distribution and the field type.” *Id.* ¶ 15 (emphasis added). In the same paragraph, the Specification further discloses that “[b]y carefully selecting and tuning the fields, the cells can be assembled and stably configured into complex three-dimensional geometries without the need to use a scaffold material.” *Id.* As to the electric fields, the Specification discloses that “*an electric field* within the vessel 12 . . . provides dielectrophoretic forces *to control the position and orientation of endothelial cells* to provide tissue vascularization as the tissue is being regenerated. . . . [E]lectric fields act on the cells . . . to create linear cell arrays or chains” *Id.* ¶ 23. By contrast, as observed by the Examiner (Ans. 3–4), the

Specification uses the term “frequency” in the singular when discussing the acoustic signal. *See, e.g.*, Spec. ¶ 20 (“The transducer 22 is intended to represent any suitable device that can generate an acoustic signal at a desired frequency . . .”).

Given the above disclosures, we do not agree with the Appellant that one of ordinary skill in the art would understand that Specification paragraph 18’s description of “multiple field frequencies enabl[ing] the collection of individual cells into specific three-dimensional surfaces” relates to the acoustic signal (Reply Br. 2). Rather, we agree with the Examiner that “the [S]pecification does not provide any clear support for how the ‘multiple field frequencies’ are attributed to the acoustic signal alone.” Ans. 4.

Accordingly, we sustain the rejection of claims 1–15 under 35 U.S.C. § 112(a) or 35 U.S.C. § 112 (pre-AIA), first paragraph.

Rejection under 35 U.S.C. § 103

The Examiner found that Brcka discloses a system as claimed in independent claims 1 and 10, with the exception that Brcka “does not explicitly disclose a reflector or an acoustic transducer in the base portion configured to provide an acoustic signal that generates standing acoustic fields and includes multiple field frequencies in the vessel.” Final 4. The Examiner found that Stuckart “discloses a device for the flocculation, precipitation, agglomeration or coagulation of substances or microorganisms present in a liquid.” *Id.* The Examiner found that Stuckart’s device comprises a tube having an ultrasonic transducer (an acoustic transducer) in a base portion and a reflector at the other end. *Id.* The Examiner further found that Stuckart discloses exposing liquid to two ultrasonic fields (multiple fields) and that the ultrasonic treatment can be performed at two or

more decreasing frequencies (the signal includes multiple field frequencies). The Examiner determined that one of ordinary skill in the art would have modified Brcka's system

to include the acoustic transducer in the arrangement as taught by [Stuckart] because it provides for extraction and recovery of microorganisms from a liquid in the most effective manner in a simple and energy-saving process (Column 1, lines 34–40) and allows for a rapid coagulation or agglomeration of the substances with a low energy requirement (Column 2, lines 13–15) and advantageously allows for further agglomeration during the growth of the coagulates (Column 4, lines 9–13).

Final 4–5.

The Appellant argues that the Examiner reversibly erred in finding that Stuckart teaches or suggests multiple field frequencies in a single acoustic signal. Appeal Br. 13. Specifically, the Appellant argues that “Stuckart teaches ‘two fields which spatially intersect one another’, but does not teach two (or multiple frequencies)[, and] that Stuckart teaches only the use of a single ultrasonic frequency - not multiple field frequencies.” *Id.* The Appellant concedes that Stuckart discloses using different frequencies, but argues that those frequencies are used in different subsequent steps, i.e., each step uses one, not multiple field frequencies. *Id.* at 13–14.

The Appellant's arguments are not persuasive of reversible error in the Examiner's conclusion of obviousness for the reasons explained in the Answer. *See* Ans. 4–5. We add the following to address arguments made in the Reply Brief.

The Examiner cited Stuckart column 3, lines 14–28 as support for finding that Stuckart discloses multiple ultrasonic fields. Final 7–8; Ans. 4. The Appellant argues that this disclosure “is clearly describing two different fields created by two different transducers (‘intersecting each other at right

angles’),” and there is no disclosure that different frequencies are used for the two fields. Reply Br. 3. The Appellant’s argument does not persuade us of error in the Examiner’s obviousness rejection because Stuckart’s disclosure is not so limited.

