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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/864,982	09/29/2007	Magdalena Bynum	10060740-01	4404

22878 7590 01/18/2013
Agilent Technologies, Inc. in care of:
CPA Global
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EXAMINER
LAM, ANN Y

ART UNIT	PAPER NUMBER
1641	

NOTIFICATION DATE	DELIVERY MODE
01/18/2013	ELECTRONIC

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MAGDALENA BYNUM, TIMOTHY BEERLING, BRIAN PETER, MARC VALER SERRA, and HUI WANG

Appeal 2012-002088
Application 11/864,982
Technology Center 1600

Before TONI R. SCHEINER, STEPHEN WALSH, and SHERIDAN K. SNEDDEN, *Administrative Patent Judges*.

SNEDDEN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a micro fluidic device. The Examiner has rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE

Appellants' invention relates to a microfluidic reverse affinity-blot device that "combines affinity binding for isolation and/or enrichment of protein(s) from a sample, followed by separation/identification thereof." (Spec., Abstract.) The device is "a closed system of interconnected components …, wherein the interconnected components include a capture region upstream from a protein separation region and subsequent detection region." (*Id.*) The interconnected components are "held by a substrate" (*id.* at 2, ll. 26-27), where the substrate may include an opening "formed of transparent materials for operative connection to an energy source and sensor provided external to microfluidic reverse affinity-blot device" (*id.* at 10, ll. 2-3).

Claims 1-13, 15 and 23 are on appeal. Claim 1, the only independent claim on appeal, is representative and reads as follows (emphasis added):

> 1. A microfluidic device for isolation and/or size determination of one or more proteins in a sample, the microfluidic device comprising:
>
> a loading well;
>
> a capture region fluidly connected to the loading well, wherein the capture region comprises an immobilized capture agent for capture of one or more protein species in the sample, and an elution well for holding binding-disruptive reagent for subsequently releasing the captured proteins;
>
> a protein separation region fluidically connected to the capture region to receive the captured proteins, wherein the protein separation region comprises a separation media for separation of the captured proteins; and
>
> a detection region operatively connected to the protein separation region that detects the captured proteins in the sample after separation, the detection region comprising: a channel, a metal surface positioned on an interior surface of the channel, and *an opening for*

the operative connection of an external energy source to the protein separation region.

The claims stand rejected as follows:

I. Claims 1-13 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Hafeman[1] and Yager.[2]

II. Claim 23 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hafeman, Yager, and Tarcha.[3]

I.

Issue

The Examiner has rejected claims 1-13 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Hafeman and Yager. The Examiner finds that Hafeman "is silent as to a metal surface and an opening for the operative connection of an external energy source to the separation region." (Ans. 11.) For the missing elements the Examiner relies on Yager, which discloses "a metal surface on an interior surface of a detection region." (*Id.*, 12.) The Examiner further finds that Yager discloses "a microfluidic device in which at least a portion of one of the walls at the detection area is adapted for interrogation with detection systems selected from the group consisting of surface Plasmon resonance (SPR)." (*Id.*) The Examiner further finds that Yager discloses "at least a portion of two opposite walls of the microfluidic channel comprises electrodes." (*Id.*, citing Yager at col. 4, ll. 15-33.) In reaching a conclusion of obviousness, the Examiner explains as follows:

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[1] Hafeman et al., US 2006/0211055 A1, published Sept. 21, 2002.
[2] Yager et al., US 7,258,837 B2, issued Aug. 21, 2007.
[3] Tarcha, et al., US 5,376,556, issued Dec. 27, 1994.

> It would have been obvious to the skilled artisan to provide a metal electrode on a wall of the detection region as taught by Yager et al. in the Hafeman et al. device to provide the benefits of detection techniques such as surface plasmon resonance and/or electrokinetic pumping means, as taught by Yager et al. The skilled artisan would have had reasonable expectation of success since Yager et al. specifically teach that the metal surface for such detection technique is compatible with electrokinetic pumping means, such as that disclosed by Hafeman et al.

