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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HONG WANG, BRENT BOYCE,
and FRANCIS WUILLAUME

Appeal 2011-003919
Application 11/523,092
Technology Center 1700

Before BRADLEY R. GARRIS, JEFFREY T. SMITH, and DEBORAH KATZ, *Administrative Patent Judges*.

KATZ, *Administrative Patent Judge*.

DECISION ON APPEAL

Statement of the Case

Appellants[1] seek our review, under 35 U.S.C. § 134(a), of the Examiner's decision to reject claims 1-21. (App. Br. 5.) We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

The Examiner made the following rejections of the claims:

- Claims 1, 16, 20, and 21 under 35 U.S.C. § 103(a) over Belkind[2] in view of Wang[3] (Ans. 4-9);
- Claims 1-4, 9, 13-18, 20, and 21 under 35 U.S.C. § 103(a) over Wang in view of Belkind (Ans. 9-15);
- Claims 5 and 8 under 35 U.S.C. § 103(a) over Wang in view of Belkind and Thomsen[4] (Ans. 15-16);
- Claims 6 and 10-12 under 35 U.S.C. § 103(a) over Wang in view of Belkind and Grubb[5] (Ans. 16-18);
- Claims 7 and 19 under 35 U.S.C. § 103(a) over Wang in view of Belkind and Hughes[6] (Ans. 18-19).

Appellants present the same arguments against each of these rejections, without arguing that any claims are separately patentable, except claim 20. We focus on claim 1 in our review, *see* 37 C.F.R. § 41.37(c)(1)(vii), and discuss claim 20 below.

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[1] The real party in interest is Guardian Industries Corp. (App. Br. 3.)
[2] Belkind et al., U.S. Patent 5,338,422, issued August 16, 1994.
[3] Wang, U.S. Patent 6,800,179 B2, issued October 5, 2004.
[4] Thomsen and Andreasen, U.S. Patent 6,783,253 B2, issued August 31, 2004.
[5] Grubb et al., European Patent Application 0456488 A1, published November 13, 1991.
[6] Hughes and Jeskey, U.S. Patent 5,215,832, issued June 1, 1993.

Appellants' claim 1 recites:

> A method of making a first surface mirror, the method comprising:
>
> causing a glass substrate to move past at least one rotating sputtering target;
>
> sputter-depositing a reflective layer, for reflecting visible light, on the glass substrate using the at least one rotating sputtering target;
>
> introducing at least oxygen gas into a low flux area proximate a first side of the sputtering target as the glass substrate is moving past the sputtering target, and introducing at least an inert gas into a high flux area below the sputtering target as the glass substrate is moving past the sputtering target, so as to sputter deposit the reflective layer in a manner such that the reflective layer of the mirror is oxidation graded so that the reflective layer is more oxided in an area closer to the glass substrate than in a central portion of the reflective layer; and
>
> depositing at least a first dielectric layer on the glass substrate over at least the reflective layer.

(App. Br. 23, Claims App'x.)

The method of claim 1 is explained by referring to Figure 3 of Appellants'Drawing, which is reproduced below.

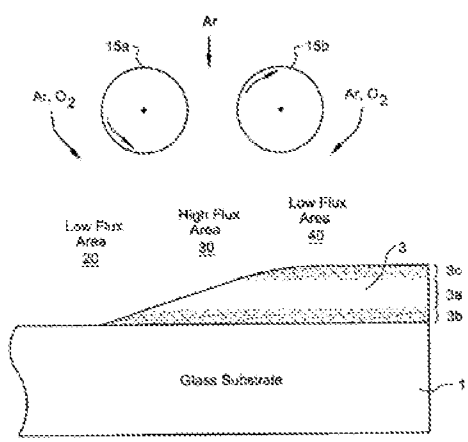

Figure 3 depicts a glass substrate moving from left to right underneath two magnetron sputtering targets, 15a and 15b. (Spec., ¶ [0039].) As the glass substrate approaches the metal cathode/target 15, it first encounters a low flux area 20. (*Id.* at ¶ [0041].) Next, the glass substrate encounters a high flux area 30, which is "directly under the cathode(s)/target(s) 15." (*Id.* at ¶ [0040]). The glass substrate then proceeds through the second low flux area 40, which "is typically located slightly beyond the target(s) 15." (*Id.*) Figure 3 also depicts both argon and oxygen gas being introduced into low flux areas 20 and 40, which are described as being proximate the front side of target 15a and the rear side of target 15b, respectively. (*Id.* at ¶ [0041].) Argon gas only is introduced into high flux area 30, which is described as being between targets 15a and 15b. (*Id.*)

The Examiner rejected claim 1 as being obvious over the combination of Belkind and Wang.

