The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS J. HUGHES

Appeal No. 1998-2308
Application No. 08/379,868

ON BRIEF

Before OWENS, TIMM, and DELMENDO, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 23, which are all of the claims pending in the subject application.[1]

The subject matter on appeal relates to a method of depositing an oxidized metal coating on a substrate in a chamber having

[1] The appellant filed an amendment under 37 CFR § 1.116 (1981) on April 8, 1996, proposing a change to claim 20. (Paper 6.) The proposed amendment was approved by the examiner and has been entered. (Advisory action of April 19, 1996, paper 7.)

throughout an atmosphere comprising a mixture of reactive and inert gases and having a sputtering station and an oxidizing

station spaced apart within the chamber. Further details of this appealed subject matter are recited in illustrative claims 1, 10, 12 through 14, 19, and 20, which are reproduced below:

> 1. A method of depositing an oxidized metal coating on a substrate in a chamber having throughout an atmosphere comprising a mixture of reactive and inert gases and having a sputtering station and an oxidizing station spaced apart within said chamber, the oxidizing station providing a glow discharge, including the steps of disposing the substrate at the sputtering station and there sputtering onto the substrate from a metal target a layer of elemental metal and oxidized metal, and moving the substrate to the oxidizing station and there subjecting said layer to reactive ions which oxidize the elemental metal in said layer.
>
> 10. A method as in claim 1 in which said sputtering step comprises applying to said target a generally square wave voltage having a positive portion which is less than fifty percent of a cycle and a negative portion which is more than fifty percent of a cycle and provides a negative DC component.
>
> 12. A method as in claim 10 wherein the voltage is applied from a low-impedance source.
>
> 13. A method as in claim 10 wherein the oxidizing station is provided with a non-sputtering cathode including the step of applying to said cathode a negative DC potential.

14. A method as in claim 13 wherein the potential is applied from a high-impedance source.

19. A method of depositing oxidized coatings on a pair of substrates in a chamber having throughout an atmosphere comprising a mixture of reactive and inert gases and having a sputtering station and an oxidizing station spaced apart within said chamber, the oxidizing station providing a glow discharge, including the steps of disposing one substrate at the sputtering station and there sputtering onto the substrate from a metal

target a layer of elemental metal and oxidized metal, disposing the other substrate at the oxidizing station and there subjecting it to reactive ions which oxidize the metal in any layer of elemental metal and oxidized metal previously sputtered thereon, and repetitively moving the one substrate between the sputtering and oxidizing stations while repetitively moving the other substrate between the oxidizing and sputtering stations.

20. A method of depositing an oxidized metal coating on a substrate in a chamber having throughout an atmosphere comprising a mixture of reactive and inert gases and having a sputtering station comprising an electrode and a target including the steps of disposing the substrate at the sputtering station, applying between the electrode and the target a generally square wave voltage such that the target has a negative voltage relative to the electrode for more than half a cycle and a positive voltage relative to the electrode for less than half a cycle, each of said positive and negative voltages producing discharges well into the abnormal glow region but a safe margin below the voltage at which an arc discharge would be initiated, the positive and negative voltages having absolute values roughly equal to one another, the square wave voltage having a roughly constant RMS value irrespective of its duty cycle, and varying the duty cycle of said square wave voltage to oppositely vary the DC and RMS AC components thereof such that the RMS AC

component is sufficiently large to cause complete sputtering of oxide coatings formed on the target.

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

Quazi	4,693,805	Sep. 15, 1987
Scobey et al. (Scobey)	4,851,095	Jul. 25, 1989
Scherer et al. (Scherer)	4,931,169	Jun. 5, 1990
Latz et al. (Latz)	5,122,252	Jun. 16, 1992
Kügler	5,292,417	Mar. 8, 1994 (filing date Apr. 8, 1992)

The following grounds of rejection are presented for our review in this appeal:

I. Claims 12 and 14 stand rejected under the second paragraph of 35 U.S.C. § 112 as indefinite. (Examiner's answer, pages 3-4.)

II. Claims 1 through 9 and 15 through 19 stand rejected under 35 U.S.C. § 103 as unpatentable over Kügler in view of Scobey. (Id. at pages 4-8.)

III. Claims 13 and 14 stand rejected under 35 U.S.C. § 103 as unpatentable over Kügler in view of Scobey, as applied to claims 1 through 9 and 15 through 19, and further in view of Latz. (Id. at pages 8-9.)

