UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SATYABRATA RAYCHAUDHURI,
YONGAN YAN, and CHORNG-JEOU CHEN

Appeal 2008-2178
Application 10/853,877
Technology Center 1700

Decided: April 29, 2008

Before CHARLES F. WARREN, THOMAS A. WALTZ, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 1 through 19 and 44 in the Office Action mailed December 4, 2006. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2006).

We affirm the decision of the Primary Examiner.

Claim 1 illustrates Appellants' invention of an abrasion-resistant, antistatic, antireflective coating for a transparent article, and is representative of the claims on appeal:

1. An abrasion-resistant, antistatic, antireflective coating for a transparent article, comprising

a. a hard coat layer deposited onto a surface of the transparent article; and

b. an antistatic, antireflective layer deposited onto the outer surface of the hard coat layer;

c. wherein the antistatic, antireflective layer consists essentially of hydrolyzed silica and silica particles having a size less than 1000 nm and a concentration in the range of 0.00015 to 0.01 mg/cm^3;

d. wherein the antistatic, antireflective layer is deposited onto the outer surface of the hard coat layer using a sol-gel method comprising:

i. preparing a sol-gel solution comprising a hydrolyzed organo-metallic compound of silicon and silica particles,

ii. modifying the outer surface of the hard coat layer,

iii. depositing the sol-gel solution onto the modified outer surface of the hard coat layer, and

iv. thermally treating the article in an atmosphere having a controlled humidity, wherein the partial pressure of the water, P_{H2O}, expressed in kPa, satisfies the following inequality:

$P_{H2O} \geq 0.09 + 0.05\ T$

where T is temperature, in degrees C.

The Examiner relies upon the evidence in these references (Ans. 3):

Onozawa	US 2002/0028328 A1	Mar. 7, 2002
Miyatake	US 6,773,121 B2	Aug. 10, 2004

Appellants request review of the ground of rejection under 35 U.S.C. § 103(a) (Br. 2): claims 1 through 19 and 44 as unpatentable over Miyatake in view of Onozawa. Ans. 3.

Appellants argue the claims as a group. Br. in entirety. Thus, we decide this appeal based on claim 1. 37 C.F.R. § 41.37(c)(1)(vii) (2006).

The principal issue in this appeal is whether the Examiner has carried the burden of establishing a prima facie case of obviousness.

The plain language of claim 1 specifies, in pertinent part, any transparent article having a coating comprising at least, among other things, any layer, that is antistatic to any extent and antireflective to any extent, consisting essentially of any hydrolyzed silica and any silica particles having a size less than 1000 nm. The layer is further characterized as deposited onto the outer surface of any hard coat layer on the surface of the article by any sol-gel method comprising at least the steps of, among other things, depositing the sol-gel solution onto the hard coat layer by any means; and thermally treating the thus coated article at any temperature for any period of time in an atmosphere having a controlled humidity falling within the specified inequality. *See, e.g., In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) (citing, *inter alia*, *In re Brown*, 549 F.2d 531, 535 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348 (CCPA 1969)) ("product-by-process claims are limited by and defined by the process"); *In re McKee*, 95 F.2d 267, 267 (CCPA 1938) (critical process steps omitted from product-by-process claims); *cf. Ex parte Fahrbach*, 155 USPQ 533 (Bd. App. 1966) (citing, *inter alia*, *McKee*, 95 F.2d at 267) (all necessary features of the process must be recited in a product-by-process claim).

In these respects, the open-ended term "comprising" used in transition and in the body of claim 1 opens the product-by-process claim to include transparent articles that contain additional components in the coating and are

prepared by sol-gel methods containing additional steps and reagents. Indeed, the term "comprising" is used in claim 1 with its ordinary meaning in claim construction of "containing at least" the specified steps and ingredients. *See, e.g.*, *Exxon Chem. Pats., Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1555 (Fed. Cir. 1995) ("The claimed composition is defined as comprising - meaning containing at least - five specific ingredients."); *In re Spada*, 911 F.2d 705, 706 (Fed. Cir. 1990) ("While claim 31 requires that the polymers comprise members of two general classes of monomers, Spada's specific examples illustrate polymers in which members of three general classes of monomers are present."); *In re Baxter*, 656 F.2d 679, 686 (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.").

