

The opinion in support of the decision being entered today
is *not* binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BURKHARD KÖHLER,
JOACHIM PROBST, and MICHAEL SONNTAG

Appeal No. 2007-1487
Application 09/562,632
Technology Center 1700

Decided: May 31, 2007

Before CHUNG K. PAK, PAK, CHARLES F. WARREN, and
CATHERINE Q. TIMM, *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 8 in the Office Action mailed December 8, 2005. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2005).

We affirm the decision of the Primary Examiner.

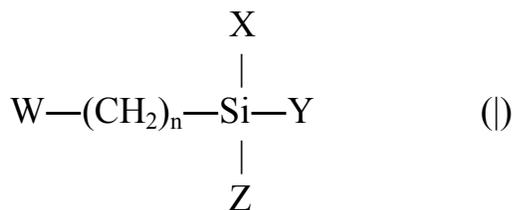
Claim 1 illustrates Appellants' invention of a coating, and is representative of the claims on appeal:

1. A coating composition comprising

a) 30 to 95 wt.% of an aqueous, hydroxy-functional, acid-group containing resin dispersion, said dispersion having an hydroxyl value of from 8 to 264 mg KOH/g resin solids and an acid value of from 3 to 100 mg KOH/g resin solids,

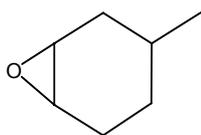
b) 5 to 70 wt.% of a polyisocyanate component having a free isocyanate group content of 5 to 50 wt.% and a viscosity of 5 to 10,000 mPa.s at 23°C and $D = 40s^{-1}$ and

c) 0.1 to 10 wt.% of an epoxy functional silane component, inert to isocyanate groups and reactive with acid groups in said dispersion via epoxy groups, of the general formula (I)

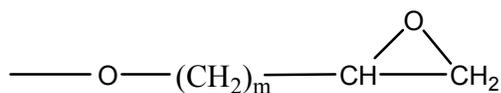


wherein

W denotes the group



or



with $m = 1$ to 4 and

n denotes a whole number from 2 – 4

and

X, Y, Z represent, independently of one another, the same or different organic groups with 1 to 30 atoms, with the proviso that at least one of the groups represents an alkoxy group with 1 to 4 carbon atoms,

wherein the molar ratio of the hydroxyl groups of component a) to the isocyanate groups of component b) is between 0.2:1 and 3:1, and the sum of the wt.% of components a) to c) is 100.

The Examiner relies on the evidence in these references:

Kubitza	US 5,075,370	Dec. 24, 1991
Morikawa	US 6,482,523 B1	Nov. 19, 2002

Appellants request review of the ground of rejection of claims 1 through 8 under 35 U.S.C. § 103(a) as being unpatentable over Kubitza taken in view of Morikawa (Answer 3-5; Br. 3).

Appellants argue claims 1 through 7 as a group and claim 8 separately (Br. 4 and 6). Thus, we decide this appeal based on independent claims 1 and 8 as representative of Appellants' groupings of claims. 37 C.F.R. § 41.37(c)(1)(vii) (2005).

The Examiner contends Kubitza discloses an aqueous coating composition containing the claimed aqueous, hydroxy-functional, acid group containing resin dispersion and the claimed polyisocyanate component, thus differing from the claimed coating composition in the absence of an epoxy functional silane component as defined in claim 1 (Answer 3-5). The Examiner contends Morikawa discloses a composition which contains a carboxyl functional polyurethane resin, polyisocyanate curing agent and an epoxy functional silane component which can be β -(3,4-epoxycyclohexyl)ethyltrimethoxysilane or γ -glycidoxypropyl-trimethoxysilane, the latter also named (3-glycidoxypropyl)-trimethoxysilane (*id.* 5; *see* appealed claim 3). The Examiner concludes it would have been obvious to one of ordinary skill in the art to utilize the epoxy functional silane coupling agent of Morikawa in the coating

composition of Kubitza to improve the adhesion of Kubitza's composition to metals (*id.*).