(*Id.*, 13)

Appellants contend that Hafeman "discloses a separation region, but does not clearly describe a protein separation region operatively connected to the detection region." (App. Br. 7.)

Appellants further contend that the "Examiner's Answer concedes that *Hafeman, et al.* does not disclose … an opening, but fails to direct Applicants to any aspect of *Yager, et al.* for the alleged disclosure of this conceded deficiency of *Hafeman, et al*." (Reply Br. 3.)

The issue presented is:

Does the evidence of record support the Examiner's conclusion that the cited prior art renders Claim 1 obvious?

Findings of Fact

The following findings of fact ("FF") are supported by a preponderance of the evidence of record.

FF1. Figure 2 of the Specification is reproduced below.

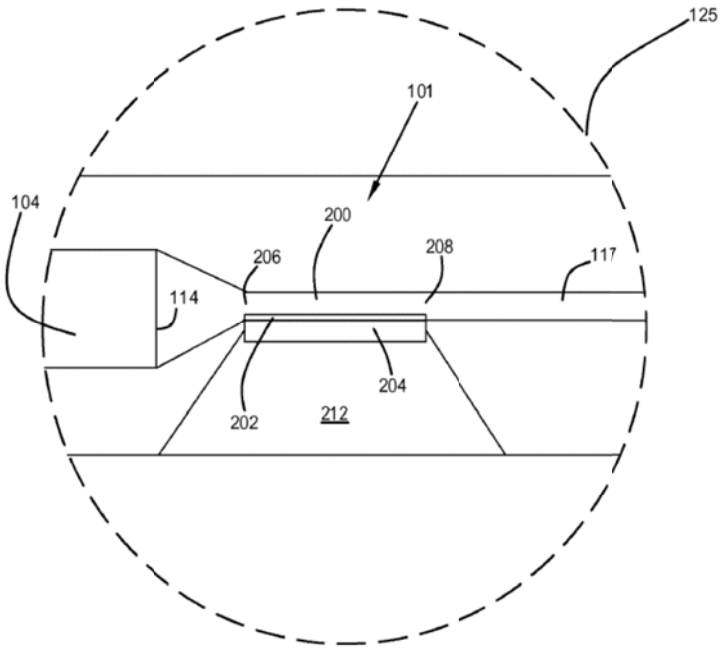

Figure 2 provides an enlarged area of a microfluidic reverse affinity-blot device of the present disclosure. (Spec. 1, ll. 20-23.)

FF2. The features of the device shown in Figure 2 are described in the following passages of the Specification:

> In the greatly enlarged embodiment of **Figure 2**, detection region 106 includes channel 200, metal surface 202, and transparent illuminating body 204. Channel 200 fluidly connected at first end 206 to end 114 of separation region 104 and is fluidly connected at second end 208 to terminal well 118. Metal surface 202 is positioned on interior surface 210 of channel 200 between first end 206 and second end 208.
>
> …
>
> In the embodiment of **Figure 2** and various other embodiments, opening 212 in substrate 101 is provided for operative connection to an energy source and sensor. In an alternative embodiment, substrate 101, *at least in the area designated opening 212, is formed of transparent material for*

> *operative connection to an energy source and sensor provided external to microfluidic reverse affinity-blot device*.

(Spec. 9, ll. 20-23; and 9, l. 29, to 10, l. 3.) (Emphasis added.)

FF3. Hafeman discloses "microfluidic devices and systems for detecting a component of interest in a sample." (Hafeman 3, ¶ [0016].)

FF4. Hafeman discloses as follows:

> "The devices will typically include a detection region downstream of the separation channel region."

(*Id.*, ¶ [0018].)

FF5. Yager discloses "a microfluidic device for use in the detection of one or more analytes in a fluid using solid-phase affinity binding assays." (Yager, col. 3, ll. 3-5.)