Furthermore, we agree with the Examiner that on this record, and contrary to Appellants' contentions, the limitation "the antistatic, antireflective layer consists essentially of hydrolyzed silica and silica particles" does not preclude additional ingredients in the layer. Ans. 5-6. Appellants contend the phrase "consists essentially of" limits the layer to such additional materials that do not materially effect the basic and novel characteristics of the claimed article. Br. 5-6. In this respect, Appellants contend that "fluoro alkyl compounds materially affect" the articles on the sole basis that such compounds "are known to" have certain effects on coatings. Br. 6.

We have difficulty with Appellants' position in two respects. First, we find no disclosure in the Specification of any ingredients, including

"fluoro-alkyl compounds," identified as materially affecting the formation of an antistatic, antireflective layer. *See, e.g., In re Herz*, 537 F.2d 549, 551-52 (CCPA 1976) ("[I]t is necessary and proper to determine whether [the] specification reasonably supports a construction" that would exclude or include particular ingredients.); see also, e.g., *PPG Indus., Inc. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1354-57 (Fed. Cir. 1998) (Patentees "could have defined the scope of the phrase 'consisting essentially of' for purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention. The question for our decision is whether PPG did so."). Indeed, the Specification describes the "sol-gel solution" in such non-restrictive terms as "comprises" and "includes" with respect to a variety of materials, including silica particles treated with diverse dispersion agents. Spec., e.g., ¶¶ 0014, 0017, 0018, and 0044-0051.

Secondly, Appellants' contentions with respect to the generic term "fluoroalkyl compounds" do not address specific compounds which can be included in a sol-gel solution, such as compound "(B) having a fluoro alkyl structure *and* a polysiloxane structure" applied in a sol-gel solution as disclosed by Miyatake. Miyatake, e.g., col. 2, ll. 17-64 (emphasis supplied). In any event, these contentions are unsupported by evidence, and thus, entitled to little weight. *Cf., e.g., In re De Blauwe*, 36 F.2d 699, 705 (Fed. Cir. 1984); *In re Payne*, 606 F.2d 303, 315 (CCPA 1979); *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972).

We find Miyatake would have disclosed to one of ordinary skill in this art a transparent article coated with "an antireflection film having a hard coat

layer . . . and an antireflection layer with a low refractive index laminated onto a surface of the hard coat layer," wherein the antireflection layer has scratch-proof and stain resistant properties. Miyatake col. 2, ll. 18-41. The hard coat layer can include "fine particles," such as silica, to provide "an antiglare property;" and "additives, such as leveling agents, thixotropy agents, and antistatic agents may be used," wherein "[a]s thixotropy agents, silica . . . having particle diameter of 0.1 or less μm may be mentioned." Miyatake, e.g., col. 3, ll. 46-55 and col. 6, ll. 22-28. We find 0.1 μm is 100 nm.

The antireflection layer is formed by dry curing a sol-gel material, wherein the sol-gel material is a solution comprising a siloxane polymer (A) and compound (B). Miyatake, e.g., col. 2, ll. 42-64, and col. 6, l. 45 to col. 8, l. 29. "[A] sol in which silica . . . [is] dispersed in alcoholic solvent may be added in the antireflection layer forming agent." Miyatake col. 8, ll. 6-9. In this method, the coated sol-gel solution is dried and then cured for a time and temperature that are "adjusted suitably," with exemplary time and temperature ranges of 100 hours or less and 60 to 150ºC. Miyatake col. 8, ll. 11-29.

