UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WILLIAM R. BROWN,
ELBERT F. FESKE,
and
ARTHUR G. MACK,
Appellants

Appeal 2008-3289
Application 10/377,569[1]
Technology Center 1700

Decided: May 23, 2008

Before PETER F. KRATZ, CAROL A. SPIEGEL, and MARK NAGUMO, *Administrative Patent Judges.*

SPIEGEL, *Administrative Patent Judge.*

DECISION ON APPEAL

---

[1] Application 10/377,569 ("the 569 application") was filed 28 February 2003. The real party-in-interest is Albemarle Corporation (BRIEF ON APPEAL, as amended 16 March 2007 ("App. Br."), 1).

I. Statement of the Case

This is an appeal under 35 U.S.C. §134 (2002) from a final rejection of claims 8-40, all the pending claims. We have jurisdiction under 35 U.S.C. § 6(b) (2002). We AFFIRM.

The subject matter on appeal is directed to flame retardant additive compositions of use in flexible polyurethane foams. Claim 8 is illustrative and reads (App. Br. Claims Appendix A1 1, emphasis and bracketed text added):

> 8. In a flexible polyurethane foam composition formed by mixing isocyanate and polyol along with at least one surfactant, at least one blowing agent, at least one catalyst, and reacting the mixture, the improvement which comprises the inclusion in the polymerization formulation of:
>
> a) at least one brominated aromatic diester diol;
>
> b) at least one alkylated triphenylphosphate;
>
> c) at least one hindered amino antioxidant; and
>
> d) at least one phenolic antioxidant in which the phenolic ring is substituted by an alkanoic acid alkyl ester group in which [the] alkanoic acid moiety has <u>in the range of 2 to about 4 carbon atoms</u> and the alkyl group has <u>in the range of about 6 to about 16 carbon atoms</u> in amounts sufficient to provide flame retardancy and scorch resistance to the flexible foam being produced.

The Examiner relies on the following prior art[2] of record as evidence of unpatentability:

Gilman I[3]	US 2003/0040548 A1	Feb. 27, 2003
Gilman II	US 2003/0050354 A1	Mar. 13, 2003
Rose	US 2003/0078325 A1	Apr. 24, 2003

The issues are whether claims 8-40 are (a) unpatentable under 35 U.S.C. § 112, second paragraph (indefinite) and/or (b) unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Rose and either Gilman I or Gilman II (Ans.[4] 3-4).

Since Appellants have not provided separate patentability arguments for any of claims 8-40, we decide this appeal on the basis of claim 8. 37 C.F.R. § 41.37(c)(1)(vii).

II. Opinion

A. Definiteness

Claim definiteness is analyzed "not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art." *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971). The definiteness inquiry "focuses on whether those skilled in the art would understand the scope of the claim when the claim is read in light of the rest of the specification." *Union Pac. Res. Co. v. Chesapeake Energy Corp.*, 236 F.3d 684, 692 (Fed. Cir. 2001).

The Examiner rejected claims 8-40 under 35 U.S.C. § 112, second paragraph (definiteness) (Ans. 3-4). According to the Examiner, "[t]he use

[2] No references to *et al.* are made in this opinion.
[3] Gilman I is published application 10/132,667, which is said to be a divisional of application 10/033,541, which was published as Gilman II.
[4] Examiner's Answer mailed 12 July 2007 ("Ans.").

of 'about' to define the number of carbon atoms within components c) and d) renders the claims indefinite, because it is unclear with respect to exactly what compounds are encompassed by the language" (Ans. 3).

Appellants argue guidance to establish what compounds are encompassed by claimed components c) and d) is provided in the specification at paragraphs 20 and 21 (App. Br. 7).

Paragraphs 20 and 21 of the 569 specification read:

> Component c)
>
> **[0020]** This component is at least one hindered amine antioxidant which preferably is a liquid . . . in which the alkyl ring substituent or substituents each contain about 4-9 carbon atoms. One such product is Irganox® 5057 antioxidant . . . which is a mixture N-phenylbenzeneamine (*i.e.*, diphenylamine) . . . with 2,4,4-trimethylpentene. A similar product is . . . Durad® AX 57. Non-limiting examples of other suitable liquid hindered amine antioxidant components include Durad AX 55 (mixture of tertiary octylated and styrenated diphenylamine), and Durad AX 59 (nonylated diphenylamine). Also suitable are hindered-amine antioxidants such as 4-benzoyloxy-2,2,6,6,-tetramethylpiperidine, bis(2,2,6,6-tetramethyl-4-piperidinyl)sebacate, bis(1-octyloxy-2,2,6,6-tetramethyl-4-piperidinyl)sebacate, bis(1,2,2,6,6-pentamethyl-4-piperidinyl)sebacate, dimethyl succinate-1-(2-hydroxyethyl)4-hydroxy-2,2,6,6-tetramethylpiperidine and condensed products thereof, and 8-acetyl-3-dodecyl-7,7,9,9-tetramethyl-1,3,8-triazaspyrro[4,5]decane-2,4-dione. . . Use of Irganox® 5057 is preferred.
>
> Component d)

