

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ALLEN P. MARDIAN, PHILIP H. CAMPBELL,
CRAIG M. CARPENTER, RANDY W. MERCIL,
and SUJIT SHARAN

Appeal 2008-2369
Application 10/150,388
Technology Center 1700

Decided: June 5, 2008

Before BRADLEY R. GARRIS, PETER F. KRATZ, and
KAREN M. HASTINGS, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of claims 1, 3, 5-7, 9-11, and 47-62, which are the only claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

I. BACKGROUND

The invention relates to a chemical vapor deposition apparatus.

Representative claims 1 and 7 read as follows:

1. A chemical vapor deposition apparatus comprising:

a deposition chamber defined at least in part by a chamber sidewall, a chamber top wall, and a chamber base wall opposing the chamber top wall;

a substrate holder within the chamber, the substrate holder having an upper surface over which a substrate to be deposited upon within the chamber is to be received, the upper surface being elevated relative to the chamber base wall;

at least one process chemical inlet to the deposition chamber configured to introduce a process chemical into the deposition chamber through the chamber top wall; the chamber sidewall comprising a chamber surface extending from elevationally higher than the substrate holder upper surface to elevationally lower than the substrate holder upper surface, the chamber surface having a plurality of purge gas inlets to the chamber therein which are received at least elevationally lower than the substrate holder upper surface, the purge gas inlets being distinct from the at least one process chemical inlet and being disposed at multiple elevations along the chamber sidewall; and

a purge gas inlet passageway in fluid communication with the purge gas inlets, the apparatus being configured to provide purge gas through the purge gas inlets while providing a process chemical through the process chemical inlet.

7. A chemical vapor deposition apparatus comprising:

a deposition chamber defined at least in part by a chamber sidewall and a chamber base wall;

a substrate holder within the chamber,

at least one process chemical inlet to the deposition chamber, the at least one process chemical inlet passing through a chamber lid within opposes the chamber base wall;

a chamber outlet;

at least one of the chamber sidewall and chamber base wall comprising a chamber surface having a plurality of purge gas inlets to the chamber therein, the purge gas inlets being separate from the at least one process chemical inlet;

a purge gas inlet passageway in fluid communication with the purge gas inlets; and

wherein the purge gas inlets are of at least two different inlet sizes, at least some of the purge gas inlets further from the chamber outlet being larger than at least some of the purge gas inlets closer to the chamber outlet.

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

Hirose	4,633,809	Jan. 6, 1987
Barbee	4,640,221	Feb. 3, 1987
Yuuki	5,618,349	Apr. 8, 1997
Sakai (as translated)	JP 2002-371361	Dec. 26, 2002

Claims 1, 6, 9, 10, 11, 47, 52, 53, 54, and 56 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Yuuki.

Claims 3, 7, 55, 57, and 59-62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Hirose.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Barbee.

Claims 48-51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki in view of Sakai.

Claim 58 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yuuki and Hirose in view of Barbee.

Appellants do not separately argue with any reasonable specificity the individual claims rejected under 35 U.S.C. § 102(b), except for claims 52-54 (Br. 11-13). Therefore, we select the broadest independent claim 1 and dependent claims 52-54¹ to decide this issue on appeal. With the exception of independent claim 7, Appellants do not separately argue the various rejections made under 35 U.S.C. § 103 of the remaining claims (Br. 13-17). Therefore, we will separately address claim 7 below.

ISSUES ON APPEAL

The first issue is whether the Appellants have shown that the Examiner reversibly erred in rejecting claims 1, 6, 9, 10, 11, 47, 52, 53, 54, and 56 as anticipated by Yuuki.

For the reasons which follow, we determine that while the Examiner has established a reasonable belief that claims 1, 6, 9, 10, 11, 47, and 56 are anticipated by Yuuki, claims 52-54 are not anticipated by Yuuki.

The second issue is whether Appellants shown reversible error in the Examiner's determination that a person having ordinary skill in the art would have found it obvious to arrive at the claimed invention of the remainder of the claims in view of the applied prior art.

For the reasons which follow, we determine that the Appellants have not shown that the Examiner erred with respect to claims 3, 5, 48-51, 57, and 58-62, but have shown reversible error with respect to claims 7 and 55.

¹ These claims depend from claim 7.

