

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 R. SHAWN CHILDRESS and JAMES L. MCINTYRE JR.

Appeal 2007-2739
Application 11/106,321
Technology Center 1600

Decided: September 12, 2007

Before TONI R. SCHEINER, ERIC GRIMES, and NANCY J. LINCK,
Administrative Patent Judges.

GRIMES, *Administrative Patent Judge.*

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a process for making silylisocyanurate compounds. The Examiner has rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

BACKGROUND

“Silylisocyanurate has utility as an accelerator or promoter for adhesion of room temperature vulcanizable organosiloxanes and silane modified polymers, as an additive for organosiloxane compositions suitable

for fiber treatment[,] and in automotive coatings” (Specification 1). Silylisocyanurate compounds can be prepared by cracking a silylorganocarbamate in the presence of a cracking catalyst to produce a silylorganoisocyanate intermediate, and then, without isolating the intermediate, allowing it to undergo trimerization *in situ* (*id.*).

However, the aluminum- and tin-containing cracking catalysts typically used in such processes “involve[] certain disadvantages, either for the cracking/trimerization process itself or, potentially, for the silylisocyanurate product resulting from the process” (*id.* at 2). The Specification discloses a process of making silylisocyanurate that “dispenses entirely with the metal-containing alkoxide and tin-containing cracking catalysts . . . which may actually hinder the progress of the subsequent trimerization reaction” (*id.*).

DISCUSSION

1. CLAIMS

Claims 1 and 3-20 are pending and on appeal. Appellants state that “Claims 1 [and] 3-20 stand or fall together” (Br. 2).¹ Claim 1 is representative and reads as follows:

1. A process for making silylisocyanurate which compromises [sic] cracking silylorganocarbamate in the presence of a catalytically effective amount of, as cracking catalyst, at least one carboxylate salt selected from the group consisting of ammonium carboxylate, alkali metal carboxylate and alkaline earth metal carboxylate to provide silylorganoisocyanate and trimerizing silylorganoisocyanate in the presence of the carboxylate salt to provide silylisocyanurate

¹ Appeal Brief filed September 21, 2006.

wherein the process is conducted in the substantial absence of metal alkoxide or tin-containing compound.

Thus, claim 1 is directed to a process of making silylisocyanurate by cracking silylorganocarbamate in the presence of a cracking catalyst – a carboxylate salt of ammonium, an alkali metal, and/or an alkaline earth metal – to produce a silylorganoisocyanate, and trimerizing the silylorganoisocyanate in the presence of the cracking catalyst to yield the silylisocyanurate. The process is conducted in the substantial absence of metal alkoxides or tin-containing compounds.

2. PRIOR ART

The Examiner relies on the following references:

Berger	US 3,598,852	Aug. 10, 1971
Barsa	US 4,540,781	Sep. 10, 1985
Pepe	US 5,218,133	Jun. 8, 1993

3. OBVIOUSNESS

Claims 1 and 3-20 stand rejected under 35 U.S.C. § 103 as obvious in view of Pepe, Berger, and Barsa (Answer 3-5).

The Examiner cites Pepe as disclosing “a process for making silylorganoisocyanurate which involves the cracking of the corresponding silylorganocarbamate in presence of a cracking catalyst and a trimerization catalyst wherein [the] cracking catalyst encompasses metal alkoxide and tin carboxylates while the trimerization catalyst include[s] several alkali and metal salts of organic acids” (*id.* at 3). The Examiner notes that Pepe’s process uses the cracking and trimerization catalysts together without isolating the silylorganoisocyanate intermediate, but concedes that claim 1 “differ[s] from Pepe et al. in avoiding the use of cracking catalyst but use[s]

only ammonium and alkali and alkaline earth metal carboxylates as cracking agent” (*id.*).

The Examiner cites Berger as teaching “a process for making silylorganoisocyanurate which involves cracking of the corresponding silylorganocarbamate by heating. . . . Thus, Berger et al[.] clearly teaches that cracking by heating is enough to promote decomposition of the carbamate to isocyanate and its subsequent trimerization” (*id.* at 4, citations omitted).²

The Examiner urges that while Pepe teaches the use of cracking catalysts, “the two secondary references clearly teach [the] viability of omitting a cracking catalyst and thermal activation as well as alkali, alkaline earth and ammonium salts of organic acids as catalysts” (*id.*). The Examiner concludes that one of ordinary skill “would have been motivated to combine both the primary and secondary references and employ the process taught by these prior art to the process of making silylorganoisocyanurate without using alkoxide or tin containing carboxylic acids salt as cracking catalysts . . .” (*id.*).

Recently addressing the issue of obviousness, the United States Supreme Court stated that

[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue

² The Examiner cites Barsa as teaching trimerization of isocyanates by heating in the presence of ammonium or alkali metal salts of organic acids (Answer 4). Because we conclude that Pepe and Berger support a prima facie case of obviousness with respect to claim 1, we will not discuss Barsa further.

the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.

KSR Int'l v. Teleflex Inc., 127 S. Ct. 1727, 1742 (2007).

