Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MANOOCHER BIRANG, RAMIN EMAMI,
SHIJIAN LI and FRED C. REDEKER

Appeal No. 2002-1025
Application No. 09/454,354

ON BRIEF

Before ABRAMS, FRANKFORT, and BAHR, Administrative Patent Judges.

ABRAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-25, which are all of the claims pending in this application.

We AFFIRM-IN-PART AND ENTER NEW REJECTIONS UNDER 37 CFR § 1.196(b).

BACKGROUND

The appellants' invention relates to a method of preconditioning a fixed abrasive article (claims 1-16) and an apparatus for chemically-mechanically polishing a wafer (claims 17-25). An understanding of the invention can be derived from a reading of exemplary claims 1 and 17, which have been reproduced below.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Chiou et al. (Chiou)	5,873,769	Feb. 23, 1999
Brunelli	5,957,750	Sep. 28, 1999
Duescher	5,993,298	Nov. 30, 1999

Claims 1-23 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Brunelli in view of Duescher.

Claim 24 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Brunelli in view of Duescher and Chiou.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the Answer (Paper No. 11) and the final rejection (Paper No. 6) for the examiner's complete reasoning in support of the rejections, and to the Brief (Paper No. 10) and Reply Brief (Paper No. 12) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

The claims stand rejected as being obvious under 35 U.S.C. § 103(a). The test for obviousness is what the combined teachings of the prior art would have suggested to one of ordinary skill in the art. See, for example, In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). In establishing a prima facie case of obviousness, it is incumbent upon the examiner to provide a reason why one of ordinary skill in the art would have been led to modify a prior art reference or to combine reference teachings to arrive at the claimed invention. See Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Int. 1985). To this end, the requisite motivation must stem from some teaching, suggestion or inference in the prior art as a whole or from the knowledge generally available to one of ordinary skill in the art and not from the appellants' disclosure. See, for example, Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1052, 5 USPQ2d 1434, 1439 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988).

The appellants' invention relates to thermally preconditioning by means such as hot water the fixed abrasive pads used for polishing semiconductor wafers. According to the appellants, the invention removes embedded debris from the surface of the

abrasive pads prior to their initial use, thereby enabling planarization of metallic surfaces with significantly reduced defects, such as scratches.

Claim 1 reads as follows:

> A method of preconditioning a fixed abrasive article comprising a plurality of abrasive elements, the method comprising heating the fixed abrasive article before initial use in chemical-mechanical polishing (CMP) a surface of a workpiece.

The claim stands rejected as being unpatentable over Brunelli in view of Duescher. It is the examiner's position that all of the subject matter recited in the claim is disclosed by Brunelli except for preconditioning the pad before initial use. However, the examiner contends it would have been obvious to one of ordinary skill in the art to precondition the Brunelli abrasive pad before its initial use in view of Duescher, suggestion being found in Duescher's teaching of doing so to remove defects and thus prevent scratching of the workpiece (Paper No. 6, page 2).

Brunelli is concerned with periodically removing from an abrasive pad the waste matter accumulations that build up in the course of planarizing substrates by chemical-mechanical polishing (CMP), which over time adversely affects the CMP operation (column 2, lines 59-64). This removal of accumulated material is accomplished by heating the pad to a predetermined temperature to soften the accumulations so that they can be more easily removed by means such as abrasives and blades (column 2, line 64 et seq.; column 4, lines 13-26). Thus, Brunelli does not precondition pads, that

is, treat them prior to their initial use, but periodically removes them from service during use for cleaning and subsequent return to service.

Like the appellants, Duescher preconditions abrasive disks (pads) in order to reduce the height of defect spots or areas that can scratch the workpiece. To do so,

> [a] hard material can be held stationary against the disk surface (particularly at an edge) or the hard material may be oscillated slowly and radially to knock off or wear down high spots. Another abrasive material could be rotated with its own high (or slow) velocity against the surface of the abrasive disk to remove high spots or loose materials. Any loose or weak abrasive materials at the inner and outer radius of the disk would be broken loose by this initial conditioning treatment and would be eliminated from the system prior to actual lapping of the work piece (column 39, lines 48-60).