We find Onozawa would have disclosed to one of ordinary skill in this art transparent articles having "[a] very fine anti-glare hard coat film which comprises . . . a hard coat layer," wherein the hard coat layer comprises an ionizing radiation cured resin; 2 to 25 parts by weight of silica particles having an average diameter of 0.5 to 5 μm, that is, 500 to 5000 nm; and 10 to 200 parts by weight of fine particles having an average particle size of 1 to 60 nm, wherein the fine particles can be SiO_2. Onozawa, e.g.,

¶¶ 0002, 0015, 0021, 0025, and 0030-0034. In contrast to the silica particles,

> [t]he fine particles . . . exhibit the effect of maintaining the excellent anti-glare property of the silica particles, suppressing deterioration in the quality of displayed images by improving the clarity of vision through [sic], and moreover, improving the antistatic property by decreasing the surface resistivity of the hard coat layer when some types of the fine particles are used. When the average particle diameter of the fine particles is outside the above range, the above effect is not sufficiently exhibited.

Onozawa ¶¶ 0032-0033. "[F]ine particles of SiO_2 are preferable" and "[t]he fine particles of SiO_2 are commercially available in the form of a sol." Onozawa ¶ 0034.

Appellants disclose in the Specification several optional thermal treatments under controlled humidity conditions, for curing the sol-gel material which significantly differ in time and temperature ranges. Spec., e.g., ¶¶ 0021-0024. In one of the optional thermal treatments, the time and temperature ranges are up to 10 hours and 80 to 200ºC, respectively. Spec., e.g., ¶ 0022. Another of the optional thermal treatments involves two steps: (1) the time and temperature ranges are up to 10 hours and 80 to 200ºC, respectively; and (2) the temperature ranges from 15 to 140ºC for an unspecified time. Spec., e.g., ¶ 0022. We find that one of ordinary skill in the art would reasonably infer that the humidity conditions for each of the optional thermal treatments, including all of the steps thereof, are maintained according to the disclosed inequality. Spec., e.g., ¶ 0019.

Appellants disclose in Specification Example 1 a comparison between two articles in which the dried coated layer corresponding to the claimed

antistatic, antireflective layer is subjected to a two step thermally treatment. In the first step, the coated article is heated in an oven to a temperature of about 120ºC, held at this temperature for about 2.0 hours, and then gradually cooled at a particular rate, with no disclosed humidity control Spec. ¶ 0072. The thus treated article exhibited a static decay time of about 4.7 seconds. In the second step, the article is further thermally treated at about 20ºC for about 1 day in air humidified with about 1.17 kPa partial pressure of water vapor, at which time the static decay time is below
2 seconds; after continuing the treatment for a further 5 days, the static decay time is 1.6 seconds; and after "about 10 days," is 1.1 seconds. Spec. ¶¶ 0072 and 0076.

We determine the combined teachings of Miyatake and Onozawa, the scope of which we determined above, provide convincing evidence supporting the Examiner's case that the claimed invention encompassed by claim 1, as we interpreted this claim above, would have been prima facie obvious to one of ordinary skill in the transparent article arts familiar with the coatings and layers used for such articles. We agree with the Examiner that Miyatake would have taught this person to use silica particles dispersed in a sol in the sol-gel process utilizing a solution comprising a siloxane polymer and a compound consisting of a fluoro alkyl structure and a polysiloxane structure, in forming the antireflection layer of a transparent article. Ans. 3 and 4-5. We further agree with the Examiner that this person would have recognized from Onozawa that fine particles of SiO_2, that is, silica, at the lower end of the claimed particle size range, available in the

form of a sol, provides anti-glare and clarity of vision through the layer properties to layers of transparent articles.

