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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/010,973	01/29/2016	JOEL MYERSON	20140284-02	8331

22878 7590 09/29/2020

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EXAMINER
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ART UNIT	PAPER NUMBER
1639	

NOTIFICATION DATE	DELIVERY MODE
09/29/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOEL MYERSON and BO U. CURRY

Appeal 2020-001122
Application[1] 15/010,973
Technology Center 1600

Before ANTON FETTING, ULRIKE W. JENKS, and
RACHEL H. TOWNSEND, *Administrative Patent Judges*.

TOWNSEND, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims to a method of producing an array of proteins from an array of expression cassettes, which have been rejected as obvious.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Agilent Technologies, Inc. (Appeal Br. 2.)

[2] The provisional obviousness-type double patenting rejections made by the Examiner have been rendered moot by the abandonment of Application 14/550,713.

STATEMENT OF THE CASE

Claims 1–20 are on appeal. Claim 1 is illustrative and reads as follows:

> 1. A method comprising:
>
> a) providing an array of expression cassettes;
>
> b) providing a planar absorbent support comprising an in vitro transcription and translation (NTT) mix impregnated therein;
>
> c) placing the planar absorbent support in contact with the array of expression cassettes; and
>
> d) incubating the planar absorbent support and array under conditions by which the expressed cassettes are transcribed and translated by the impregnated NTT components, thereby producing an array of protein in, within or at the surface of the planar absorbent support.

(Appeal Br. 15.)

The prior art relied upon by the Examiner is:

Name	Reference	Date
Taussig et al.	US 2008/0293591 A1	Nov. 27, 2008
Jacobson et al.	US 2012/0220497 A1	Aug. 30, 2012
Bertozzi et al.	US 2012/0244601 A1	Sept. 27, 2012
Hudson et al.	US 2013/0252849 A1	Sept. 26, 2013
M. He et al., *Printing protein arrays from DNA arrays*, 5(2) Nature , 175–177 (2008)		

The following grounds of rejection by the Examiner are before us on review:

Claims 1, 7, 8, and 12 under 35 U.S.C. § 102 (a)(1) and (a)(2) as anticipated by Taussig.

Claims 1, 7, 10, and 12 under 35 U.S.C. § 102 (a)(1) and (a)(2) as anticipated by He.

Claims 2–5 and 18–20 under 35 U.S.C. § 103 as unpatentable over Taussig and Hudson.

Claim 6 under 35 U.S.C. § 103 as unpatentable over Taussig, Hudson, and Bertozzi.

Claims 9, 11, and 13–17 under 35 U.S.C. § 103 as unpatentable over Taussig and Jacobson.

DISCUSSION

Anticipation

A. Taussig

The Examiner finds that Taussig teaches a protein expression system, including a sandwich embodiment that meets the claimed limitations. (Final Action 2.) In particular, the Examiner states that in the sandwich embodiment that Taussig teaches, the DNA molecule templates are immobilized in an array to a first surface, a membrane filter that is presoaked with a cell-free expression system extract (referred to as an IVTT) is placed on top of the immobilized DNA array, and a second surface comprising protein capture reagents is placed on top of the filter. (*Id.* at 2–3 (citing Taussig ¶¶63, 69, and Example 1).) The Examiner explains that the pre-soaked membrane filter includes "transcriptional promoters, transcriptional regulatory sequences, untranslated leader sequences, sequences encoding cleavage sites, recombination sites, transcriptional terminators or ribosome entry sites, cistrons, and open reading frames (e.g., para 0023-0024, pg. 2)." (*Id.* at 3.)

Appellant focuses only on the limitations of claim 1. Claims 7, 8, and 12 have not been argued separately and therefore fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

Appellant argues that the claims on appeal require "protein capture by the IVTT impregnated planar absorbent support by virtue of protein production in, within or at the surface of the support" and the rejection is in error because Taussig "does not describe protein capture or production within or at the surface of an IVTT impregnated planar absorbent support." (Appeal Br. 6; Reply Br. 5.) According to Appellant, the three layer sandwich assay described in Taussig "does not disclose or suggest production of a protein array in, within or at the surface of an IVTT impregnated planar absorbent support" and because the protein capture surface is separated from the DNA array surface by a membrane, it does not "disclose placing the planar absorbent support in contact with the array of expression cassettes." (Appeal Br. 6; Reply Br. 5.) We disagree.

Appellant's claim 1 requires that after "an array of expression cassettes" is incubated with "a planar absorbent support" that has an in vitro transcription and translation mix impregnated therein, "an array of protein" is produced "in, within or at the surface of the planar absorbent support." Thus, the claim 1 does not literally recite "protein capture." Instead it simply recites producing an array of protein "in, within or at the surface of" the planar absorbent support that has an IVTT mix impregnated therein.

The term "array" is defined in Appellant's Specification, in terms of a two-dimensional arrangement but not in terms of protein capture. (Spec. 4 ("The term 'array' is intended to describe a two-dimensional arrangement of addressable regions bearing oligonucleotides associated with that region.").)