We agree with the Examiner that claim 1 would have been obvious to one of ordinary skill in view of the teachings of Pepe and Berger. In Pepe, “a silylorganocarbamate . . . is heated at a temperature sufficient for dissociation of the carbamate at subatmospheric pressure in the presence of a cracking catalyst and a weak base trimerization catalyst to produce the silylisocyanurate” (Pepe, col. 3, ll. 43-48). Pepe teaches that when the cracking step is performed “[i]n the presence of a trimerization catalyst, the silylorganoisocyanate is believed to trimerize in-situ to form the silylisocyanurate” (*id.* at col. 3, ll. 55-58). Pepe discloses that suitable trimerization catalysts include “calcium acetate [and] potassium acetate” as well as “alkali metal salts of organic acids . . . includ[ing] the sodium, potassium, lithium, and cesium salts of glacial acetic acid, propionic acid,” and other carboxylic acids (*id.* at col. 8, l. 66, through col. 9, l. 19).

Thus, Pepe teaches a process in which the starting material recited in claim 1 is subjected to the claimed cracking step, in the presence of alkali metal and alkaline earth metal carboxylate catalysts, to produce the claimed final product. Pepe differs from claim 1 in that Pepe teaches that the reaction mixture should contain the metal alkoxide and tin-containing cracking catalysts that claim 1 explicitly excludes from the process.

However, Berger discloses that “[t]he conversion of . . . silylorganocarbamate to the corresponding isocyanate can be readily achieved . . . by heating it to reflux under reduced pressure” (Berger, col. 4,

ll. 6-10). Berger states that “[w]ith proper adjustment of the reflux ratio, there can be achieved continuous cracking of the silylorganocarbamate, and continuous overhead separation of the silylorganoisocyanate as an overhead product” (*id.* at col. 4, ll. 14-17).

Thus, Berger teaches that Pepe’s step of converting the silylorganocarbamate to the silylorganoisocyanate intermediate can be alternatively accomplished in the absence of Pepe’s cracking catalysts, simply by heating the reaction mixture appropriately. One of ordinary skill making silylisocyanurate according to Pepe’s teachings would therefore have considered it obvious to leave out Pepe’s cracking catalysts and heat the silylorganocarbamate in the presence of the trimerization catalysts to produce the silylorganoisocyanate intermediate, and ultimately the silylisocyanurate. We therefore agree with the Examiner that claim 1 would have been *prima facie* obvious to one of ordinary skill in view of Pepe and Berger.

Appellants argue that Berger uses a silylorganohalide to produce the silylorganocarbamate starting material, whereas the “process of the present invention *does not* use a silyl[*I*]organohalide, a chemical with specific characteristics, in conducting the process” (Br. 8). Appellants urge that, “[m]oreover, combining Berger with Pepe et al. still does not correct the fact that the process described in Pepe et al. uses aluminum and tin alkoxide, wherein the claimed process specifically *excludes* any substantial amount of aluminum and tin alkoxides as part of the process” (*id.*).

We do not find this argument persuasive. Claim 1 does not contain any limitation regarding the method by which the silylorganocarbamate

starting material is made. Moreover, claim 1 uses the transitional term “compr[is]es” to delimit the process. Claim 1 therefore does not exclude preparing the silylorganocarbamate by Berger’s methods. *See Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368 (Fed. Cir. 2003) (“The transition ‘comprising’ in a method claim indicates that the claim is open-ended and allows for additional steps. Claim 1 uses the open-ended transition ‘comprising’ to introduce the recited steps. Thus the claim signals to patent practitioners that claim 1 allows activity . . . before the recited steps.” (citations omitted)).

Moreover, we do not agree that the combination of Pepe and Berger fails to suggest leaving out Pepe’s metal alkoxide and tin cracking catalysts. As discussed above, Berger teaches that those catalysts are not needed when the reaction mixture is heated under the appropriate conditions (Berger, col. 4, ll. 6-10). Thus, as disclosed by Berger, the heating would by itself convert the silylorganocarbamate to the silylorganoisocyanate intermediate. As disclosed by Pepe, the alkali or alkaline earth carboxylates present in the heated reaction mixture would allow the silylorganoisocyanate to trimerize to form the silylisocyanurate.

Appellants argue that because Barsa does not disclose making silylisocyanurate, the process disclosed in Barsa is not sufficiently analogous to that recited in claim 1 to render it obvious (Br. 9-10).

We are not persuaded by this argument. As discussed above, we agree with the Examiner that the combination of Pepe and Berger is sufficient to render claim 1 *prima facie* obvious. Thus, even assuming for argument’s sake that the compounds prepared in Barsa are not relevant to

the syntheses disclosed in Pepe and Berger, that fact does not undermine the Examiner's prima facie case.

