

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 39

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LIVIO BALDI

Appeal No. 1997-3532
Application 08/411,385

ON BRIEF

Before PAK, WARREN and DELMENDO, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

Decision on Appeal and Opinion

We have carefully considered the record in this appeal under 35 U.S.C. § 134, including the opposing views of the examiner, in the answer, and appellant, in the brief and reply brief,¹ and based on our review, find that we cannot sustain the grounds of rejection of appealed claims 1, 2 and 4 through

¹ We have considered the brief filed July 19, 1996 (Paper No. 30). We have not considered the declaration under 37 CFR § 1.132 filed with the brief as the examiner refused entry thereof in the advisory action of September 27, 1995 (Paper No. 24).

25,² all of the claims in the application, that is, claims 1, 2, 4 through 6, 9 and 10 are rejected under 35 U.S.C. § 103 as being unpatentable over Yamaha taken with Doering et al. and Wolf or Chen et al. and further in view of Dixit et al., Sun et al., and Manos et al.;³ claims 7 and 8 are rejected under 35 U.S.C. § 103 as being unpatentable over Yamaha taken with Doering et al. and Wolf or Chen et al., and further in view of Dixit et al., Sun et al., and Manos et al., as applied to claims 1, 2, 4 through 6, 9 and 10, and further in view of Jeuch et al. and Aoyama et al.;⁴ and, claims 11 through 25 are rejected under 35 U.S.C. § 103 as being unpatentable over Yamaha taken with Doering et al. and Wolf or Chen et al. and further in view of Dixit et al., Sun et al., Manos et al. and Jeuch et al.⁵

It is well settled that a *prima facie* case of obviousness under § 103 is established by showing that some objective teaching, suggestion or motivation in the applied prior art taken as a whole and/or knowledge generally available to one of ordinary skill in the art would have led that person to the claimed invention as a whole, including each and every limitation of the claims, without recourse to the teachings in appellant's disclosure. *See generally, In re Oetiker*, 977 F.2d 1443, 1447-48, 24 USPQ2d 1443, 1446-47 (Fed. Cir. 1992) (Nies, J., concurring); *In re Fine*, 837 F.2d 1071, 1074-76, 5 USPQ2d 1596, 1598-1600 (Fed. Cir. 1988); *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988) ("The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that [the claimed process] should be carried out and would have a reasonable likelihood of success, viewed in light of the prior art. [Citations omitted] Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure.").

We find that the claimed processes encompassed by the appealed claims, as represented by claims 1 and 11, require the sequence of depositing a prebarrier layer of titanium or a derivative thereof, which is conformally deposited over the substrate, including a contact hole (claim 1), or deposited at the

² See the amendments of August 18, 1995 (Paper No. 21), April 17, 1995 (Paper No. 17). In the present application, and the amendments of March 15, 1994 (Paper No. 10) and July 12, 1993 (Paper No. 6) in parent application 07/980,550.

³ Answer, pages 4-8.

⁴ *Id.*, pages 8-9.

⁵ *Id.*, pages 9-12.

bottom of a contact hole (claim 11); forming a layer of tungsten (claim 1), which can be a derivative thereof (claim 11), that coats all of the surfaces of the contact hole without filling the hole (claim 1), in other words, conformally coats all of the surfaces without filling the hole (claim 11); and forming a layer of aluminum or a derivative thereof over the tungsten layer under planarizing conditions, filling the contact hole (claim 1), in other words, planarizing and void filling, completely filling the hole (claim 11). While the use of the transitional term “comprising” permits the presence of other layers between the titanium layer and the tungsten layer,⁶ the titanium or derivative layer and the tungsten or derivative layer must first be in the contact hole, without filling the hole, and then the hole is filled with aluminum or derivative in a planarizing manner. Each of claims 1 and 11 requires that the tungsten or derivative layer is applied by chemical vapor deposition and the aluminum or derivative layer is applied by sputter deposition under planarizing conditions.

We find that Yamaha discloses with respect to FIG. 2, that intermediate conduction path 27 comprises, in sequence, lower barrier film 28, a metal film 29 and upper barrier film 30, wherein the metal layer can be an aluminum alloy and the lower and upper barrier layers can be titanium, titanium silicide, tungsten, tungsten or tungsten silicide or a titanium-tungsten alloy, the layers being deposited by ordinary sputtering, thus forming only a lower barrier layer and a non-planar metal film layer in a contact hole (col. 3, lines 4-65).

The examiner points out that there are a number of differences between the above teachings of Yamaha that involve each of the above noted layers and methods of forming the same required in the claimed processes encompassed by claims 1 and 11 (answer, pages 4-5 and 9) and submits that each of these differences represents a modification within the ordinary skill in this art as shown by the cited prior art.

We have carefully considered the examiner’s position but find no explanation therein with respect to the applied prior art which establishes that, *prima facie*, one of ordinary skill in this art would have found in the combined teachings of the applied prior art a suggestion to arrive at the sequence of

⁶ See *In re Baxter*, 656 F.2d 679, 686-87, 210 USPQ 795, 802-03 (CCPA 1981) (“As long as one of the monomers in the reaction is propylene, any other monomer may be present, because the term ‘comprises’ permits the *inclusion* of other steps, elements, or materials.”).

layers specified in the appealed claims or to use the methods specified in the claims to deposit the layers. There is no doubt that *each* of the layers and the methods of depositing the same had been used in this art and thus could be used to modify the layers and methods in the process of Yamaha, but this fact alone is not enough to justify combining the references. *See, e.g., In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). Indeed, even if there was motivation to combine the teachings of these references, the same would not have suggested or taught the sequence of layers specified in the appealed claims and thus it is inescapable that the references as combined by the examiner, taken as a whole, would not have resulted in the claimed method. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050-54, 5 USPQ2d 1434, 1438-41 (Fed. Cir. 1988).

Accordingly, it is manifest from this record that the examiner has used hindsight gained from appellant's specification and claims in reaching his conclusion of obviousness. *See, e.g., Fine, supra; Dow Chem.*, 837 F.2d at 473, 5 USPQ2d at 1531-32.

The examiner's decision is reversed.

Reversed

CHUNG K. PAK)	
Administrative Patent Judge)	
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CHARLES F. WARREN)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
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ROMULO H. DELMENDO)	
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