Thus an "array of expression cassettes" as required in claim 1, step a) is simply a two dimensional arrangement of addressable regions bearing expression cassettes. And "an array of protein" required in claim 1, step d) is simply a two dimensional arrangement of addressable regions bearing proteins.

Taussig teaches a planar absorbent support that includes an IVTT matrix impregnated therein. In particular, Taussig states that "cell-free protein synthesis . . . occurs *within* a protein permeable material (e.g., membrane filter)" where that filter is "pre-soaked with a coupled cell-free lysate for protein synthesis." (Taussig ¶ 63 (emphasis added).)

We find further that Taussig teaches production of protein "in, within or at the surface" of that planar absorbent support. Taussig describes the "cell-free" system that is impregnated in the protein permeable material is "capable of performing protein synthesis by transcription and translation." (*Id.* ¶ 28.) Taussig further explains that the cell-free system "provide[s] an environment in which the conditions of protein synthesis can be adjusted and controlled through addition of exogenous biomolecules or molecules" (*id.* ¶ 30) and can include agents that "interact with the arrayed proteins [that are present on a first support surface] or encode said interacting additional agents (e.g., nucleic acids capable of being transcribed and/or translated into protein by the cell-free system)" (*id.* ¶ 32). Taussig further teaches that the protein produced within the permeable membrane ends up at the surface of the membrane through diffusion. Taussig states: "The individual DNA molecules direct the synthesis of proteins 4, *which subsequently diffuse through the filter* to the second support surface 3 where they are immobilized in situ." (*Id.* ¶ 63 (emphasis added).)

It is true that Taussig teaches that the protein produced through transcription and translation by the impregnated IVTT components of the protein permeable material is "captured" on a protein capturing surface by "interaction with the capture reagent." (*Id.*; *see also id.* ¶ 28.) Nevertheless, the protein is produced "within [the] protein permeable material" and diffuses to the surface of that membrane prior to being captured on another support surface. (*Id.* ¶ 63.)

We note further that Taussig teaches the capture of the protein so diffused is in an array "that is complementary to" the DNA array on the first support surface because "protein diffusion within the plane of the membrane is limited." (*Id.*) Given that protein capture is in a complementary array, we find that the protein produced that diffuses to the surface of the membrane must be in a similar complementary array. Thus, contrary to Appellant's argument, we find Taussig describes production of a protein array as claimed. That this array of protein at the surface of the protein permeable support is not captured with a capturing reagent does not preclude finding the claimed limitations, which do not require capture, are met.

Furthermore, contrary to Appellant's argument, we find Taussig describes placing the planar absorbent support as claimed in contact with the array of expression cassettes. In particular, Taussig describes that the membrane filter that is first soaked with cell-free lysate is "placed between the DNA array slide and the protein capturing slide "and a tight contact between the surfaces was made." (Taussig ¶ 69.)

In light of the foregoing, we agree with the Examiner that Taussig anticipates the method as recited in claim 1.

B. He

Like Taussig, He teaches a sandwich assay in which a planar absorbent support, i.e., a permeable membrane, carries a cell-free lysate, capable of performing coupled transcription and translation, that is positioned between a DNA array and a capture slide. (He 175.) As with Taussig, the protein that is synthesized during the incubation, diffuses through the membrane to its surface and then is immobilized on the capture slide surface. (*Id.*)

Here, again, Appellant focuses its arguments only on the limitations of claims 1. Claims 7, 10, and 12 have not been argued separately and therefore fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

Appellant's arguments as to why He does not anticipate claim 1 are the same as those it made with respect to Taussig. (Appeal Br. 8–9; Reply Br. 7–8.) We do not find Appellant's arguments persuasive for the same reasons discussed above with respect to Taussig.

Obviousness

Appellant's arguments against the Examiner's obviousness rejections stem from its contention that Taussig does not anticipate the method of producing the protein array recited in claim 1. (*See* Appeal Br. 10–11.) However, for the reasons discussed above, we disagree with Appellant's proposition. Consequently, we affirm the Examiner's rejections of

a) claims 2–5 and 18–20 under 35 U.S.C. § 103 as unpatentable over Taussig and Hudson;

b) claim 6 under 35 U.S.C. § 103 as unpatentable over Taussig, Hudson, and Bertozzi; and

c) claims 9, 11, and 13–17 under 35 U.S.C. § 103 as unpatentable over Taussig and Jacobson.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 7, 8, 12	102	Taussig	1, 7, 8, 12	
1, 7, 10, 12	102	He	1, 7, 10, 12	
2–5, 18–20	103	Taussig, Hudson	2–5, 18–20	
6	103	Taussig, Hudson, Bertozzi	6	
9, 11, 13–17	103	Taussig, Jacobson	9, 11, 13–17	
Overall Outcome			1–20	

TIME PERIOD FOR RESPONSE

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

AFFIRMED