Appellants argue that when the cited references are considered as a whole, they do not provide the specific incentive required to render the claimed process obvious (Br. 10-13). Specifically, Appellants urge that the Examiner improperly relies on *In re Kerkhoven*, 626 F.2d 846 (CCPA 1980), because the court in *Kerkhoven* declined to uphold the rejection of a process claim since the claim “was directed to a process that involved much more than simply combining references” (Br. 11; *see also* 12-13). Appellants argue that the instant facts similarly require more than a simple combination of references, because “the required conditions of the Pepe et al. reference, namely, using alkoxide catalyst including tin containing compounds must be totally eliminated from the reaction medium and the conditions changed to meet the limitations in the appealed claims” (Br. 12).

Therefore, Appellants argue, Pepe “does not provide the suggestion or motivation to eliminate using alkoxide metals including tin containing compounds and substituting the claimed conditions” (*id.* at 13). Instead, Appellants argue, Pepe teaches away from the claimed invention because it teaches that the metal alkoxides and tin compounds are required cracking catalysts (*id.* at 14).

We do not find this argument persuasive. We note that a “patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). Thus, “it can be important to identify a reason that would have prompted a person of

ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.” *Id.*

In recognizing the need to identify a reason for practicing the claimed invention, however, the Supreme Court cautioned that “[t]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents.” *Id.* The Court reasoned that “[w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *Id.* at 1740.

In the instant case, Pepe discloses making a silylisocyanurate using a reaction mixture containing a silylorganocarbamate, a cracking catalyst, and a trimerization catalyst (Pepe, col. 3, ll. 43-48). Pepe discloses that the reaction proceeds by an initial cracking step that converts the silylorganocarbamate to a silylorganoisocyanate intermediate, followed by an in-situ trimerization step in which the isocyanate intermediate is converted to the silylisocyanurate (*id.* at col. 3, ll. 51-58).

Berger discloses that an alternative method of converting Pepe’s silylorganocarbamate starting material to the isocyanate intermediate is to simply heat the reaction mixture under the appropriate conditions, in the absence of cracking catalysts (*see* Berger, col. 4, ll. 6-17). Thus, one of ordinary skill viewing these references in combination would have recognized from Berger that, as a predictable alternative to using Pepe’s

cracking catalysts, one could simply heat an initial reaction mixture containing a silylorganocarbamate and a trimerization catalyst, and thereby generate the isocyanate intermediate via the heat, and ultimately generate the silylisocyanurate in situ via the trimerization catalyst. We therefore do not agree with Appellants that the cited references would have failed to provide the artisan of ordinary skill with sufficient impetus to practice the invention recited in claim 1.

Nor do we agree that Pepe teaches away from practicing the claimed invention. While Pepe discloses that the alkoxide and tin cracking catalysts “facilitate thermal dissociation of the silylorganocarbamate to alcohol and the silylorganoisocyanate” (Pepe, col. 7, ll. 52-54), we do not see, and Appellants do not point to, any disclosure in Pepe suggesting that Berger’s simple heating method would fail to accomplish the cracking step.

Moreover, it is well settled “[n]on-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references. . . . [The reference] must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole.” *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Because Appellants’ “teaching away” argument looks only at Pepe’s teachings regarding the desirability of cracking catalysts, and ignores Berg’s teaching that the cracking step can be performed without alkoxide or tin-containing catalyst, the argument is based on precisely the analysis method rejected in *Merck*.

Appellants argue that, through a misunderstanding of the claimed invention, the Examiner incorrectly states the difference between claim 1

and Pepe (Reply Br. 1-2). We do not agree. The Examiner found that claim 1 “differ[s] from Pepe et al. in avoiding the use of cracking catalyst but us[ing] only ammonium and alkali and alkaline earth metal carboxylates as cracking agent” (*id.*). The Examiner therefore clearly recognized that claim 1 excludes the cracking catalysts used by Pepe.

Appellants argue that Pepe’s failure to mention the combination of elements recited in claim 1, despite the availability of Berger and Barsa to the inventors of the Pepe patent, “can be seen as further evidence that the Appellants[’] invention is not so obvious and that the Examiner has used improper hindsight reconstruction to arrive at the claimed invention” (Reply Br. 5-6).

We are not persuaded by this argument. When evaluating claims for obviousness a “factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. Rigid preventative rules that deny factfinders recourse to common sense, however, are neither necessary under our case law nor consistent with it.” *KSR Int’l v. Teleflex Inc.*, 127 S. Ct. 1727, 1742 (2007). Moreover, as is often stated, any obviousness analysis by necessity involves using hindsight, “but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.” *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971).

As discussed above, we agree with the Examiner that one of ordinary skill would have considered heating in the absence of alkoxide and tin

compounds to be an obvious alternative to Pepe's cracking step, in view of Berger's teaching that those catalysts are not needed when the reaction mixture is heated under the appropriate conditions. Because this conclusion is based only on knowledge imparted by the references, we do not agree that the rejection is improperly based on hindsight.

SUMMARY

Because we agree with the Examiner that claim 1 would have been obvious to one of ordinary skill, we affirm the Examiner's obviousness rejection of that claim. Claims 3-20 fall with claim 1 because they were not argued separately. 37 C.F.R. § 41.37(c)(1)(vii).

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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