From our perspective, Duescher would have instructed one of ordinary skill in the art to precondition the Brunelli pads by placing them in contact with a hard or abrasive material to remove high spots or loose materials prior to being placed in service. We fail to perceive any teaching, suggestion or incentive in either reference which would have led one of ordinary skill in the art to modify the Brunelli method in the manner proposed by the examiner, that is, to precondition the pad by the thermal means Brunelli utilizes to remove waste from the planarizing operation which accumulates on the pad during use. It appears to us that suggestion for such a modification is found only in the hindsight afforded one who first viewed the appellants' disclosure which, of course, is not a proper basis for a rejection under 35 U.S.C. § 103. In re Fritch, 972 F.2d 1260, 1264, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992).

We therefore conclude that the combined teachings of Brunelli and Duescher fail to establish a prima facie case of obviousness with regard to the subject matter recited in claim 1, and we will not sustain the rejection of claim 1 or, it follows, of claims 2-16, which are dependent therefrom.

Independent apparatus claim 17, which reads as follows, also stands rejected on the basis of Brunelli and Duescher.

> 17. An apparatus for chemical-mechanical polishing a workpiece, the apparatus comprising:
>
> a fixed abrasive element; and
>
> a dispenser for dispensing hot water onto the fixed abrasive element.

It should be recognized at the outset that this claim is not directed to preconditioning a pad. Brunelli discloses a fixed abrasive element for planarizing a workpiece, as well as a system for periodically removing from the abrasive element waste material accumulated thereon during the planarizing operation. This waste is removed by contacting the fixed abrasive element (polishing pad) with a conditioning disk either concurrently with the planarization operation or in a separate step (column 5, lines 41-46). The conditioning operation "is expedited by supplying the planarizing liquid 244 to the planarizing surface 242 during conditioning," which "augments the conditioning disk" (column 6, lines 3-5). The planarizing liquid is disclosed as being "a solution having no additives, or it may be a slurry having abrasives and/or chemical agents" (column 5, lines 1-3), which may be heated in a vessel and then directed

through a conduit onto the planarizing surface to heat the surface, such that “[t]he temperature of the planarizing liquid 244 is regulated to heat the waste matter accumulations 264 on the planarizing surface 242 to the point at which they soften and/or become more soluble in the planarizing liquid 244" so that the waste is more easily removed (column 9, lines 7-23). Brunelli also discloses that instead of slurry, “de-ionized water, which does not contain expensive abrasive or chemical additives, may be used during conditioning, resulting in additional cost savings” (column 7, lines 60-67).

Based on the foregoing, it is our opinion that one of ordinary skill in the art would have been taught by Brunelli that planarizing solutions, or de-ioninzed water as a substitute therefor, can be heated in a vessel and directed through a conduit onto the abrasive planarizing pads during the process of conditioning the pads, in order to soften the waste accumulation so it is more easily removed during the conditioning process. This being the case, the subject matter recited in claim 17 is taught by Brunelli and we shall affirm the examiner’s rejection of claim 17,[1] as well as claim 18, which depends from claim 17 and has been grouped therewith.

Claim 19 adds to claim 17 the requirement that there be a controller for maintaining the water at a temperature of about 95° to about 100°C. Brunelli does not explicitly disclose heating the solution to a temperature within this range, but the

[1]With regard to claim 17, anticipation is the epitome of obviousness. In re Fracalossi, 681 F.2d 792, 794, 215 USPQ 569, 571 (CCPA 1982).

reference does teach that the temperature must be sufficient to soften the waste matter accumulations on the abrasive disk. In this regard, Brunelli states that the planarizing surface be heated to 90°F. to 115°F. “and other temperature ranges are used in other embodiments, depending upon the composition of the waste matter accumulations 264 and the/or the polishing pad 240" (column 9, lines 23-29). Owing to the recognition by Brunelli that the temperature to which the pad is heated is dependent upon several specified factors, we consider it to be a result-effective variable, that is, a variable which achieves a recognized result, the achievement of which is determinable by routine experimentation. See, for example, In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977) and In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). Thus, we agree with the examiner (Paper No. 6, page 3), that the selection of a temperature would have been obvious to one of ordinary skill in the art in view of these recognized factors.