Thus, prima facie, the combined teachings of Miyatake and Onozawa would have led one of ordinary skill in this art to use the fine silica particles in the form of a sol disclosed by Onozawa as the silica particles in the sol-gel solution used to form the antireflection layer of the antireflection film on the transparent articles by Miyatake in the reasonable expectation of obtaining the properties taught by Onozawa to be imparted by the fine particles. We do so on the basis that this person would have been led by the combination of references to use Onozawa's fine silica particles for the properties described even though, on this record, the references would not have disclosed that the fine silica particles impart antistatic properties to the coating. *See, e.g., In re Kronig,* 539 F.2d 1300, 1304 (CCPA 1976) ("[I]t is sufficient here that [the reference] clearly suggests doing what appellants have done.")*; see also In re Kemps*, 97 F.3d 1427, 1429-30 (Fed. Cir, 1996), citing *In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990) (*en banc*).

Furthermore, the sol-gel material as claimed and the sol-gel material disclosed by Miyatake are thermally treated for substantially the same ranges of time and temperature, which process parameters as taught by Miyatake would be a matter of routine experimentation to one of ordinary skill in the art. *See, e.g., In re Aller*, 220 F.2d 454, 456-58 (CCPA 1955)
(it is not inventive to discover by routine experimentation optimum or workable ranges for general conditions disclosed in the prior art).

Therefore, on this record, while Miyatake does not prescribe the claimed humidity range parameter in making the antireflection layer of the

transparent articles, we determine that, prima facie, it reasonably appears from the commonality of materials and processing steps between the transparent article characterized by the specified process of preparing the same as claimed and the prior art articles of Miyatake, modified by Onozawa as we determined above, that the claimed transparent articles are identical or substantially identical to the transparent articles disclosed to one of ordinary skill in this art by the applied references. Accordingly, the burden has shifted to Appellants to submit effective argument and/or objective evidence to patentably distinguish the claimed articles encompassed by claim 1 over the articles of the combined teachings of Miyatake and Onozawa, even though the ground of rejection is under
§ 103(a). *See, e.g., Thorpe*, 777 F.2d at 697, and cases cited therein; *In re Fitzgerald,* 619 F.2d 67, 70-72 (CCPA 1980); *In re Brown*, 459 F.2d 531, 535-37 (CCPA 1972); *see also In re Best*, 562 F.2d 1252, 1255-56 (CCPA 1977) ("Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See *In re Ludtke*, [441 F.2d 660 (CCPA 1971)]. Whether the rejection is based on "inherency" under 35 U.S.C. § 102, on "prima facie obviousness" under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products." (footnote and citation omitted)); *cf. Spada*, 911 F.2d at 708-09 ("The Board held that the compositions claimed by Spada 'appear to be identical' to those

described by Smith. While Spada criticizes the usage of the word 'appear' we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.").

Upon reconsideration of the record as a whole in light of Appellants' contentions, we are of the opinion that Appellants have not successfully rebutted the prima facie case. On this record, we agree with Appellants that the disclosure in Miyatake and Onozawa does not specifically disclose that silica particles impart antistatic properties to the antireflection layer of Miyatake. Br. 4-5. However, we determined one of ordinary skill in the art would have added fine silica particles of the size disclosed in Onozawa to the antireflection layer of Miyatake for the purposes of obtaining the properties taught by Onozawa. Thus, Appellants' discovery of an additional property for the article taught by the prior art does not patentably distinguish the claimed article therefrom. *See, e.g., Spada*, 911 F.2d at 707, and cases cited therein.

Appellants contend Specification Example 1 illustrates that the first article with silica particles "does not have an antistatic property" even though the static decay time is 4.7 seconds. Br. 6. The static decay time of below 2 seconds for the second article treated as specified in claim 1 "indicates that the coating gains an antistatic property after this process is applied." Br. 6. Appellants argue Example 1 illustrates that "the coating subjected to the process steps in claim 1 is different than the coating" not so treated. Br. 6-7. In this respect, Appellants contend "[t]he process steps

appear to modify the physical and/or chemical structure of the coating in order to achieve the antistatic property." Br. 7. The Examiner contends the difference in static decay time between the first and second articles "is caused by a change in the length of thermal treatment and that the specific length of thermal treatment is not a claimed limitation of instant claim 1." Ans. 7. The Examiner further contends that a prior art article was not compared. Ans. 7.