Figure 1 of Belkind is reproduced below.

FIG. 1.

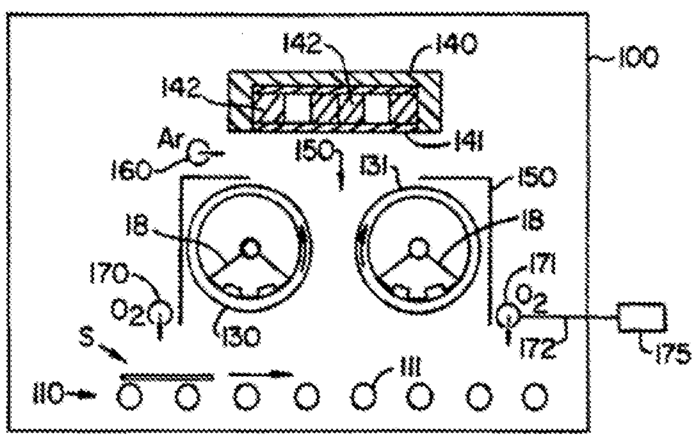

Figure 1 of Belkind depicts a substrate (S) passing underneath two rotating targets 130 and 131, with oxygen being supplied by outlets 170 and 171, and inert gas being supplied by outlet 160. (Belkind, 3:1-3 and 42-47.) Figure 1 also depicts a planar magnetron 140 above the dual cylindrical magnetrons. (*Id.* at 3:29-31.)

The Examiner finds that oxygen is introduced in a low flux area of the device depicted in Belkind and that inert gas is introduced in a high flux area of the device. (Ans. 4.) The Examiner explains that because the area below and between the two cylindrical magnetrons (130 and 131), wherein the inert gas is introduced, would have a higher concentration of flux, it would be a "high flux area." (*Id.*) Correspondingly, the areas outside the rotating cylindrical magnetrons and baffle (150), where the oxygen is introduced, would have a lower concentration of flux and so would be a "low flux area." (*Id.* at 4 and 22-23)

Belkind does not teach a method of forming a first surface mirror. (*Id.* at 4.)

Wang teaches a method of preparing coated articles, such as windows (Wang, 1:14-26), including sputter-depositing a reflective layer such as aluminum on a glass substrate (*id.* at 7:27 and 41). Figure 1 of Wang depicts a layered surface produced by the method of Wang, and is reproduced below.

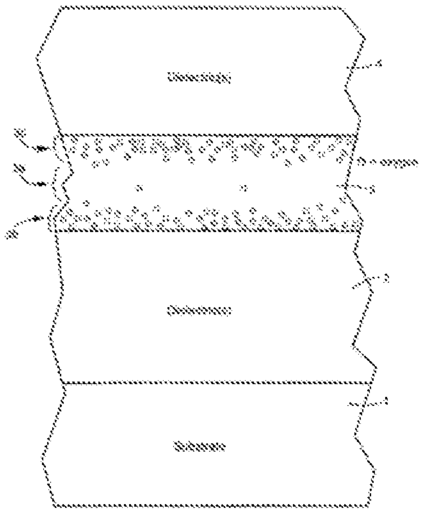

Fig. 1

Figure 1 depicts an oxidation graded layer 3 that is more metallic at the central layer 3a than the bottom and top layers 3b and 3c, respectively. (*Id.* at 7:38-45.)

Figure 2 of Wang depicts a schematic diagram of a method of using a single sputtering target to deposit an oxidation graded layer as depicted in Figure 1and is reproduced below.

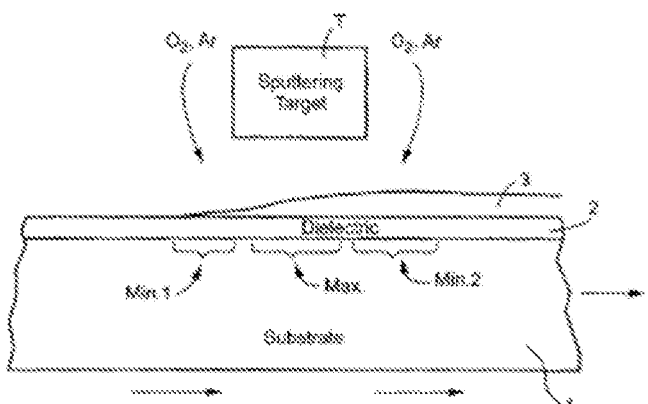

Fig. 2

Figure 2 shows a substrate that moves past a sputtering target, first encountering an area of low deposition rate (low flux area) ("Min. 1") on the input side of the sputtering target, then encountering an area of high deposition (high flux area) ("Max.") underneath the target, and finally encountering another area of low deposition (low flux area) ("Min. 2") on the output side of the target. (*Id.* at 11: 47-65.) Wang explains that by introducing a very small amount of oxygen gas into the system near the metal sputtering target and around both sides, and by introducing a relatively large amount of argon or other inert gas, the layered structure of Figure 1 can be formed because less oxygen is incorporated in the areas of high deposition rate than is incorporated in the areas of low deposition rate. (*Id.* at 11: 37-46.)