Claims 20 and 25, like claim 17, are not limited to conditioning of any kind, much less to preconditioning fixed abrasive articles. Claim 20 recites an apparatus for chemical-mechanical polishing a wafer comprising a fixed abrasive element and means for heating the fixed abrasive element to at least 90 degrees Centigrade. Claim 25 expresses the temperature requirement in terms of a heater for heating the fixed abrasive element to about 90 degrees Centigrade. Brunelli clearly discloses the fixed abrasive element and means for heating it. As for the claimed temperature range, the

position we have taken above with regard to claim 19 applies equally here, that is, in view of Brunelli's recognition that the temperature to which the abrasive pad is heated is dependent upon several recognized factors, we shall consider it to be a result-effective variable, the determination of which would have been obvious to one of ordinary skill in the art.

The rejection of claims 20 and 25 therefore is sustained, along with the like rejection of claims 21-23, which depend from claim 20 and which the appellants have chosen to group therewith.

Claim 24, which depends from claim 22, specifies that the means for heating the fixed abrasive element comprise channels through which hot fluid is passed. This claim stands rejected on the basis of Brunelli and Duescher, taken further with Chiou, which was cited for teaching such a feature in an apparatus for chemical-mechanical polishing of wafers. The only argument presented by the appellants with regard to this rejection was that Chiou failed to teach the temperature limitation that the appellants assert is not taught by the combination of Brunelli and Deuscher (Brief, page 11). However, because we do not share the appellants' belief with regard to the claimed temperature, we will sustain the rejection of claim 24.

Since the rationale we have advanced for affirming the rejection of claims 17-23 and 25, and the rejection of claim 24, differs from that set forth by the examiner, we denominate these to be new rejections under 37 CFR § 1.196(b). In arriving at the

decision to affirm these rejections, we have carefully considered all of the arguments made by the appellants which were applicable to the affected claims. However, they have not persuaded us that the rejections should not stand, albeit on the basis of different reasoning.

CONCLUSION

The rejection of claims 1-16 as being unpatentable over Brunelli in view of Duescher is not sustained.

The rejection of claims 17-23 and 25 as being unpatentable over Brunelli in view of Duescher is sustained, and is denominated to be a new rejection under 37 CFR § 1.196(b)

The rejection of claim 24 as being unpatentable over Brunelli in view of Duescher and Chiou is sustained, and is denominated to be a new rejection under 37 CFR § 1.196(b).

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

New rejections have been entered under 37 CFR § 1.196(b).

In addition to affirming the examiner's rejection of one or more claims, this decision contains a new ground of rejection pursuant to 37 CFR § 1.196(b). 37 CFR § 1.196(b) provides that "[a] new ground of rejection shall not be considered final for purposes of judicial review."

Regarding any affirmed rejection, 37 CFR § 1.197(b) provides:

> (b) Appellants may file a single request for rehearing within two months from the date of the original decision. . . .

37 CFR § 1.196(b) also provides that the appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (37 CFR § 1.197(c)) as to the rejected claims:

> (1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .
>
> (2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .

Should the appellants elect to prosecute further before the Primary Examiner pursuant to 37 CFR § 1.196(b)(1), in order to preserve the right to seek review under 35 U.S.C. § 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If the appellants elect prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

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

AFFIRMED-IN-PART; 37 CFR § 1.196(b)

NEAL E. ABRAMS Administrative Patent Judge	)
CHARLES E. FRANKFORT Administrative Patent Judge	) BOARD OF PATENT) APPEALS AND) INTERFERENCES
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