OPINION

We determine the following Factual Findings (FF) from the record in this appeal:

1. Yuuki describes a thermal treatment furnace in which semiconductor wafers are subjected to an oxidation process, an impurity diffusion process, or the like (col. 1, ll. 14-17). The furnace has a chamber (see, e.g., Figs. 1, 2), a substrate holder (see, e.g., Fig. 6, wafer holder 115), at least one first gas inlet configured to introduce a process chemical into the chamber through the top chamber wall (see, e.g., Fig. 2, gas supply pipe 20a, 20A communicating with gas inlets Hu), a second gas inlet distinct from the first gas inlet configured to introduce another gas into a plurality of second gas inlets at multiple elevations along the sidewall (see, e.g., Figs. 1, 2, gas supply pipe 20b, 20B communicating with gas inlets Hb).

2. Yuuki introduces a vapor and forms an oxide film layer on the wafers in the furnace (see, e.g., col. 2, ll. 18-29; col. 5, ll. 45-60).

3. Yuuki describes that “[f]or example, the gas inlet holes Ha² and Hb have a diameter of 3 mm and a hole density of one hole per 2 cm square” (col. 3, ll. 32-34). Likewise, Yuuki describes that the holes Hu of Fig. 2 may have a diameter of 3 mm and a hole density of one hole per 2 cm square (col. 5, ll. 5-11).

4. Yuuki does not describe that the second gas inlets Hb are of at least two different sizes, with at least some of the gas inlets Hb further from the chamber outlet being larger than at least some of the gas inlets Hb closer to the chamber outlet.

² The gas inlet holes designated Ha in Fig 1A of Yuuki correspond to the gas inlet holes designated Hu in Fig. 2.

Principles of Law Relating to Anticipation

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).

However, the law of anticipation does not require that the reference ‘teach’ what the subject patent teaches. Assuming that a reference is properly ‘prior art,’ it is only necessary that the claims under attack, as construed, ‘read on’ something disclosed in the reference, i.e., all limitations of the claim are found in the reference, or ‘fully met’ by it. *See Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772 (Fed. Cir. 1983).

It is well established that while the features of an apparatus claim may be recited functionally, the apparatus must be distinguished from the prior art in terms of structure, rather than function. *See In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). Further, where patentability rests upon a property (or function) of the claimed material (or structure) not disclosed within the art, the PTO often has no reasonable method of determining whether there is, in fact, a patentable difference between the prior art materials and the claimed material. Therefore, where the claimed and prior art products are identical or substantially identical, the PTO can require an applicant to prove that the prior art products do not necessarily possess the characteristics of his claimed product. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977); *see also In re Schreiber*, 128 F.3d at 1478.

The § 102 Rejection over Yuuki

We choose claim 1 to represent the claim grouping of claims 1, 6, 9, 10, 11, 47, and 56.

Applying the preceding legal principles to the factual findings in the record of this appeal, we determine that the Examiner has properly identified factual findings and reasoning for establishing a prima facie case of anticipation of claims 1, 6, 9, 10, 11, 47, and 56 based on Yuuki.

The Examiner correctly finds that all the structure set out in claim 1 is found in Yuuki (Ans. 3-5; FF 1). Appellants, however, contend that Yuuki does not disclose a chemical vapor deposition apparatus. We disagree.

It is axiomatic that during examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). The Examiner has stated that the furnace of Yuuki is a chemical vapor deposition apparatus (Ans. 3, 15). Yuuki does indeed introduce a vapor and does form an oxide film layer on the wafers (FF 2). Appellants' Specification does not provide any specific definition of what constitutes a chemical vapor deposition apparatus. Thus, Yuuki appears to describe all the structure required for a chemical vapor deposition apparatus in accordance with representative claim 1 (see, e.g., FF 1). While unnecessary to the Examiner's anticipation position for the claimed apparatus, Yuuki seemingly describes the steps necessary for a chemical vapor deposition process to occur (see, e.g., FF 2). For these reasons, we find that the furnace of Yuuki reasonably appears to be a chemical vapor deposition apparatus as found by the Examiner.