With respect to product claim 8, the Examiner further contends a person of ordinary skill in the coating arts is a chemist knowledgeable in combining non-reactive ingredients (*id.* 4-5). Thus, the Examiner concludes this person would have combined the polyisocyanate component of Kubitza with the epoxy functional silane coupling agent of Morikawa in preparing the coating compositions of Kubitza since these two components would not react, and thus, the epoxy functional silane would not react with the acid groups in the resin component before the resin component is mixed with the polyisocyanate component (*id.*).

Appellants contend there is no suggestion in Kubitza "that there are any adhesion or corrosion resistance problems with the compositions described therein" (Br. 4). Appellants contend Morikawa does not suggest "the use of an aqueous, OH-functional, acid group containing resin dispersion" (*id.*; original emphasis omitted). Appellants contend Morikawa suggests adding a silane coupling agent to the non-aqueous compositions "to improve 'workability' and 'bonding strength' (see column 8, lines 57-59)" but "the results reported by the reference for those compositions using a silane did not exhibit any improvement in bond strength (see Table 6 – adhesives AD-A, AD-C, AD-E, AD-F, AD-G, AD-I and AD-J contained a silane)" (*id.* 4-5). Appellants contend "[t]he results in Table 6 do not show any improvement for those compositions where a silane was present," and thus, "[i]t is completely unclear how or why one of ordinary skill in the art

would add such silane agents to the aqueous compositions described in”
Kubitza (*id.* 5).

With respect to claim 8, Appellants contend Kubitza does not contain any teaching to add an epoxy functional silane component to the polyisocyanate component and the Examiner has not established why the claimed product would be obvious by citing references.

Appellants contend the object of the claimed invention is to provide an aqueous, two-component polyurethane system that exhibits improved adhesion and corrosion resistance on metal surfaces, and the results of showing of systems with and without an epoxy functional silane component in Specification Example 1-4 demonstrate “better crosshatch adhesion” and “better resistance to blistering” (*id.* 5, citing Specification 12, 14, 16, and 18). Appellants contend “the results could not be predicted from the teachings of the references” (*id.* 5-6).

The Examiner responds that Morikawa’s compositions in Tables 4 and 5 do not include any examples showing the same composition with and without the epoxy functional silane component and thus, the results in Table 6 are inconclusive with respect to the “effect of silane coupling agent on bonding strength” and adhesion (Answer 6-7).

The issue in this appeal is whether the Examiner has carried the burden of establishing a prima facie case of obviousness under § 103(a) with respect to claims 1 and 8.

This panel entered a decision in Appeal No. 2004-1131 on June 29, 2004. In subsequent prosecution, Appellants amended claim 1 and added new claim 8 to which the Examiner applied a different combination of

references. Accordingly, we consider the record anew. *Cf. In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976).

The plain language of independent claim 1 specifies a coating composition comprising at least the specified amounts of an aqueous, hydroxy-functional, acid-group containing resin dispersion with the specified properties, a polyisocyanate component with the specified properties, and an epoxy functional silane component which is inert to isocyanate groups and reactive with acid groups in said dispersion via epoxy groups. The claimed composition is described as a two-component polyurethane coating composition which contains a epoxy functional silane component that can be, *inter alia*, β -(3,4-epoxycyclohexyl)ethyl-trimethoxysilane or (3-glycidoxypropyl)trimethoxysilane, the latter specified in claim 3 (Specification, e.g., 1:8-9, 4:7, and 5:19-21). The claimed coating composition is disclosed to exhibit adhesion and corrosion resistance on metal substrates, including aluminum and galvanized steel (*id.*, e.g., 1:9-10).

The plain language of claim 8 specifies a coating composition produced by adding the epoxy functional silane component to the polyisocyanate component, and dispersing the mixture with the aqueous, hydroxy-functional, acid-group containing resin dispersion component, wherein the components are defined in the same manner and present in the same amounts as in claim 1. Thus, the claim is couched in product-by-process format. *See, e.g., In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). The method set forth in this claim is described as avoiding a premature reaction of the epoxy functional silane component in

the aqueous, hydroxy-functional, acid-group containing resin dispersion (Specification, e.g., 6:23-22).