> **[0021]** One or more liquid phenolic antioxidants in which the phenolic ring is substituted by an alkanoic acid alkyl ester group are used in this component. . . . In other words, this substituent group can be depicted as $-R^1COOR^2$, where R^1 is alkylene having 1-5 carbon atoms and R^2 is alkyl having in the range of about 6 to about 16 carbon atoms, and preferably in the range of about 6 to about 10 carbon atoms. Mixtures of two or more such alkyl ester substituted phenolic antioxidants can be used. One example of a useful compound of this type is Irganox® 1135 antioxidant . . . which . . . is . . . a C_7-C_9 branched alkyl ester of 3,5-bis(1,1-dimethylethyl)-4-hydroxybenzenepropionic acid. Other non-limiting examples . . . include C_7-C_9 branched alkyl ester of 3-tert-butyl-5-methyl-4-hydroxylphenylpropionic acid, C_7-C_9 branched alkyl ester of 3,5-diisopropyl-4-hydroxylphenylpropionic acid, C_6-C_8 branched alkyl ester of 3-tert-amyl-5-methyl-4-hydroxylphenylpropionic acid, C_8-C_{10} branched alkyl ester of 3,5-di-tert-butyl-4-hydroxylphenylacetic acid, C_7-C_8 branched alkyl ester of 3-tert-butyl-5-methyl-4-hydroxyphenylbutyric acid, and C_6 branched alkyl ester of 3-tert-amyl-5-methyl-4-hydroxyphenylhexanoic acid.

The Examiner noted that paragraphs 20 and 21 did not provide an exact definition of "about" (Ans. 5-6). However, the Examiner did not explain why a skilled artisan would not have understood the scope of claims 8-40 when read in light of the 569 specification, particularly paragraphs 20 and 21.

Consequently, we reverse the rejection of claims 8-40 under § 112, second paragraph (definiteness).

B. Obviousness

A claimed invention is not patentable if it would have been obvious to a person having ordinary skill in the art. 35 U.S.C. § 103(a); *KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727 (2007); *Graham v. John Deere Co.*, 383 U.S. 1 (1966). Facts relevant to a determination of obviousness include (1) the scope and content of the prior art, (2) any differences between the claimed invention and the prior art, (3) the level of skill in the art, and (4) any relevant objective evidence of obviousness or non-obviousness. *KSR*, 127 S.Ct. at 1734; *Graham*, 383 U.S. at 17-18. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 127 S.Ct. at 1739. All that is required for obviousness under 35 U.S.C. § 103 is a reasonable expectation of success. *In re O'Farrell*, 853 F.2d 894, 904 (Fed. Cir. 1988).

The Examiner rejected claims 8-40 under 35 U.S.C. § 103(a) as obvious over the combined teachings of Rose and either Gilman I or Gilman II (Ans. 4).

Gilman I and II are directed to flame retardant flexible polyurethane foam compositions (Gilman I ¶¶ 3 and 9; Gilman II ¶¶ 3 and 9). Tables 2 of Gilman I and II disclose a polyurethane foam composition made by mixing an isocyanate (PAPI 901), polyols (PPG-425, PPG-1000, PPG-2000), a surfactant (L-5617), a catalyst, a flame retardant (ANTIMONY TRIOXIDE), brominated aromatic diester diols (SAYTEX BT93, PHT4-DIOL), a hindered amine antioxidant (IRGANOX 5057), and a phenolic antioxidant substituted by an alkanoic acid ester group (IRGANOX 1135) (Gilman I and II, Tables 1 and 2; ¶¶ 46-47). Gilman I and II further disclose adding small amounts of blowing agent (Gilman I ¶ 55; Gilman II ¶ 55).

The Examiner found that Gilman I and II differed from the claimed invention in failing to disclose "the use of alkylated triphenylphosphate (appellants' component (b))" (Ans. 4).

According to Rose, "higher alkylated triaryl phosphates, having lower phosphorus content" than previously used "offer superior flame retardant performance in flexible polyurethane foam, combining improved efficiency with a lower propensity to fog" (Rose ¶¶ 8, 10). "[P]olyurethanes containing blends of the higher alkylated mixtures of triaryl phosphate esters and halogen flame retardants exhibit better flammability test performance than blends of conventional lower alkylated triaryl phosphates and halogenated flame retardants" (Rose ¶ 23).

