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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte COLIN CLIPSTONE,
STEVE S. HAHN, YIQIAN ERIC LIU,
NEVILLE SONNENBERG, and ANDREW ZHUK

Appeal 2011-009981
Application 11/375,693
Technology Center 1700

Before CHUNG K. PAK, CATHERINE Q. TIMM, and GEORGE C. BEST, *Administrative Patent Judges*.

BEST, *Administrative Patent Judge*.

DECISION ON APPEAL

On July 8, 2010, the Examiner finally rejected claims 25-33 of Application 11/375,693 under 35 U.S.C. § 103(a) as obvious. Appellants seek reversal of this rejection pursuant to 35 U.S.C. § 134(a). We have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we AFFIRM.

BACKGROUND

The '693 application describes a method for making razor blades. Spec. 1. Razor blades are typically formed from a substrate such as stainless steel. *Id.* The cutting edge is sharpened to a tip with a radius of less than about 1000 angstroms. *Id.* To strengthen the cutting edge of the razor blade and to improve corrosion resistance, a variety of coatings, including diamond-like carbon ("DLC"), can be applied to the razor blade. *Id.* An outer layer of polytetrafluoroethylene ("PTFE") can be used to reduce friction when the blade is used. *Id.*

The '693 application describes an alleged improvement to known manufacturing processes. Spec. 1. The alleged improvement is the use of a DLC coating layer that includes a dopant such as silicon, chromium, or titanium. *Id.* at 1-2. The use of the doped DLC coating is alleged to provide the razor blade with improved thermal stability and wear resistance. *Id.* at 2.

Claim 25 is the only independent claim in the '693 application and is reproduced below:

> 25. A method of making a razor blade, comprising:
>
> depositing a metal-doped diamond-like carbon coating directly onto a substrate having a cutting edge defined by a sharpened tip and adjacent facets by sputtering a target comprising graphite and doped with the metal; and
>
> coating polytetrafluoroethylene onto the metal-doped diamond-like carbon coating.

(App. Br. 13 (Claims App'x)).

REJECTIONS

1. The Examiner finally rejected claims 25, 26, 29, and 33 under 35 U.S.C. § 103(a) as obvious over Yamada[1] in view of Cuomo[2] or Kokaku[3] (Final Rejection ("FR") 2 (July 8, 2010)).
2. The Examiner finally rejected claims 27, 28, and 30-32 under 35 U.S.C. § 103(a) as obvious over Yamada in view of either Cuomo or Kokaku and further in view of Goel[4] (FR 4).

DISCUSSION

Rejection 1. Appellants argue that the Examiner erred in rejecting claims 25, 26, 29, and 33 as obvious over the combination of Yamada and either Cuomo or Kokaku because these combinations of references fail to create a prima facie case of obviousness (App. Br. 3). Appellants argue for the patentability of these claims as a group (*id.* at 6). We select claim 25 as representative of the claims in this group. 37 C.F.R. § 41.37(c)(1)(vii) (2010). The other claims, therefore, stand or fall with claim 25.

Rejection over Yamada and Cuomo. The Examiner asserts that Yamada describes every element in claim 25 except for "sputtering a target comprising graphite and doped with the metal" that forms part of the DLC coating (Ans. 4). The Examiner relies upon Cuomo as describing or suggesting this claim limitation (*id.* (citing Cuomo col. 4, ll. 43-50, col. 5,

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[1] WO 01/94083, published Dec. 13, 2001. We follow the Examiner in using U.S. Patent No. 7,060,367 B2, issued June 13, 2006, as the English language counterpart. Appellants have not objected to the Examiner's reliance on the U.S. Patent.
[2] U.S. Patent No. 5,852,303, issued Dec. 22, 1998.
[3] U.S. Patent No. 5,104,709, issued April 14, 1992.
[4] U.S. Patent No. 5,795,648, issued Aug. 18, 1998.

ll. 1-18)). Appellants argue that this finding is erroneous (App. Br. 3-6). For the following reasons, we are not persuaded by these arguments. We, therefore, affirm the Examiner's rejection of claim 25 as obvious over the combination of Yamada and Cuomo.