Even assuming *arguendo* that Appellants are correct that the furnace of Yuuki is not *de facto* a chemical vapor deposition apparatus, the Examiner also states the furnace of Yuuki is capable of being used as a chemical vapor deposition apparatus (Ans. 15). We agree with the

Examiner. What method steps are actually performed in the furnace of Yuuki is irrelevant; the issue is whether the apparatus of Yuuki is capable of being used as a chemical vapor deposition apparatus. Likewise, the issue is whether the two gas inlets 20a, 20b near the valves V1 and V2 reasonably appear to have the capability to function as claimed. *See, e.g., In re Schreiber*, 128 F.3d at 1478.

Appellants have provided no evidence, nor any persuasive line of technical reasoning explaining why the furnace of Yuuki is not a chemical vapor deposition apparatus. Nor have Appellants established why Yuuki's furnace is not capable of being used as a chemical vapor deposition apparatus. Further, Appellants have not provided any evidence that the apparatus of Yuuki (namely, the respective separate gas inlet ports 20a, 20b which lead to separate gas inlets Ha/Hu and Hb) could not be used to introduce a chemical process gas and a purge gas "while providing a process chemical through the process chemical inlet" as set forth in claim 1.

The geometry of Yuuki's furnace appears to be very similar to that disclosed by Appellants; compare, e.g., Fig. 1 of Appellants' with Figs. 1A and 2 (with wafer holder 115 shown in Fig 6) of Yuuki. Given the structural identity and similarity of Yuuki's apparatus to Appellants' apparatus as claimed and disclosed respectively (see also FF 1), we determine that the Examiner was justified in concluding that the furnace of Yuuki appears reasonably capable of being used as a vapor deposition apparatus. We also determine that the Examiner was justified in concluding that the furnace of Yuuki appears reasonably capable of being used to introduce a chemical process gas via 20a, 20A, Hu and a purge gas via 20b, 20B, Hb "while

providing a process chemical through the process chemical inlet” as set forth in claim 1.

For these reasons, we determine that the Examiner has established that the apparatus of the prior art (i.e., Yuuki) reasonably appears to be the same as that claimed. Thus, the burden shifts to Appellants to prove that the claimed apparatus is not the same as the prior art (e.g., establish with evidence that Yuuki will not inherently function as claimed). *See In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) (the burden shifts to applicant to prove *lack* of a (i.e., a different) recited functional limitation if evidence shows products (including apparatus) or processes are the *same or similar*); *see also In re Swinehart*, 439 F.2d 210, 213 (CCPA 1971), and *In re Schreiber*, 128 F.3d at 1478.

As discussed above, the Appellants have not submitted any evidence to rebut the Examiner’s position.

Thus, we affirm the rejection of claim 1 as anticipated by Yuuki.

Dependent claims 52-54

Dependent claims 52-54 depend from independent claim 7. Claim 7 is not included in the rejection under § 102 based on Yuuki.

We agree with Appellants that the Examiner has not established that claim 7 is anticipated by Yuuki (Br. 13).

Independent claim 7 requires that “the purge gas inlets are of at least two different inlet sizes, at least some...further from the chamber outlet being larger than at least some... closer to the chamber outlet”. Yuuki does not teach such a feature (see, FF 3, 4). Indeed, the Examiner agrees that claim 7 does not include this feature (Ans. 10, section (i)). The only rejection of claim 7 is under 35 U.S.C. § 103 (Ans. 8).

We are constrained by these circumstances to reverse the Examiner's § 102 rejection based on Yuuki of claims 52-54.

The § 103 Rejection over Yuuki and Hirose

The Examiner bears the initial burden of presenting a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) *quoted with approval in KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007).

Claims 7 and 55

Applying the legal principles with respect to obviousness to the factual findings in this record, we determine that the Examiner has not properly identified factual findings and reasoning for establishing a prima facie case of obviousness based on Yuuki in view of Hirose with respect to claims 7 and 55.

As discussed above, Yuuki does not describe the two different inlet sizes as recited in claim 7. The Examiner does not rely upon Hirose to teach or suggest this feature; the Examiner merely concludes that “[i]t would have been obvious to one of ordinary skill in the art...to optimize the dimension of Yuuki's purge gas... inlets...Further, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art.” (Ans. 11-12)³.