FF6. Yager discloses that the microfluidic device includes a detection area where "at least a portion of one of the walls at the detection area is adapted for interrogation with detection systems selected from the group consisting of optical absorption, fluorescence intensity, fluorescence position, [and] surface plasmon resonance (SPR)." (*Id.*, col. 3, ll. 62-66.)

FF7. Yager discloses that, "[f]or optical measurements, at least a portion of one of the walls in the detection area is transparent to light." (*Id.*, col. 4, ll. 9-10.)

FF8. Yager discloses "electrochemical detection and acoustic detection can utilize individual sensors (electrodes and acoustic detectors) or arrays of detectors integrated into or on one or more walls of the microfluidic channel." (*Id.*, col. 4, ll. 4-8.)

FF9. Yager discloses that "at least a portion of two opposite walls of the microfluidic channel comprises electrodes." (*Id.*, col. 4, ll. 15-16.)

Principles of Law

"A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l v. Teleflex Inc*., 550 U.S. 398, 418 (2007). However, a prima facie conclusion of obviousness may be supported by a showing that a combination of familiar elements according to known methods yields no more than predictable results. *Id.* at 401; citing *United States v. Adams*, 383 U.S. 39, 40 (1966). Furthermore, the Supreme Court has emphasized that "the [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.* at 418. "If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *Id.* at 417.

The Board "determines the scope of claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction 'in light of the specification as it would be interpreted by one of ordinary skill in the art."' *Phillips v. AWH Corp*., 415 F.3d 1303, 1316 (Fed. Cir. 2005) (quoting *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). Nevertheless, the Board "avoid[s] the temptation to limit broad claim terms solely on the basis of specification passages." *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). "Absent claim language carrying a narrow meaning, the PTO should only limit the claim based on the specification or prosecution history when those sources expressly disclaim the broader definition." *Id.; citing Liebel-Flarsheim Co.*

v. Medrad, Inc., 358 F.3d 898, 906-09 (Fed. Cir. 2004) (explaining requirement for an express disclaimer in either the specification or prosecution history).

Analysis

We find that the evidence of record supports the Examiner's finding that Hafeman discloses a separation region operatively connected to the detection region. (FF4; *see e.g.*, Ans. 7.) We are thus, not persuaded by Appellants arguments to the contrary. (*See* App. Br. 7.)

Appellants further contend that the Examiner's Answer fails to direct Applicants to any aspect of Yager that discloses an "opening" as required by claim 1. (*See* Reply Br. 3.) We disagree. The Examiner highlights the disclosure of Yager describing the detection area, where "at least a portion of one of the walls at the detection area is adapted for interrogation with detection systems" such as surface plasmon resonance. (FF6; Ans. 12.) This portion of one of the walls in the detection area of Yager may be transparent. (FF7.) We find the Examiner's reliance on this disclosure of Yager to satisfy the "opening" element of claim 1 is reasonable because the Specification discloses an embodiment where the "opening" may be "formed of transparent material for operative connection to an energy source." (FF2.)

Conclusion of Law

The evidence of record supports the Examiner's conclusion that the cited prior art renders claim 1 obvious. Claims 2-13 and 15 fall with claim 1. 37 C.F.R. § 41.37(c)(1)(vii).

II.

The Examiner rejects claim 23 under 35 U.S.C. § 103(a) as being unpatentable over Hafeman, Yager, and Tarcha. Appellants argue that "claim 23 depends from claim 1 and is patentable for at least the same reasons and in view of its additionally recited subject matter" without providing additional argument or evidence. (App. Br. 8.) Thus, for the same reasons discussed above, we find the evidence of record supports the Examiner's conclusion that the cited prior art renders claim 23 obvious.

SUMMARY

We affirm the rejection of claims 1-13 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Hafeman and Yager.

We affirm the rejection of claim 23 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hafeman, Yager, and Tarcha.

AFFIRMED

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