First, Appellants argue that Cuomo only describes sputtering processes that use carbon targets doped with non-metal impurities and does not suggest the use of metals as a dopant (App. Br. 3-4). This argument is not persuasive because Yamada describes a razor blade with a metal-doped DLC coating that is created by sputtering. Yamada col. 1, ll. 20-26; col. 5. ll. 24-28. While the dopants present in the carbon targets Cuomo uses for sputtering are not metals, Cuomo does expressly state that "other impurities may also be used." Cuomo col. 4, ll. 46-50 (identifying boron, phosphorus, nitrogen, and oxygen as dopants present in the carbon target). Cuomo further describes how the sputtering process creates the DLC layer on the substrate and how the dopants included in the target also are deposited on the substrate. *Id.* at col. 4, l. 66-col. 5, l. 14. Cuomo, moreover, does not contain any description or suggestion that the dopants that can be transferred to the substrate are limited to non-metallic elements.

Second, Appellants argue that Cuomo teaches away from the incorporation of a metal dopant into the carbon target (App. Br. 4-5). Appellants base this argument on Cuomo's description of the dopants present in the carbon target as "impurities" (*id.* (citing Cuomo col. 4, ll. 46-50)). Appellants argue that metals are not naturally found in a precursor material, such as graphite, used to create the carbon target, while the non-metal dopants identified by Cuomo are naturally occurring (*id.* at 4). Appellants argue that, therefore, a person of ordinary skill in the art would not understand the term "impurities" as encompassing metals (*id.*).

We are not persuaded by this argument for several reasons:

- Appellants' factual assertions regarding the sorts of impurities that occur naturally in a source material such as graphite are not supported by any evidence of record.

- Cuomo uses the term "impurities" to describe the dopants to distinguish the doped target from a pure carbon target. Cuomo col. 4, ll. 46-48.

- Cuomo describes the use of metal dopants lithium and sodium to modify the conductivity of the carbon matrix produced by its processes. *Id.* at col. 2, ll. 25-28.

- Appellants have not identified any specific statement or description in Cuomo that excludes metals from the list of possible dopants that could be introduced via inclusion in the sputtering target.

Contrary to Appellants' assertions (App. Br. 4-5), Cuomo does not teach away from the use of metals as dopants in a graphite target used in a sputtering process. Although Cuomo describes doping of the product amorphous diamond with lithium or sodium by a diffusion process, Cuomo col. 3, ll. 57-60, the mere description of a prior art method for creating the desired material does not constitute a teaching away. In this case, the list of potential dopants is left open to the inclusion of materials other than boron, phosphorous, nitrogen, and oxygen. *Id.* at col. 4, ll. 48-50.

Finally, we are not persuaded by Appellants' argument that Cuomo fails to describe or suggest that the metal included in the carbon target is the same as the metal that is present in the claimed DLC layer (App. Br. 6). As discussed above, Cuomo describes the introduction of desired dopants into the amorphous diamond layer that is produced by sputtering via their inclusion in the carbon sputtering target. Cuomo col. 6, ll. 35-37.

For the foregoing reasons, the Examiner did not err in concluding that the combination of Yamada and Cuomo renders the use of a metal-doped graphite target in a sputtering process to create a metal-doped DLC layer on a razor blade obvious to a person of ordinary skill in the art at the time of invention.

Rejection over Yamada and Kokaku. The Examiner asserts that Yamada describes every element in claim 25 except for "sputtering a target comprising graphite and doped with the metal" that forms part of the DLC coating (Ans. 4). The Examiner relies upon Kokaku as describing or suggesting this claim limitation (*Id.* at 4-5 (citing Kokaku col. 12, ll. 64-67; Table 2)). Appellants argue that this finding is erroneous for several reasons (App. Br. 6-8).

First, Appellants argue that Kokaku—which describes a method for making a magnetic recording medium—is non-analogous prior art that cannot be used as a basis for a § 103(a) rejection (*id.* at 6). The Examiner found that Kokaku was within the Appellants' field of endeavor because Kokaku describes the deposition of thin films on a substrate through a sputtering process (Ans. 8).