³ The Examiner cited several prior legal decisions in support of this conclusion (Ans. 12). In accordance with MPEP § 2144.04, if the facts in a prior legal decision are sufficiently similar to those in an application under

The deficiency of the Examiner's obviousness conclusion is that claim 7 does not merely set forth a change in the dimension of the purge gas inlets. The claim language sets forth a specific geometric relationship of two different sizes of inlets relative to the chamber outlet in order to achieve a specific result (namely, a greater volumetric flow of purge gas further from the chamber outlet than closer thereto, Spec. 8:15-21⁴). We note that of the cases relied upon by the Examiner, *In re Rose*, 220 F.2d 459 (CCPA 1955) and *In re Rinehart*, 531 F.2d 1048 (CCPA 1976) involved mere scaling up of prior art sizes; whereas *Gardner v. TEC Systems, Inc.*, 725 F. 2d 1338 (Fed. Cir. 1984) involved a situation wherein the evidence showed that the claimed dimensional limitations did not perform any differently than the prior art. The situation before us does not involve "mere scaling up" of the prior art, nor is there any evidence nor rationale provided by the Examiner that the claimed dimensional relationship would not perform any differently than the prior art device. We therefore must agree with Appellants that no support for the Examiner's conclusory statement is found in the applied prior art or otherwise (Br. 16).

The Examiner has not clearly articulated any reason why an artisan would have made such a modification to the furnace of Yuuki. We fail to understand the Examiner's reasoning that optimizing the dimensions would be an obvious exercise in order to "accommodate varying wafers/substrates" in Yuuki, as alleged by the Examiner (Ans. 18). The

examination, the Examiner may use the rationale used by the court. We fail to see any such similarity of the facts of the prior legal decisions cited by the Examiner to the facts of the instant application.

⁴ The drawings do not appear to illustrate this feature of the invention.

Examiner does not explain how the geometry as recited in claim 7 would function to “accommodate varying wafers/substrates” in the furnace of Yuuki.

Thus, the evidence presented by the Examiner falls short of supporting a prima facie case of obviousness. We are constrained by these circumstances to reverse the Examiner’s § 103 rejection based on Yuuki and Hirose of claims 7 and 55.

Claims 3, 57 and 59-62

Appellants do not separately argue the § 103 rejection of these claims. Rather, Appellants rely upon the same arguments made with respect to claim 1 for dependent claim 3, independent claim 57 and claims 59-62, which depend on claim 57 (see, e.g., Br. 15, 17). In this regard, it is noted that pointing out what claim 57 covers does not amount to a separate argument for the patentability thereof (Br. 16; 37 C.F.R. § 41.37 (c) (vii)). Accordingly, we find these arguments unpersuasive for the same reasons discussed above.

Accordingly, we sustain the Examiner’s § 103 rejection of claims 3, 57, and 59-62 based on the combined teachings of Yuuki and Hirose.

The remaining § 103(a) rejections

Claims 5, 48-51, and 58

Appellants do not separately argue the § 103 rejections of any of the remaining claims (namely, claims 5, 48-51, and 58). Rather, Appellants rely upon the same arguments made with respect to claim 1 (Br. 13-17). We find these arguments unpersuasive for the same reasons discussed above.

Accordingly, we sustain the Examiner’s § 103 rejection of claim 5 based on the combined teachings of Yuuki and Barbee, the § 103 rejection

of claims 48-51 based on the combined teachings of Yuuki and Sakai; and the Examiner's § 103 rejection of claim 58 based on the combined teachings of Yuuki, Hirose, and Barbee.

CONCLUSION

In summary:

The § 102 rejection based on Yuuki of claims 1-3, 5-8, 16-18, 20, and 21-29 is affirmed for the foregoing reasons and the reasons stated in the Answer; whereas the § 102 rejection based on Yuuki of claims 52-54 is reversed.

The § 103 rejection based on Yuuki in view of Hirose of claims 3, 57, and 59-62 is affirmed. The § 103 rejection based on Yuuki in view of Hirose of claims 7 and 55 is reversed.

The § 103 rejection based on Yuuki in view of Barbee of claim 5, the § 103 rejection based on Yuuki in view of Sakai of claims 48-51, and the § 103 rejection based on Yuuki and Hirose in view of Barbee of claim 58 are affirmed.

The decision of the Examiner is affirmed-in-part.

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

AFFIRMED-IN-PART

PL Initial:
sld

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