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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HUI CHEN, ALLEN L. D'AMBRA, SEN-HOU KO, YUFEI CHEN, ADRIAN BLANK, MARIO D. SILVETTI, GERALD J. ALONZO, and LAKSHMANAN KARUPPIAH

Appeal 2015-000690
Application 12/771,969
Technology Center 3700

Before CHARLES N. GREENHUT, JEFFREY A. STEPHENS, and BRENT M. DOUGAL, *Administrative Patent Judges*.

DOUGAL, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from a final rejection of claims 1–15 and 21–25. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

CLAIMED SUBJECT MATTER

The claims are directed to a substrate cleaner. Claims 1 and 11, reproduced below, are illustrative of the claimed subject matter:

1. A substrate cleaner, comprising:

a chamber body defining a processing volume, wherein the chamber body has a top opening configured to allow passage of a substrate;

a substrate chuck disposed in the processing volume, wherein the substrate chuck contacts a back surface of a substrate to secure the substrate and rotate the substrate in a substantially vertical orientation about a central axis of the substrate chuck; and

a brush assembly disposed in the processing volume, wherein the brush assembly comprises:

a disk brush movably disposed opposing the substrate chuck, wherein the disk brush has a substantially planar processing surface facing the substrate chuck for contacting and cleaning a front surface of the substrate on the substrate chuck.

11. A substrate cleaner, comprising:

a tank having an upper opening and an inner volume for accommodating a substrate in a substantially vertical direction;

a vacuum chuck disposed in the inner volume, wherein the vacuum chuck is configured to receive and rotate a substrate in a substantially vertical orientation;

a substrate handler disposed in a lower portion of the inner volume, wherein the substrate handler is configured to transfer a substrate between the vacuum chuck and an exterior robot; and

a brush assembly comprising:

a disk brush movably disposed in the inner volume opposing the substrate chuck, wherein the disk brush has a substantially planar processing surface for contacting and cleaning a substrate on the vacuum chuck;

a sliding mechanism configured to slide the disk brush parallel to the vacuum chuck between a central region of the vacuum chuck and an edge region of the vacuum chuck;

a spray nozzle coupled to the sliding mechanism near the disk brush, wherein the spray nozzle directs a processing fluid towards a substrate on the vacuum chuck and the disk brush;

> a rotating motor configured to rotate the disk brush about a central axis of the substantially planar processing surface; and
>
> a cylinder configured to move the substantially planar processing surface of the disk brush towards and away from the vacuum chuck.

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Hasegawa	US 5,282,289	Feb. 1, 1994
Amai	US 2007/0175501 A1	Aug. 2, 2007
Banerjee	US 2009/0126760 A1	May 21, 2009
Chen	US 2010/0099342 A1	Apr. 22, 2010
Masachika	JP 11-330032 (machine translation)	Nov. 30, 1999

REJECTIONS

Claims 1 and 3–7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Masachika and Amai.

Claims 2, 8–15, and 25 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Masachika, Amai, and Banerjee.

Claims 21 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Masachika, Amai, and Hasegawa.

Claim 23 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Masachika, Amai, Banerjee, and Chen.

Claims 11 and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Masachika, Amai, Banerjee, and Hasegawa.

OPINION

Claims 1–10 and 21–23

The Examiner finds that Masachika teaches the majority of the features of independent claim 1. Final Act. 2. The Examiner further finds that Amai teaches that it is known "to form a brush (3) with a substantially planar processing surface" and that the combination of Masachika and the teachings of Amai would have been obvious. *Id.* at 2–3.

Appellants argue that "Masachika fails to disclose an element that could be considered a chuck that 'contacts a back surface of the substrate'" as required by claim 1. Appeal Br. 9. Appellants argue that Masachika only teaches holding a wafer by its "peripheral edges." *Id.* at 10 (emphasis omitted).

The Examiner responds:

> Since, elements (C2C1, C2C2) include a slot for holding the wafer (see paragraph 12 in the translation of Masachika) and it is disclosed that the front and rear sides of the wafer are "held by the wafer holder" (see "solution" of the abstract) the examiner believes that elements (C2C1, C2C2) do contact front and back surfaces of the wafer while rotating the wafer in a vertical orientation.

Answer 13.

Paragraph 12 of the machine translation of Masachika states:

> A wafer holding fixture (C2[C]) attaches a wafer supporter (C2[C]2) to a solid of revolution (C22) with an axis (C2[C]1), and it moves the wafer supporter (C2[C]2) so that the end face of this wafer (W) may be held by the guide or a cam (C2[C]3). A wafer supporter (C2[C]2) has a slot of the circular arc of the same degree as a wafer (W) periphery, and since it showed it to this wafer (W) end face and it holds it, it does not carry out omission or damage of the wafer W at the time of rotation.

It is not apparent from this paragraph that Masachika teaches or suggests contacting a back surface of the substrate, as it only refers to the "end face" of the wafer and the "wafer (W) periphery." The end face and the periphery of the wafer appear to be different from the "surface and back surface" to be cleaned mentioned elsewhere in Masachika. *See, e.g.*, Masachika ¶ 4.