> References within the statutory terms of 35 U.S.C. § 102 qualify as prior art for an obviousness determination only when analogous to the claimed invention. Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

In re Bigio, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (internal citation omitted). "References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in the art." *In re Kahn*, 441

F.3d 977, 986-87 (Fed. Cir. 2006). We find that Kokaku is analogous art and is available for use in a § 103(a) rejection under the Federal Circuit's second test for determining whether a reference is analogous prior art. We turn to the '693 application's Specification to identify the particular problem with which the inventors were involved. Our review of the Specification establishes that Appellants were concerned with the creation of a protective coat that adheres both to the underlying substrate and to the overlaying PTFE lubricant layer. Spec. 1, 3. Kokaku describes the use of carbon films as protective layers to protect metal oxide recording media from abrasion. Kokaku col. 3, l. 47-col. 4, l. 5. Kokaku's protective layers further provide enhanced adhesion of a lubricant such as PTFE. *Id.* Accordingly, we conclude that the Examiner did not err in finding that Kokaku is from an analogous art and is available for use in a rejection under § 103(a).

Second, Appellants argue that a person of ordinary skill in the art would not have been motivated to combine Kokaku with Yamada (App. Br. 7-8). Appellants' argument is based on an incorrect understanding of Kokaku's description. In particular, Appellants assert that addition of metal to the carbon containing protective layer results in "Examples 1-20, all results with increased friction coefficients, one being so large that disk movement stopped. See e.g., Kokaku, col. 12, lines 23-25" (App. Br. 7). The cited portion of Kokaku, however, describes the performance of a Comparative Example which does not include the incorporation of a metal into the carbon protective layer. Kokaku col. 3, ll. 14-25. Appellants' faulty understanding of Kokaku further underlies their assertions that "[n]owhere does Kokaku teach or suggest a *doping* of the carbon protective layer, nor that the target be doped with *the same metal* of the metal-doped diamond like carbon coating as required in Appellant's base Claim 25" (Ans. 8

(emphasis in original)). Kokaku describes the deliberate incorporation of the metal adhesion-promoting substance into the carbon protective layer and that such doping can be accomplished by including the metal adhesion promoting substance in the carbon-containing sputtering target. *See*, *e.g.*, Kokaku col. 5, ll. 38-64.

For the foregoing reasons, we affirm the Examiner's rejection of claims 25, 26, 29, and 33 as obvious over the combination of Yamada and Kokaku.

Rejection 2. Appellants argue that the Examiner erred in rejecting claims 27, 28, and 30-32 as obvious over the combinations either of Yamada, Cuomo, and Goel or of Yamada, Kokaku, and Goel because these combinations of references do not establish a prima facie case of obviousness (App. Br. 9).

Goel describes a diamond-like nanocomposite ("DLN") which comprises at least two interpenetrating networks of material: (1) an amorphous network of diamond-like carbon, and (2) a glass-like silicon network that is stabilized by oxygen. Goel col. 2, ll. 37-58. Goel further states that the DLN may also include a third interpenetrating network comprising metallic dopants. *Id.*

Appellants' arguments are based, in part, on the alleged errors addressed in connection with Rejection 1 (App. Br. 9). For the reasons set forth above, we do not find those arguments to be persuasive.

Appellants further argue that Goel teaches away from the deposition of a DLC layer directly onto a substrate without the use of an interlayer to promote adhesion of the DLC to the substrate (App. Br. 9-10 (citing Goel col. 6, ll. 6-31)). In particular, Appellants argue:

> Goel specifically teaches the deposition of a DLN coating directly to a substrate stating that "DLC coatings . . . require an intermediate layer between the substrate and the DLC coating and [*sic*, [and]] . . . with the DLN coatings . . . adherence is so good that an interlayer is usually not required." (See Goel, col. 6, lines 6-31). Appellant contends that Goel's solution teaches one of skill in the art away from the use of a structure having DLC characteristics applied *directly* on a substrate as recited in base Appellant's Claim 25 from which Claim 27, 28, 30-32 depend, and towards the direct deposition of DLN coatings onto a substrate.