The Examiner concluded that in view of Rose's teachings

> that alkylated triaryl phosphates are suitable flame retardants for combination with brominated phthalates, are liquid, and reduce fogging within flexible polyurethane foams . . . one of ordinary skill in the art would have been motivated to substitute alkylated triaryl phosphate flame retardants for the solid antimony trioxide flame retardants of . . . [Gilman I and II], so as to obtain more homogeneous and compatibilized reaction mixtures that are more easily processed and still display the low-fogging characteristics of the antimony based system. [Ans. 5.]

Appellants argue not only that neither Gilman I/II nor Rose suggests their combination, but also that they teach away from combination with each other (App. Br. 9; Reply Br. 8). According to Appellants, the flame retardants in Gilman I/II are for high-density flexible polyurethane foams, while those of Rose are for low-density flexible polyurethane foams (App.

Br. 10; Reply Br. 6-7). "Appellants submit that the concept that a particular flame retardant would work with any polyurethane foam is unsubstantiated" (Reply Br. 5). Appellants further argue that Rose teaches away from using alkylated triaryl phosphate esters with halogenated compounds (App. Br. 10; Reply Br. 6-7).

None of Appellants' arguments are persuasive. While the Supreme Court recently rejected a rigid application of the teaching, suggestion, or motivation test in an obviousness inquiry in *KSR*, 127 S.Ct. at 1730, the Court acknowledged the importance of identifying "a reason that would have prompted a person of ordinary skill in the art to combine the elements in the way the claimed new invention does[,]" *id.* at 1731, to avoid hindsight reconstruction of the claimed invention. Here, as explained by the Examiner, one of ordinary skill in the art would have been motivated to substitute Rose's alkylated triaryl phosphate flame retardants for Gilman I/II's solid antimony trioxide flame retardants to obtain more homogeneous and compatibilized reaction mixtures that are more easily processed and still display the low-fogging characteristics of the antimony based system. The proper inquiry under § 103 is what the collective teachings of the prior art would have reasonably suggested to one of ordinary skill in the art. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

Furthermore, Gilman I/II and Rose are directed to flame retardant flexible polyurethanes and their manufacture (Gilman I/II ¶3; Rose ¶30). Gilman I/II and Rose are concerned with reducing fogging in flexible polyurethane foams (Gilman I/II ¶¶45-46; Rose ¶ 6). Gilman I/II and Rose use flame retardants which are compatible with halogenated additives (Gilman I/II Table 2; Rose ¶23). Gilman I/II and Rose produce flame

retardant foams by combining an isocyanate, a polyol, catalysts, surfactants, multiple flame retardants and halogenated additives, such as brominated phthalates (Gilman I/II Table 2 and ¶¶ 64 and 65; Rose ¶¶23-30). Given these similarities in teachings, the preponderance of the evidence indicates that one of ordinary skill in the art would have had a reasonable expectation of success when combining the teachings of the references of obtaining flexible, flame-retardant polyurethane foam compositions.

In particular, Rose expressly teaches combining its higher alkylated triaryl phosphate ester flame retardant with halogenated flame retardants (Rose ¶14). Moreover, although Rose exemplifies production of low density foams in Tables 2 and 7, a prior art disclosure is not limited to its preferred embodiments or specific working examples. *In re Burckel*, 592 F.2d 1175, 1179 (CCPA 1979); *In re Mills,* 470 F.2d 649, 651 (CCPA 1972). Finally, according to Rose, "[k]nown flame retardant additives are volatile or contain volatile components that tend to form an undesirable film on windows as the volatile components are released. This phenomenon is known as fogging." [Rose ¶ 4.] Gilman I/II teach using combinations of low VOC (compounds having 2% or less by weight volatile organic compound levels) flame retardant compositions comprising halogenated components to provide low fogging in the cured composition (Gilman I/II ¶¶ 46-47). Thus, both Gilman I/II and Rose teach how to use halogenated compounds, while preventing/minimizing fogging.

Appellants have not come forward with credible evidence to the contrary. Attorney argument is not a substitute for evidence.

Therefore, we affirm the rejection of claims 8-40 under § 103(a) over the combined teachings of Rose and either Gilman I or II.

III. Order

Upon consideration of the record, and for the reasons given, it is

ORDERED that the decision of the Examiner rejecting claims 8-40 as unpatentable under 35 U.S.C. § 112, second paragraph (definiteness) is REVERSED;

FURTHER ORDERED that the decision of the Examiner rejecting claims 8-40 as unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Rose and either Gilman I or Gilman II is AFFIRMED; and,

FURTHER ORDERED that 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).

AFFIRMED

QG

Edgar Spielman
ALBEMARLE CORPORATION
451 Florida Blvd.
Baton Rouge, LA 70801