The Examiner finds that those of ordinary skill in the art would have considered it obvious to use the method of Belkind[7] to sputter deposit a reflective layer on a substrate, as taught in Wang, to form a first surface mirror. (Ans. 6.)

The Examiner also finds that even though Wang does not teach a rotating sputtering target (*id.* at 10), it would have been obvious to those of skill in the art to have modified the methods taught in Wang with the cylindrical targets of Belkind because the rotating targets have the advantages of being self-cleaning, which eliminates arcing problems caused by buildup of dielectric material (*see* Belkind, 1:50-55). (Ans. 10.)

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[7] The Examiner's Answer states that "it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Wang" by using sputter depositing a reflective layer as taught in Wang. (Ans. 6.) We take this to be a typographical error, wherein the Examiner intended that it would have been obvious to modify the method of Belkind by sputter depositing a reflective layer as taught in Wang.

Appellants raise the issue of whether Belkind and Wang teach "introducing at least an inert gas into a high flux area below the sputtering target."

Appellants argue that the Examiner has misconstrued the claim term "introducing" to mean allowing the inert gas to be present, instead of an active initial placement of the gas. (App. Br. 13-15; Reply Br. 2-3.) According to Appellants, Belkind teaches introducing inert gas above and off to the side of the cylindrical magnetrons, not to a high flux area below the target (App. Br. 13) and Wang teaches introducing the inert gas argon into areas identified as low flux areas, that is, around the sides of the target (*id.* at 14).

As the Examiner finds, the term "introducing" is not expressly defined in Appellants' Specification. (Ans. 21.) Thus, under the broadest reasonable interpretation, introduction of the inert gas is not limited to any particular means, but encompasses introduction by, for example, diffusion. (*Id.*) Though Appellants cite to dictionary definitions in the Reply Brief, these definitions do not persuade us that introduction by diffusion is excluded from the broadest reasonable interpretation of their claimed method. Accordingly, we are not persuaded that the Examiner erred in finding that Belkind and Wang teach "introducing at least an inert gas into a high flux area below the sputtering target."

Furthermore, though Appellants argue that Figure 1 of Belkind does not depict introducing argon in a high flux area, which, according to Appellants, would be below and generally between the two cylindrical targets 130 and 131 of Belkind Figure 1 (App. Br. 12-13), we note that

Appellants' Figure 3 also depicts the introduction of argon as beginning *above* the cylindrical targets 15a and 15b.

Appellants also argue that it is improper to combine the teachings of Belkind and Wang because Belkind relies on three sputtering targets to form a titanium dioxide base, while Wang uses only one target with a relatively low amount of oxygen. (App. Br. 15-16.) We are not persuaded by Appellants' arguments because their claims are directed to methods using "at least one rotating sputtering target," which encompasses both Belkind's three sputtering devices and Wang's one. In addition, the argument does not address the Examiner's rejections based on the modification of the methods of Belkind to make reflective mirrors (Ans. 6) or of Wang to use rotatable cylindrical targets (*id.* at 10). That Belkind does not discuss gradient or mirrored coatings, as Appellants argue (App. Br. 17), is not a persuasive argument that it would not have been obvious to modify the methods it teaches accordingly.

Appellants provide a separate argument against the rejection of claim 20. (App. Br. 19.) Claim 20 recites: "The method of claim 1, wherein no additional sputtering target(s) are located above the at least one rotating sputtering target during sputtering." (*Id.* at 27, Claims App'x.) Appellants argue that the Examiner has failed to indicate where the high flux area would be in Belkind's Figure 4 and where the inert gas would be introduced. (*Id.* at 19.) We are not persuaded by Appellants' argument because Belkind teaches that the planar target 141 can be a cylindrical sputtering target. (Belkind, 3: 29-31.) Thus, we agree with the Examiner that Belkind teaches no sputtering targets in addition to the at least one rotating sputtering target(s). (Ans. 8, 14-15, and 24.)

Conclusion

Upon consideration of the record and for the reasons given, the rejections of the appealed claims are sustained.

Therefore, we affirm the decision of the Examiner.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136.

AFFIRMED

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