We agree with the Examiner's findings that Kubitza would have disclosed to one of ordinary skill in this art a two-component polyurethane coating composition comprising an aqueous, hydroxy-functional, acid-group containing resin dispersion and a polyisocyanate component, each having the properties specified. Kubitza prepares the composition by producing the resin in an organic solvent, such as ethyl acetate, converting the resin to an aqueous dispersion, and emulsifying the polyisocyanate in the aqueous dispersion of the resin. *See* Answer 3-4; Kubitza, e.g., Abstract, column 1, line 51, to column 3, line 37; column 4, line 9, to column 5, line 35; column 6, lines 42-48; and Examples. Kubitza does not disclose or suggest the addition of an epoxy functional silane component to the coating composition (Kubitza, e.g., col. 6, ll. 53-58). Kubitza discloses the aqueous coating compositions can be used "where solvent-containing, solventless or other aqueous paint and coating systems" are used, including "the painting and coating of metal surfaces . . . and the painting and sealing of various plastic surfaces," and are "suitable for the surface bonding of various materials" which are the same or different (*id.* col. 6, l. 59, to col. 7, l. 6).

We find Morikawa would have disclosed to one of ordinary skill in this art an adhesive for lamination applicable to substrates, including, *inter alia*, plastic films, metal foils, and metallized films, which can be a polyurethane containing composition of a polyurethane resin having carboxyl groups and a polyisocyanate curing agent in ethyl acetate (Morikawa, e.g., col. 1, ll. 67-8, col. 2, l. 15, to col. 3, l. 10, col. 7, ll. 9-18,

col. 8, ll. 24-32, and col. 9, ll. 16-43). Morikawa teaches a coupling agent improves the workability and bonding strength of the coating, with silane coupling agents, used in 0.05 to 10.0 parts by weight per 100 parts, that is, 0.05 to 10 parts by weight, preferred (*id.* col. 8, l. 54, to col. 9, l. 2). Preferred silane coupling agents include, *inter alia*, “epoxy-silane compounds such as β -(3,4-epoxycyclohexyl)ethyltrimethoxysilane, γ -glycidoxypropyl-trimethoxysilane,” wherein “[p]articularly preferable are epoxysilane compounds for improving the adhesiveness” (*id.* col. 9, ll. 3-13). The polyurethane compositions can be applied by such methods as “wet lamination” and “nonsolvent lamination” (*id.* col. 9, ll. 44-46).

Morikawa discloses adhesive formulations in Table 4 which include the polyurethane resin and polyisocyanate curing agent, and additionally contain in adhesives AD-A and AD-C, 0.5 parts coupling agent A-186: β -(3,4-epoxycyclohexyl)ethyltrimethoxysilane, and in adhesives AD-E, AD-F, and AD-G, 0.5 parts coupling agent A-187: γ -glycidoxypropyl-trimethoxysilane (Morikawa cols. 13-15, and col. 15, ll. 18-21). Each of the adhesives AD-A through AD-H is prepared with a different polyurethane resin PU-A through PU-H (*id.* cols. 9-13 and Tables 1 and 3). Each of the adhesives AD-A through AD-H is coated on PET film which is then laminated to aluminum foil, and each is further coated on the aluminum foil which is then laminated to PP film (*id.* col. 15, ll. 25-41). The laminates were subject to a T-peel test with the results set forth in Table 6 (*id.* col. 15, ll. 25-41). Morikawa discloses that the results in Tables 1, 3, and 6 demonstrate that “bonding strength” is “good” (*id.* col. 6, ll. 31-41). We agree with the Examiner’s finding that this evidence provides a comparison

of any of the adhesives AD-A, AD-C, AD-E, AD-F, and AD-G with a corresponding adhesive composition that does not contain an epoxy functional silane coupling agent (Answer 6-7).