(App. Br. 10 (emphasis in original)).

Not only is this argument unpersuasive, it misrepresents Goel's disclosure. The relevant portion of Goel is reproduced in its entirety below, with material omitted by Appellants italicized and material added by Appellants indicated in bold.

> *As already mentioned, to improve adherence of coatings,* DLC coatings *often* require an intermediate layer between the substrate and the DLC coating **and** . *Often, if the DLC coatings are too thick, delamination occurs. Surprisingly,* with the DLN coatings *of the present invention* adherence is so good that an interlayer is usually not required.

Goel col. 6, ll. 6-11 (emphasis added).

As is readily apparent, Appellants' first and second uses of ellipses in their quotation of this passage create the impression that Goel states that DLC coatings *always* require an interlayer to adhere to a metal substrate and are therefore distinct from DLN layers, which Goel states usually do not require an interlayer. Not only is this inconsistent with Goel's actual teaching that interlayers may or may not be required for DLC layers to adhere to a metal substrate, *id.*; *see also* Goel col. 2, ll. 10-11, but as the Examiner noted (Ans. 11), it is inconsistent with Yamada, which also

describes the use of an adhesion-promoting interlayer with a DLC layer as optional.

Finally, Appellants argue that neither of the combinations of prior art asserted by the Examiner in this rejection describe the limitations set forth in the dependent claims (App. Br. 10-11). These arguments are not persuasive.

First, claims 26, 27 and 31 contain limitations specifying ranges of the amount of metal dopant present in the claimed DLC layer. The Examiner cited Goel's description of the composition of the DLN layer as comprising at least 2 atomic % non-carbon atoms (Ans. 12). The relevant portion of Goel states that "[t]he sum of the silicon, oxygen and dopant elements and dopant containing compounds is greater than about 2 atomic % of the DLN." Goel col. 5, ll. 40-43. Appellants correctly note that this passage does not state that the metal dopant comprises any particular atomic percentage of the DLN material (App. Br. 10). Appellants, however, fail to address Goel's specific description of the ratios of carbon to the various non-carbon components in the DLN. Goel col. 5, ll. 43-54. In particular, Goel discloses an embodiment that has a metal to carbon ratio of from about 0.01 to about 1.5. *Id.* at col. 5, ll. 51-54. Because Goel describes the DLN as comprising between about 40 to about 98 atomic % carbon, Goel describes the amount of metal present in the DLN in a range that overlaps the ranges set forth in claims 27, 28, and 31.

Appellants next attempt to distinguish Goel's description of a metal content that overlaps the claimed ranges by arguing that Goel's description is of a DLN rather than a DLC (App. Br. 10). This argument is not persuasive because Yamada describes a metal-doped DLC layer. The Examiner cited Goel for its description of a range of metal content in protective layers that can be applied to razor blades. Appellants have not

explained why the metal-content range described in Goel for DLN is not a sufficient suggestion of the range of metal content that would be useful in Yamada's metal-doped DLC. Furthermore, Goel describes tuning the metal content of the DLN to obtain desired properties. Goel col. 6, l. 60-col. 7, l. 6. Goel thus establishes that the metal content of a carbon-based protective layer is a result effective variable, which a person of ordinary skill in the art would optimize as a matter of routine.

Second, claims 30-32 require the tip radius of the razor blade to fall within certain ranges. Appellants argue that Goel does not describe these limitations because Goel describes the tip radius of a razor blade coated with DLN rather than DLC. This argument is not persuasive because the Examiner relies upon Goel only for its description of the tip radii of razor blades and applies this description to the metal-doped DLC-coated razor blade described in Yamada.

For the foregoing reasons, we affirm the Examiner's rejection of claims 27, 28, and 30-32.

CONCLUSION

For the foregoing reasons, we determine that Appellants have not identified any error that compels reversal of the rejections of claims 25-33 of the '693 application. Therefore, we affirm these rejections.

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

AFFIRMED

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