For further support, the Examiner also cites to the "Solution" section of the Abstract of the machine translation of Masachika, which states:

> SOLUTION: In this wafer cleaning device, a wafer W is driven and rotated within the vertical or almost vertical plane inside a chamber C by a rotator arranged with a wafer holder to be driven and rotated, the front and rear sides of the wafer W held by the wafer holder are singly or simultaneously cleaned by the rotary brush equipped with a nozzle S or by the nozzle S for supplying the cleaning liquid, and the wafer is cleaned by dispersing the cleaning liquid over the surface of the wafer with centrifugal force.

The Examiner relies on a portion of the sentence that states: "the front and rear sides of the wafer W held by the wafer holder are singly or simultaneously cleaned by the rotary brush . . . ." When the entire sentence is considered, together with the detailed description and the fact that this is a machine translation, the meaning of this portion of the sentence is not clear. It could be interpreted at least two different ways – 1) the wafer is held by the wafer holder, and that the front and rear sides of the wafer are singly or simultaneously cleaned; or 2) the front and rear sides of the wafer are held by the wafer holder and the front and rear sides of the wafer are singly or simultaneously cleaned. In view of the rest of the specification of Masachika as discussed above, it seems that the first meaning is more likely. Because of this ambiguity, we agree with Appellants that the Examiner's

rejection resorts to speculation to address features of claim 1. "[L]egal determinations of obviousness, as with such determinations generally, should be based on evidence rather than on mere speculation or conjecture." *Alza Corp. v. Mylan Laboratories, Inc.*, 464 F. 3d 1286, 1290 (Fed. Cir. 2006).

For these reasons, we reverse the Examiner's rejection of claim 1. For these same reasons, we reverse the Examiner's rejection of claims 2–10 and 21–23, which depend from claim 1.

Claims 11–15 and 25 (Masachika, Amai, Banerjee)

Concerning independent claim 11, the rejection is outlined as follows: "Masachika discloses the claims (sic) invention as previously mentioned and Banerjee et al. further show a vacuuming unit (Figure 7)." Final Act. 5.

Appellants argue that the cited references do not teach or suggest "a vacuum chuck configured to receive and rotate a substrate in a substantially vertical orientation, as recited in claim 11." Appeal Br. 11.

The Examiner does not address Appellants' argument in the Answer.

Banerjee discloses that its system "can be either at atmospheric pressure or connected to provide a vacuum for the system" (Banerjee ¶ 129), but does not discuss a vacuum chuck as required by claim 11.

We reverse the rejection of claim 11 as the Examiner has not accounted for all of the elements of the claim in the rejection. We also reverse the rejection of claims 12–15 and 25, which depend from claim 11, for this same reason.

Claims 11 and 24 (Masachika, Amai, Banerjee, Hasegawa)

Appellants argue the rejection of claims 11 and 24 together. We select claim 11 as representative. The Examiner finds that Masachika teaches the majority of the features of independent claim 11. Final Act. 8. The Examiner then relies on Hasegawa for teachings of a vacuum chuck. *Id.*

Appellants argue that "*Hasegawa, et al.* would not be combined with at least Masachika since the front and rear sides of the wafer W could not be 'simultaneously' cleaned, as described in the Abstract of Masachika." Appeal Br. 13. Appellants further argue that "if *Hasegawa, et al.* were to be combined with *Masachika*, *Masachika* would be rendered in operable since the front and rear sides of the wafer W could not be 'simultaneously' cleaned." *Id.*

But as noted by the Examiner, "Masachika does not require that the wafer must be 'simultaneously' cleaned, . . . [rather] the wafer can be 'singly or simultaneously cleaned' (see lines 4-6 of the 'solution' within the abstract). Therefore, the wafer could be cleaned on one side, subsequently flipped, and the other side cleaned." Answer 14.

Appellants have not demonstrated that Masachika requires the simultaneous cleaning of both sides of the wafer, or that cleaning each side "singly" would render the device inoperable. This is especially true as Masachika specifically mentions cleaning each side "singly" or "independently." Masachika Abstract, claim 2 ("A wafer cleaning apparatus washing the surface or a back surface of a wafer independently or simultaneous."), ¶¶ 5, 16. Though some functionality may be lost by the combination, such a loss does not show that one of skill in the art would not combine the references as per the rejection.

For this reason, we are not informed of error in the Examiner's rejection of claim 11 or claim 24.

DECISION

The Examiner's rejection of claims 1 and 3–7 under 35 U.S.C. § 103(a) over Masachika and Amai is reversed.

The Examiner's rejection of claims 2, 8–15, and 25 under 35 U.S.C. § 103(a) over Masachika, Amai, and Banerjee is reversed.

The Examiner's rejection of claims 21 and 22 under 35 U.S.C. § 103(a) over Masachika, Amai, and Hasegawa is reversed.

The Examiner's rejection of claim 23 under 35 U.S.C. § 103(a) over Masachika, Amai, Banerjee, and Chen is reversed.

The Examiner's rejection of claims 11 and 24 under 35 U.S.C. § 103(a) over Masachika, Amai, Banerjee, and Hasegawa is affirmed.

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-IN-PART