Appellants acknowledge that “adhesion problems have been observed with these [prior art] aqueous [two component] [polyurethane] systems after application on special substrate surfaces, especially untreated metal surfaces such as aluminum, galvanized steel and car body sheet (USt 1405 steel sheet)” which “can then lead to undesirable signs of corrosion” (Specification 2:1-4; see also 1:18-30). Appellants disclose four Examples in Tables 1-4 and Tables 1a-4a, each involving a comparison between a two-component polyurethane composition with and without 0.39 to 0.43 parts of (3-glycidoxypropyl)-trimethoxysilane, as set forth in Tables 1-4, with respect to crosshatch adhesion and resistance to blistering, as set forth in Tables 1a-4a (*id.* 10:28 to 18:10). No evaluation of the test results in Tables 1a-4a is disclosed (*id.* 12, 14, 16, and 18).

We determine the combined teachings of Kubitza and Morikawa, the scope of which we determined above, provide convincing evidence supporting the Examiner’s case that the claimed composition encompassed by claims 1 and 8, as we interpreted these claims above, would have been prima facie obviousness to one of ordinary skill in the coating arts familiar with the two-component polyurethane coating compositions. We are not convinced of error in the Examiner’s position by Appellants’ contentions.

We are of the opinion that one of ordinary skill in this art would have combined Kubitza and Morikawa because Morikawa teaches that bonding, workability, and adhesion are improved in a two-part polyurethane coating

composition by the addition of an epoxy functional silane coupling agent. We determine from the acknowledged observance of adhesion problems leading to signs of corrosion with coatings of prior art aqueous coating compositions on metal surfaces that this person would have readily observed such conditions, *see In re Goodman*, 339 F.2d 228, 232-33, 144 USPQ 30, 33-34 (CCPA 1964), and there is no evidence that recognition of this problem is part of appellants' claimed invention. *See, e.g., In re Ludwig*, 353 F.2d 241, 243, 147 USPQ 420, 421 (CCPA 1965); *In re Spinnoble*, 405 F.2d 578, 585, 160 USPQ 237, 243 (CCPA 1969). It is well settled that "[t]he significance of evidence that a problem was known in the prior art is, of course, that knowledge of a problem provides a reason or motivation for workers in the art to apply their skill to its solution." *In re Nomiya*, 509 F.2d 566, 572, 184 USPQ 607, 613 (CCPA 1975). Thus, we are of the opinion that one of ordinary skill in this art would have addressed the problem of adhesion of the aqueous coating compositions on metal surfaces leading to corrosion by combining the references.

We are not convinced otherwise by the fact that Kubitza discloses aqueous compositions while Morikawa discloses organic solvent containing compositions wherein the solvent can be ethyl acetate. Indeed, the same or similar carboxylic acid group containing polyurethane resins in both references can be prepared in ethyl acetate, and Kubitza discloses that such resins can thereafter be converted to aqueous dispersions to which the same or similar polyisocyanate components are added. Appellants do not contend that one of ordinary skill in this art would not have added an epoxy functional silane disclosed by Morikawa to Kubitza's compositions because

this person would have recognized that this component would be incompatible with an aqueous composition.

Furthermore, one of ordinary skill in this art would have reasonably expected from Morikawa that the addition of an epoxy functional silane component to Kubitza's composition would improve workability, bond strength, and adhesion of two-part polyurethane coating compositions, and indeed, both Kubitza and Morikawa teach that such two-part compositions can be applied to the same materials, including metal surfaces, in the same manner, including, *inter alia*, wet and solventless processing. Thus, on this record, this person routinely following the combined teachings of the references would have reasonably arrived at the claimed aqueous coating composition encompassed by claims 1 and 8 by following the method of preparation disclosed by Kubitza without recourse to Appellants' specification. *See In re Corkill*, 771 F.2d 1496, 1497-1500, 226 USPQ 1005, 1006-08 (Fed. Cir. 1985); *In re Skoll*, 523 F.2d 1392, 1397-98, 187 USPQ 481, 484-85 (CCPA 1975); *In re Castner*, 518 F.2d 1234, 1238-39, 186 USPQ 213, 217 (CCPA 1975); *In re Lintner*, 458 F.2d 1013, 1015-16, 173 USPQ 560, 562-63 (CCPA 1972); *see also In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991) ("Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure."); *In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1680-81 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success." (Citations omitted)); *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary

