

The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YANGHUA HE,
CHAD J. KANESHIGE
and MICHAEL S. WANG

Appeal 2007-1394
Application 10/301,464
Technology Center 1700

Decided: August 30, 2007

Before BRADLEY R. GARRIS, CHUNG K. PAK, and
PETER F. KRATZ, *Administrative Patent Judges*.

KRATZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal from the Examiner's final rejection of claims 5-25, the only claims that remain pending in this application. We have jurisdiction pursuant to 35 U.S.C. §§ 6 and 134.

Appellants' invention is directed to a chemical mechanical polishing (CMP) polisher wafer pedestal (chuck) comprising a plate and a non-adhesive edge contact ring connected to the plate. According to Appellants, reducing the contact between a wafer pedestal and the active dies of a wafer to be held thereon can be accomplished via the disposition of an edge contact ring on a top plate shaped surface of the pedestal (Specification 1-4). A prior art film that allegedly covered a larger portion of the top plate surface of a pedestal is acknowledged to be known in the art (Specification 1-3, Figs. 1-2). However, Appellants' invention is said to reduce contamination of the wafer surface with potentially contaminating film materials; that is, particles shed by such a film material (Specification 3-4). The provision of an edge contact ring with a specified maximum width is disclosed as one embodiment or part of an embodiment of reduced contact pedestal covering(s) that provide wafer support without the edge ring contacting the active die of the wafer (Specification 5, Figs. 5 and 6). The edge ring can be made from the same material as the prior art plate film covering (*id.*). Claims 5 and 15 are illustrative and reproduced below:

5. A wafer pedestal of a CMP polisher comprising:

a plate having ports for providing deionized water and a vacuum, said plate located in said CMP polisher;

a non-adhesive edge-contact ring connected to said plate, said non-adhesive edge-contact ring also coupled to a face down wafer substantially in areas of said wafer not containing full active die.

15. A wafer pedestal of a CMP polisher comprising:

a plate, said plate located in said CMP polisher;

a non-adhesive edge-contact ring connected to said plate, said non-adhesive edge-contact ring also coupled to a face down wafer substantially in areas of said wafer not containing full active die.

In addition to allegedly admitted prior art (APA) found in the Specification (1-2) and in drawing figures 1-3, the Examiner relies on the following prior art references as evidence in rejecting the appealed claims:

Babb	US 4,603,867	Aug. 5, 1986
Nulman	US 5,460,703	Oct. 24, 1995
Yang	US 6,537,143 B1	Mar. 25, 2003

Claims 5-8 and 15-19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over APA or Yang, each in view of Babb. Claims 9-14 and 20-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over APA or Yang, each in view of Babb and Nulman.

We affirm. Our reasoning follows:

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations. *See Graham v. John Deere of Kansas City*, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966). The analysis supporting obviousness should be made explicit and should “identify a reason that would have prompted a person of ordinary skill in the art to combine the elements” in the manner claimed. *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1731, 82 USPQ2d 1385, 1389 (2007). In

considering the question of the obviousness of the claimed invention in view of the prior art relied upon, we are guided by the basic principle that the question under 35 U.S.C. § 103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made. *See Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989) and *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). That is, the question of obviousness cannot be approached on the basis that an artisan having ordinary skill would have known only what they read in the references, because such artisan is presumed to know something about the art apart from what the references disclose. *See In re Jacoby*, 309 F.2d 513, 516, 135 USPQ 317, 319 (CCPA 1962). Nor is it necessary that suggestion or motivation be found within the four corners of the references themselves. Indeed, a conclusion of obviousness may be made from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference. *See In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969).

The Examiner has determined that each of the APA and Yang discloses or suggests a CMP polisher wafer pedestal including: (1) a plate having ports for providing de-ionized water and a vacuum; (2) a non-adhesive contact film connected to the plate for supporting (connecting with) a wafer in a face down position (Answer 5-6: APA (Specification 1-2, drawing Figures 1-3; Yang, Abstract, col. 3, ll. 5-24, col. 4, ll. 1-49, col. 5, l. 14- col. 7, l. 14). The Examiner has found that both the APA and Yang further recognize that the film leaves a residue on a wafer held thereon as a contaminant (*id.*).

Thus, one of ordinary skill in the art would have recognized that lessening the area of the film contact with the plate and the wafer would reduce the amount of contaminant material from the film left on a wafer surface after being held on a plate having such a reduced area film covering. Indeed, as the Examiner points out, Yang expressly teaches that the use of a pedestal plate film covering minimal areas on a pedestal plate for supporting a wafer reduces the contamination of the wafer from the film residue (Answer, 4; Yang, col. 6, l. 66-col. 7, l. 4). Thus, the applied APA and Yang teach or suggest that the contact area (shape) of a film interposed between the pedestal plate and wafer should provide support for the wafer held on the plate film covering yet the film covering should be minimally sized to reduce contamination of the wafer by the film particles.

However, the Examiner has determined that both the APA and Yang lack an express description of a pedestal plate film presented in an edge contact ring shape, as Appellants' appealed claims require (Answer 5 and 6). Hence, the Examiner has identified a difference between the subject matter called for in all of the rejected claims and the disclosure of either the APA or Yang (*see* independent claims 5 and 15).