The cited disclosure in Stuckart describes an embodiment in which liquid is “exposed to two ultrasonic fields which spatially intersect one another . . . and act on the liquid simultaneously or alternately.” Stuckart 3:15–18; *see* Ans. 4. The use of fields that intersect at right angles is merely identified as preferred. *Id.* at 3:19–20; *see also id.* at 8:36–38 (describing an embodiment in which more than one ultrasonic transducer is used to form ultrasonic fields that intersect one another at right angles); Ans. 5. Moreover, as found by the Examiner, based on the Appellant’s admission that “an acoustic signal including multiple field frequencies would be routine and conventional,” one of ordinary skill in the art would appreciate that Stuckart’s transducer is capable of producing an acoustic signal that includes multiple field frequencies. Ans. 4–5 (quoting Appeal Br. 14 (“[H]ow a transducer can be configured to provide a single signal with multiple frequencies . . . is no different than how an audio speaker operates.”)). The Appellant does not dispute the Examiner’s finding as to the knowledge and skill level of the ordinary artisan. *See generally*, Reply Br.

The Appellant argues that Stuckart’s description of using “two or more successive steps at decreasing frequency” is not a description of “multiple frequencies in a single applied field as in Appellant’s claims.” Reply Br. 3. As explained by the Examiner, the Appellant’s argument is not commensurate in scope with the claim language. Claims 1 and 10 require an acoustic transducer configured to provide an acoustic signal that is capable

of generating standing acoustic fields in the vessel and includes multiple field frequencies. The Appellant has not explained persuasively why the claims should be limited to an acoustic transducer configured to generate multiple field frequencies simultaneously, but to exclude an acoustic transducer configured to generate a field frequency in one process step and a different field frequency in another process step. Further, as noted in the prior paragraph, the Appellant has not refuted the Examiner's finding that one of ordinary skill in the art would appreciate that Stuckart's transducer is capable of producing an acoustic signal that includes multiple field frequencies.

Accordingly, for the reasons stated in the Final Office Action, the Answer, and above, we are not persuaded of reversible error in the Examiner's rejection of independent claims 1 and 10.

The Appellant presents a separate argument in support of patentability of dependent claims 4 and 11, and the claims dependent therefrom (claims 6, 7, 13, and 14). Appeal Br. 16–17. The Examiner fully addresses this argument on pages 5–7 of the Answer and we agree that the Appellant's argument is not persuasive of reversible error for the reasons stated in the Answer. In particular, we determine that the Examiner has provided sufficient facts and reasons to support a finding that Brcka discloses the same structural features recited in the claims and, therefore, Brcka's system would be capable of performing the functional limitations recited in the claims. “[W]hen the prior art evidence reasonably allows the PTO to conclude that a claimed feature is present in the prior art, the evidence ‘compels such a conclusion if the applicant produces no evidence or

argument to rebut it.” *In re Crish*, 393 F.3d 1253, 1259 (Fed. Cir. 2004) (quoting *In re Spada*, 911 F.2d 705, 708 n.3 (Fed. Cir. 1990)).

Because the Appellant has not provided persuasive evidence or argument to rebut the Examiner’s findings, we are not persuaded of reversible error in the Examiner’s conclusion of obviousness as to dependent claims 4, 6, 7, 11, 13, and 14.

Accordingly, we sustain the rejection of claims 1–15 under 35 U.S.C. § 103 as unpatentable over Brcka and Stuckart.

CONCLUSION

Claims Rejected	35 U.S.C. §	Basis	Affirmed	Reversed
1–15	112(a) or 112, 1 st paragraph		1–15	
1–15	103	Brcka, Stuckart	1–15	
Overall Outcome			1–15	

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

AFFIRMED