reference may be bodily incorporated into the structure of the primary reference . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”).

The method set forth in product-by-process claim 8 does not, of course, patentably distinguish the claimed composition unless the recited method is established by Appellants to provide a product that is nonobvious over the applied references. *See, e.g., Thorpe*, 777 F.2d at 697, 227 USPQ at 966; *In re Best*, 562 F.2d 1252, 1255-56, 195 USPQ 430, 433-34 (CCPA 1977). Here, Appellants have not addressed the Examiner’s contention that one of ordinary skill in this art, familiar with two-part polyurethane coatings and the reactivity of the components thereof, including an epoxy functional silane coupling component, would have added the latter component to the other components in an advantageous manner in routinely following the combined teachings of Kubitza and Morikawa. Thus, on this record, the claimed compositions of claim 8 are identical or substantially identical to the compositions prepared by identical or substantially identical processes following the combined teachings of Kubitza and Morikawa. *See, e.g., Best*, 562 F.2d at 1255-56, 195 USPQ at 433-34.¹

¹ 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, 169 USPQ 563 (CCPA 1971)]. Whether the rejection is based on “inherency” under 35 USC 102, on “prima facie obviousness” under 35 USC 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

The evidence with respect to two-part polyurethane coating compositions containing an epoxy functional silane coupling agent set forth in Morikawa's Table 6 does not support Appellants' contention that such coupling agents do not improve bond strength. Indeed, there is no side-by-side comparison of compositions with and without such coupling agents which would provide the supporting evidence, as the Examiner argues, and there is no disclosure of the contribution of the individual components of the tested compounds to the demonstrated bond strength. *Cf., e.g., In re Heyna*, 360 F.2d 222, 228, 149 USPQ 692, 697 (CCPA 1966); *In re Dunn*, 349 F.2d 433, 439, 146 USPQ 479, 483 (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.”). Thus, on this record, one of ordinary skill in this art would have reasonably found in Morikawa the teachings that the epoxy functional silane coupling agents improve workability, bond strength, and adhesion of two-part polyurethane coating compositions.

We agree with Appellants that the comparisons between compositions with and without an epoxy functional silane component in Examples 1-4 of the Specification demonstrate “better” crosshatch adhesion and resistance to blistering. In view of the expectation of an improvement in bond strength and adhesion from the teachings of Morikawa, Appellants have the burden to submit an explanation or evidence with respect to the practical

to obtain and compare prior art products. [Footnote and citation omitted.]

significance of such results vis-à-vis the teachings of the applied references and 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, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997); *In re Merck*, 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 1986); *In re Longi*, 759 F.2d 887, 897, 225 USPQ 645, 651-52 (Fed. Cir. 1985); *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972); *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972); *In re D'Ancicco*, 439 F.2d 1244, 1248, 169 USPQ 303, 306 (1971). On this record, Appellants have not carried this burden. Thus, we determine that the demonstrated “better” results with respect to adhesion and blistering of the compared claimed compositions containing the epoxy functional silane components would have been reasonably expected by one of ordinary skill in this art from the teachings of the “improved” properties provided by this component in Morikawa.

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 Kubitza and Morikawa with Appellants’ countervailing evidence of and argument for nonobviousness, and conclude that the claimed invention encompassed by appealed claims 1 through 8 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner’s decision is affirmed.

Appeal No. 2007-1487
Application 09/562,632

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) (2006).

AFFIRMED

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