In recognition of this determined difference between the claimed subject matter and either of the APA or Yang, the Examiner supplies Babb as part of the evidence relied upon to show that a wafer holding pedestal plate (chuck) with an annular or plate edge ring shape (O-ring) element disposed thereon is known to be useful for supporting a wafer during a portion of a vacuum processing thereof. Based on the evidence of record, the Examiner contends that "it would have been obvious for one of ordinary skill in the art at the time of the invention to use the O-ring [shape] of Babb

as a pedestal film [shape for use] between the wafer and pedestal ... of APA or Yang ... which lessens the contamination due [to] the film ...” (Answer 6; Babb, element 22, Fig. 2B).

At the outset, we note that Appellants do not dispute the Examiner’s determinations as to what subject matter is admitted prior art. We shall consider the appealed claims separately to the extent separately argued. However, we start with arguments made with respect to all of the rejected claims.

Besides asserting that none of the applied references are anticipatory (describe all of the claimed features), Appellants’ main opposition to the Examiner’s obviousness position is a contention that is applicable to all of the rejected claims and which is laid out in a repetitious manner substantially throughout the Brief. This contention is that “one of ordinary skill in the art would not combine the teachings of a wafer pedestal used in a wet process for material removal (APA and Yang et al.) with the teachings of a dry process that is used for material deposition (... Babb ...).” Br. 15, 16, 18, 21, 24, 26, 29, 31, 33, 34, 36, 40, 44, 48, 51, 52, 55, 59, 62, 65, 66, 69, 72, 75, 78, and 79.

Thus, prior to addressing the subsidiary issues raised in the Brief, we have identified the main issue brought before us in this appeal as asking the following question. Have Appellants identified reversible error in the Examiner’s obviousness rejections by the assertion that the applied references including the APA, would not teach or suggest the claimed wafer pedestal because a wafer pedestal used in a wet process for removing materials (APA or Yang) can not be combined with teachings of a dry addition process (Babb)?

We answer this question in the negative. This is because Appellants have not even addressed, much less persuasively so, an underlying rationale for the proposed modification of the film of Yang or the APA film covering the CMP wafer pedestal plate that is reasonably developed by the Examiner. This rationale is premised on the teachings of the APA or Yang (the argued wet removal prior art), not Babb (the asserted dry process for depositing material).

In particular, a reading of Yang or the APA clearly reveals that one of ordinary skill in the art was informed as to a wafer contamination problem with prior art CMP wafer pedestal plate films and an option for reducing the problem contamination; that is, reducing the area of contact of the film located on the pedestal plate that is used for holding the wafer away from contact with the plate itself. For example, Yang discloses a number of options, including an annular edge arrangement of discrete pedestal film members (1113b, Fig. 14). O-ring type members for holding a wafer spaced from a plate, at least temporarily, are well-known as evidenced by Babb for holding and spinning a wafer (vacuum chuck) during wafer processing and testing, albeit not explicitly described for a CMP utility. Hence, we have no doubt that one of ordinary skill in the art would have been led to use and modify, as appropriate, such a familiar edge ring shape type holder element as a known shape available for use as the film element shape of the pedestal wafer holder (chuck) of the APA or Yang. This is so because such a shape for a contacting member of a plate shaped holder would have been familiar to one of ordinary skill in the art with or without the evidence thereof

furnished by Babb.¹ Moreover, such a familiar shape would have been readily recognized by one of ordinary skill in the art as a film member shape useful for reducing wafer contamination by the known problem of shedding film because of the relatively smaller contact area of such a ring shape member relative to a disc shaped wafer to be held thereby (*see, e.g.,* Yang, col. 6, l. 66-col. 7, l. 4). In addition, as the Examiner maintains, the use of such an O-ring shape would be advantageous in holding a wafer on the plate via vacuum because of the sealing effect thereof as taught by Babb.

In any event, the wet removal/ dry addition argument has not been fairly developed by Appellants to persuasively explain why an edge ring shape, such as the O-ring shape of the wafer holder of Babb, would not have been recognized as being an available and useful shape (edge contact ring shape) for a film member of a CMP wafer holder for placing on top of the pedestal plate (vacuum chuck) of Yang or the APA given the artisan's desire to select a film member shape or film member design that reduces the area of contact of the film with a wafer being held thereby.

Thus, Appellants have established no reversible error in the Examiner's rejection of independent claims 5 and 15 and dependent claim 16.

Dependent claims 6 and 17 require that the edge-contact ring is made of a silicon-based material whereas dependent claims 7 and 18 require an elastomer-based material for the contact ring. The Examiner has determined

¹ For example, we note that plurality of annular-shaped pedestal film members employed by Yang (Fig. 7, element 513), which shape for the members one of ordinary skill in the art would have reasonably recognized as being a suitable shape for covering the annular periphery of the pedestal plate and not just the center opening in the plate, as an option.

that the selection of an appropriate material for the edge ring film element of Yang or the APA, including either a silicon-based material and/or an elastomer-based material, would have been obvious to one of ordinary skill in the art at the time of the invention based on the combined teachings of the applied references because Babb discloses that silicone rubber is a suitable material for the vacuum chuck O-ring (Answer, 6; Babb, col. 6, ll. 6-9). We agree.