IV. Claims 10 through 12 and 20 through 23 stand rejected under 35 U.S.C. § 103 as unpatentable over Kügler in view of Scobey, as applied to claims 1 through 9 and 15 through 19, and further in view of Quazi and Scherer. (Id. at pages 9-11.)

We reverse the aforementioned rejection for reasons which follow.

Prior to addressing the merits, it is important to emphasize the procedural burdens allocated to an examiner and an applicant during the examination process. The initial burden of establishing a prima facie case of unpatentability rests on the examiner. See, e.g., In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). Only by meeting this initial burden can the examiner shift the burden of coming forward with argument or evidence to the applicant. Id.

Rejection I

Claims 12 and 14 stand rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

As pointed out by the appellant (substitute appeal brief, pages 11-13), a claim complies with the second paragraph of section 112 if, when read in light of the specification, it reasonably apprises those

skilled in the art of the scope of the invention. Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1385, 231 USPQ 81, 94 (Fed. Cir. 1986).

Here, the examiner has taken the position that the terms “low” and “high” appearing in appealed claims 12 and 14, respectively, are relative terms which lack “basis for comparison.” (Examiner’s answer, pages 4 and 18.) However, the examiner has not adequately explained on this record why appealed claims 12 and 14, given the specification description at pages 6-7, do not reasonably apprise those skilled in the relevant art of the scope of the invention recited in these claims.

Accordingly, we cannot uphold the examiner’s rejection of appealed claims 12 and 14 on this ground.

Rejections II and III

Claims 1 through 9 and 15 through 19 stand rejected under 35 U.S.C. § 103 as unpatentable over Kügler in view of Scobey. Further, claims 13 and 14 stand rejected under 35 U.S.C. § 103 as unpatentable over Kügler in view of Scobey, as applied to claims 1 through 9 and 15 through 19, and further in view of Latz.

Kügler describes a method of coating at least one object with at least one layer, wherein an ohmically conductive target is sputtered in a glow discharge, which is electrically supplied by a DC signal and a superimposed AC signal. (Column 3, lines 62-66.) Kügler further teaches that the sputtered particles react with a gas in a space between the target and the object and that the layer deposition process is controlled in the unstable transition mode between the metallic and reactive modes, whereby the deposited layer is electrically less conductive than the target material. (Column 3, line 66 to column 4, line 5.) According to Kügler, the method may further comprise a post-reaction step "[i]f the obtained reaction rate (is not yet sufficient." (Column 13, lines 8-9.)

Although Kügler teaches that the sputtered layer can either be post-reacted in chamber 10 (column 13, lines 9-11) or that "[i]t is possible and often preferred to couple" the chamber 10 (Fig. 2) in-line with a "post-reaction" chamber (column 13, lines 25-29), the examiner has not pointed to any teaching in Kügler of "a chamber having throughout an atmosphere comprising a mixture of reactive and inert gases and having a sputtering station and an oxidizing station spaced apart within said chamber" as required by appealed claim 1 or 19.

To account for this difference, the examiner relies on the teachings of Scobey. (Examiner's answer, page 7.) Specifically, Scobey teaches as follows:

> In a presently preferred approach for forming thin film coatings including refractory metal coatings and optical quality dielectric coatings such as metal oxide coatings, our invention uses an in-line translational processing configuration, or a cylindrical processing configuration in which substrates are mounted on a rotating cylindrical drum carrier, or on a rotating planetary gear carrier, or on a continuous moving web. The substrates are moved past a set of processing stations comprising (1) at least one preferably linear cathode plasma generating device (e.g., a planar magnetron or a Shatterproof rotating magnetron) operating in a metal deposition mode for depositing silicon, tantalum, etc., alternated or sequenced with (2) a similar device such as a planar magnetron operating in a reactive plasma mode, or an ion gun or other ion source configured to produce an elongated uniform high intensity ion flux adjacent the periphery of the carrier, for generating an intense reactive plasma, using oxygen or other reactive gases including but not limited to nitrogen, hydrogen or gaseous oxides of carbon. The arrangement provides long narrow zones for both deposition and reaction with complete physical separation of the zone boundaries. When similar magnetron cathodes are used, one is operated using a relatively low partial pressure of the reactive gas (such as oxygen) to provide the metal deposition mode while the other is operated at a relatively higher reactive gas partial pressure to generate the intense reactive plasma for oxidation, etc. [Col. 3, ll. 13-42.]