On this record, we find the evidence in Specification Example 1 is of insufficient weight to establish that the claimed coated articles encompassed by claim 1 are not identical or substantially identical to the coated articles of the applied prior art for several reasons. First, the sol-gel material for the antistatic, antireflective coating used in Specification Example 1 is not a coating falling within the teachings of Miyatake as modified with fine silica having a particle size taught by Onozawa, which is the thrust of the ground of rejection. Further, no explanation is provided by Appellants with respect to whether such evidence indirectly provides a reasonable comparison of such coated articles. *See e.g., Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991) ("[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared with the closest prior art." (citation omitted)); *In re Burckel*, 592 F.2d 1175, 1179-80 (CCPA 1979) (the claimed subject matter must be compared with the closest prior art in a manner which addresses the thrust of the rejection); *In re Blondel*, 499 F.2d 1311, 1317 (CCPA 1974) (indirect evidence provided a reliable indication of the performance of the closest claimed and prior art compounds).

Further, as the Examiner points out, there is a substantial difference between the first and second treatment steps with respect to the temperature and duration of the thermal treatment. There is no disclosure of humidity conditions in the first treatment step, and in this respect, the disclosure of the optional two step treatment in the Specification would reasonably include humidity control in accordance with the specified inequality. *See above* p. 7. Otherwise, the time and temperature employed in the first step falls within a disclosed optional thermal treatment as well as within the thermal treatment time and temperature ranges taught by Miyatake. *See above* pp. 6 and 7. Thus, on this record, there is no side-by-side comparison of articles coated with the same sol-gel material in which one article has characteristics imparted by the process specified in claim 1. *See above* p. 7. *Cf. In re Dunn*, 349 F.2d 433, 439 (CCPA 1965) ("[W]e do not feel it an unreasonable burden on appellants to require comparative examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables."). Therefore, Appellants' contention of a "physical and/or chemical structure" difference imparted by the process specified in claim 1 is unsupported by this record, and thus, entitled to little, if any, weight. *See, e.g., De Blauwe*, 36 F.2d at 705; *Payne*, 606 F.2d at 315; *Lindner*, 457 F.2d at 508.

Furthermore, even if the Specification provides a proper comparison, there is no disclosure in the Specification defining the antistatic property possessed by the claimed coated articles as limited to a particular static decay rate in seconds, and no limitation on this property is specified in claim 1. Indeed, Appellants have not carried their burden of submitting an

explanation or evidence with respect to the practical significance of the asserted results alone and further vis-à-vis the teachings of the applied references, or why the results would have been considered unexpected in view of the prior art by one of ordinary skill in this art. *See, e.g., In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997); *In re Merck*, 800 F.2d 1091, 1099 (Fed. Cir. 1986); *In re Longi*, 759 F.2d 887, 897 (Fed. Cir. 1985); *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972); *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972); *In re D'Ancicco*, 439 F.2d 1244, 1248 (1971).

Moreover, even if it is held that the evidence in the Specification establishes unexpected results based on the particular coated article tested, there is no evidence that the same result would be exhibited by claimed coated articles encompassed by claim 1, as we interpreted this claim above, vis-à-vis the coated articles of the combined teachings of Miyatake and Onozawa which differ as set forth in the ground of rejection. *See, e.g., In re Kulling*, 897 F.2d 1147, 1149-50 (Fed. Cir. 1990); *In re Clemens*, 622 F.2d 1029, 1035-36 (CCPA 1980); *In re Greenfield*, 571 F.2d 1185, 1189 (CCPA 1978); *Lindner*, 457 F.2d at 508; *In re Tiffin*, 488 F.2d 791, 792 (CCPA 1971).

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Miyatake and Onozawa with Appellants' countervailing evidence of and contentions for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1 through 19 and 44 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

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SHEPPARD, MULLIN, RICHTER & HAMPTON LLP
333 SOUTH HOPE STREET
48TH FLOOR
LOS ANGLES, CA 90071-1448