In the face of the Examiner's rejection, Appellants' contention that the references are not combinable is not found persuasive. After all, it would have been expected that one of ordinary skill in the art would be cognizant of the requirements of a suitable material for use in placing on a CMP pedestal plate wafer holder for contact with and holding of a silicon wafer and would have selected a compatible material, such as a known silicone rubber or another suitable known elastomer material for holding the wafer under vacuum conditions.

Dependent claims 8 and 19 require that the edge contact ring has a maximum width of 5mm. The Examiner has basically determined that it would have been obvious to one of ordinary skill in the art at the time of the invention to determine the optimum width of the wafer holding material interposed between the CMP wafer pedestal plate (vacuum chuck plate) and the wafer as a ring shaped material holder (Answer 8 and 9).

Appellants argue that none of the applied prior art anticipates the claimed subject matter and that the APA teaches away because a disc of film material is employed. We do not find these arguments to be persuasive of reversible error in the Examiner's obviousness position with regard to these claims. As to the specific question of "teaching away," our reviewing court

in *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994) stated:

[a] reference may be said to teach away when a person of ordinary skill, upon [examining] the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.

Here, we do not find that the disclosure of the APA would discourage one of ordinary skill in the art from the use of an edge ring of film material of a size as recited in claims 8 and 19 rather than a film material that covers a larger portion of the wafer pedestal plate. After all, as we noted above, one of ordinary skill in the art confronted with the known problem of wafer contamination by film material particles on contact with the wafer would have recognized that reducing the area of contact of the film material with the wafer would reduce the wafer contamination. The alternatively applied Yang makes it clear that one of ordinary skill in the art was apprised of the nature of this problem and the need for reducing the contact area of film material employed on the wafer holder plate surface (Yang, col. 6, l. 66-col. 7, l. 4). As such, we are not persuaded by Appellants' arguments of a teaching away. As for the particular width of an edge contact ring of the film material or other suitable material used, we agree with the Examiner that the determination of workable/optimum size, including the width of the wafer contact film material would have been reasonably expected to be within the ordinary skill of the artisan upon routine experimentation. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) "[I]t is not inventive to discover the optimum or workable ranges by routine experimentation."

It follows that we shall affirm the Examiner's obviousness rejection of claims 5-8 and 15-19 on this record,

Concerning the Examiner's second stated obviousness rejection of dependent claims 9-14 and 20-25, the Examiner additionally cites Nulman as evidence being relied upon. Dependent claims 9-14 further limit independent claim 5 and dependent claims 20-25 further limit independent claim 25 with regard to the cross-sectional shape of the edge contact ring. Various shapes, such as a half oval shape, a "D" shape, a square shape, a rectangular shape, a half circle shape or a trapezoid shape - which the contact ring cross-section is recited as being shaped like - are recited in these claims.

The Examiner has taken the position that it would have been an obvious to one of ordinary skill in the art at the time of the invention to select the shape of the edge contact ring material cross-section as a matter of design choice and/or as evidenced by Nulman's disclosure of differing shapes for a wafer clamp, including oval, square and round (Answer 7 and 10; Nulman, col. 4, ll. 26-32). Appellants argue that the shapes disclosed for a wafer clamping ring in Nulman are not for a clamping ring cross-section but an outer shape/outline of the surface of the clamp. We agree with Appellants that Nulman appears to be directed to the shape of a distinctly different device and type than that called for in the so rejected dependent claims. However, we nonetheless agree with the Examiner's obviousness determination. This is, in part, because we are satisfied that the various cross-section shapes that these rejected claims require for the cross-section of the edge ring are considered to be matters within the level of skill of an ordinarily skilled artisan in forming an edge ring of material between a

wafer pedestal plate and a wafer for contacting and holding the wafer away from contact with the plate itself. After all, in an obviousness assessment, skill is presumed on the part of the artisan, rather than the lack thereof. *In re Sovish*, 769 F.2d 738, 226 USPQ 771 (Fed. Cir. 1985).

Also, Appellants have not advanced any compelling argument asserting, much less evidence that establishes, that the edge ring shape of contact material employed for the wafer pedestal plate, including the cross-sectional shape recited in dependent claims 9-14 and 20-25, is attended by any unexpected results. In this regard, we note that no evidence is cited by Appellants in the Evidence Appendix to the Brief. In other words, this appeal record reflects that the claimed subject matter is attended by predictable and expected results.

Because we further determine that Appellants have not identified reversible error in the subsidiary arguments presented in the Brief with respect to the separately argued claims, we affirm the Examiner's rejections for substantially the reasons set forth in the Answer and as set forth in this Decision.

CONCLUSION

The decision of the Examiner to reject claims 5-8 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over APA or Yang, each in view of Babb; and to reject claims 9-14 and 20-25 under 35 U.S.C. § 103(a) as being unpatentable over APA or Yang, each in view of Babb and Nulman is affirmed.

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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) (2006).

AFFIRMED

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