As pointed out by the appellant (reply brief, page 2), however, Scobey teaches that the individual sputter devices 30 are physically separated by baffles 32 such that the chamber 10 is divided "into different regions or sub-chambers at each sputterer in which different gas atmospheres and/or gas partial pressures can be established." (Emphasis added; Figs. 1 and 4; column 7, lines 55-60.) Therefore, the individual sputter devices 30 described in Scobey cannot be said to be spaced apart in "a chamber having throughout an atmosphere of reactive and inert gases" (emphasis added) as recited in the appealed claims. Instead, Scobey teaches that the chamber 10 contains a plurality of different atmospheres. While Scobey states that the plasma "extends essentially throughout the vacuum sputtering chamber" (column 9, lines 20-24), this does not make up for the lack of a teaching or suggestion in the applied prior art to conduct the process in an apparatus which contains only one atmosphere throughout the chamber, which contains spaced-apart sputtering and oxidizing stations.

It is true that, in proceedings before the U.S. Patent and Trademark Office (PTO), claims must be interpreted by giving words their broadest reasonable meanings in their ordinary usage, taking

into account the written description found in the specification. In re Morris, 127 F.3d 1048, 1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). However, the interpretation of the claim language must be "reasonable in light of the totality of the written description." In re Baker Hughes Inc., 215 F.3d 1297, 1303, 55 USPQ2d 1149, 1153 (Fed. Cir. 2000).

In our view, the examiner's reading of the appealed claims is not consistent with the description found in the specification, which is directed solely to processes that use a chamber having only one atmosphere and having spaced-apart sputtering and oxidizing stations. (Specification, page 1, lines 4-9; Fig. 1.)

Under these circumstances, we determine that the combination of Kügler and Scobey does not result in the invention recited in the appealed claims. Since Latz does not cure the fundamental deficiencies of Kügler and Scobey, we hold that the examiner has not established a prima facie case of obviousness against the subject matter of the appealed claims within the meaning of 35 U.S.C. § 103.

Rejection IV

Claims 10 through 12 and 20 through 23 stand rejected under 35 U.S.C. § 103 as unpatentable over Kügler in view of Scobey, as applied to claims 1 through 9 and 15 through 19, and further in view of Quazi and Scherer.

The examiner appears to admit that neither Kügler nor Scobey describes a sputtering step which comprises applying to the target a "generally square wave voltage having a positive portion which is less than fifty percent of a cycle and a negative portion which is more than fifty percent of a cycle and provides a negative DC component" as recited in appealed claim 10 or "a generally square wave voltage such that the target has a negative voltage relative to the electrode for more than half a cycle and a positive voltage relative to the electrode for less than half a cycle" as recited in appealed claim 20. (Examiner's answer, page 10.) To remedy this additional difference, the examiner relies on Quazi and Scherer. (Id. at pages 10-11.) The examiner's conclusion is stated as follows:

> Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied waveform having a positive portion which is less than fifty percent of a cycle and a negative portion which is more than fifty percent of a cycle and provides a negative dc component as taught by Quazi and

> Scherer et al. because it is desired to deposit largely disturbance free dielectric coatings. [Id. at p. 11.]

Because Quazi and Scherer are cited only to show the particular waveform recited in the appealed claims, it follows then that our comments concerning rejections II and III are also pertinent for this rejection as applied to appealed claims 10 through 12. Moreover, it is our judgment that the examiner's position is without merit. As pointed out by the appellant (substitute appeal brief, page 14), Quazi relates to methods that use a sinusoidal waveform as opposed to a generally square wave voltage as recited in the appealed claims. (Column 6, lines 39-45.) Also, the examiner has not identified any teaching or suggestion in Scherer, much less a reasoned explanation, why the teachings of this reference are pertinent to a method that uses a generally square waveform as recited in the appealed claims. Absent specific evidence of a motivation or suggestion and the requisite reasonable expectation of success from the prior art to combine these references, the examiner's rejection cannot be sustained.

For these reasons, we must also reverse the examiner's rejection of appealed claims 10 through 12 and 20 through 23 under 35 U.S.C. § 103 as unpatentable over the applied prior art.

Summary

In summary, we reverse all of the examiner's rejections, namely rejections I through IV identified above.

The decision of the examiner is reversed.

REVERSED

TERRY J. OWENS Administrative Patent Judge	)	
CATHERINE TIMM Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
ROMULO H. DELMENDO Administrative Patent Judge	)	

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