



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/103,897	06/13/2016	Tianhua Ding	13PLAS0113-US-PCT	1401
140646	7590	02/04/2019	EXAMINER	
Cantor Colburn - SABIC General 20 Church Street 22nd Floor Hartford, CT 06103-3207			BUTCHER, ROBERT T	
			ART UNIT	PAPER NUMBER
			1768	
			NOTIFICATION DATE	DELIVERY MODE
			02/04/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTOPatentMail@cantorcolburn.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TIANHUA DING, YING XI, LIN CHEN, HONGTAO SHI, and
DAKE SHEN

Appeal 2018-002869
Application 15/103,897
Technology Center 1700

Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and
JANE E. INGLESE, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL¹

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the Examiner's decision to finally reject claims 1–4, 10–14, 16, 18, and 19 under 35 U.S.C. § 103(a) as obvious over Hoerold³ in view of Guo⁴, adding

¹ In explaining our Decision, we cite to the Final Office Action of June 2, 2017 (Final Act.), the Appeal Brief of September 15, 2017 (Appeal Br.), and the Examiner's Answer of November 13, 2017 (Ans.).

² Appellant is the applicant, SABIC Global Technologies B.V., which, according to the Appeal Brief, is the real party in interest. Appeal Br. 2.

³ Hoerold et al., US 2013/0210968 A1, published Aug. 15, 2013.

⁴ Jianbing Guo & Kaizhou Zhang, *Effect of POE Grafting Degree and Compatibilization on the Properties of PBT/POE Blends*, 554–56 *Adv. Materials Rsrch.*, 2049–53 (2012).

Ding⁵ to reject claims 7, 8, and 15, adding Peters⁶ to reject claim 17, and adding both Ding and Peters to reject claim 20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

The claims are directed to a composition (*see, e.g.*, claim 1) and an article comprising the composition (*see, e.g.*, claim 18). Claim 1, with the limitations most at issue highlighted, is illustrative:

1. A composition, comprising:

35 to 76 weight percent of a poly(alkylene terephthalate);

2 to 6 weight percent of an impact modifier comprising a polyolefin elastomer comprising an ethylene/1-octene copolymer, and, optionally, a thermoplastic polyester elastomer, provided that the amount of polyolefin elastomer does not exceed 5 weight percent;

10 to 50 weight percent glass fibers; and

14 to 25 weight percent of a flame retardant comprising

5 to 15 weight percent of a metal dialkylphosphinate,

2 to 8 weight percent of a melamine-based flame retardant, and

1 to 6 weight percent of a flame retardant synergist, the flame retardant synergist comprising an organophosphine oxide, an oligomeric or polymeric bis(phenoxy)phosphazene, an organophosphate ester, or a combination thereof;

⁵ Ding et al., US 2011/0071240 A1, published Mar. 24, 2011.

⁶ Peters et al., US 2007/0080330 A1, published Apr. 12, 2007.

wherein all weight percent values are based on the total weight of the composition.

Appeal Br. 12 (claims appendix) (emphasis added).

OPINION

The Rejection of Claims 1–4, 10–14, 16, 18, and 19

We first turn to the Examiner’s decision to reject claims 1–4, 10–14, 16, 18, and 19 under 35 U.S.C. § 103(a) as obvious over Hoerold in view of Guo. Appellant does not argue any claim apart from the others, thus, we select claim 1 as representative for resolving the issue on appeal for this rejection.

There is no dispute that Hoerold teaches flame-retardant polyester compounds including poly(alkylene terephthalate), glass fibers, and the mixture of flame retardants required by claim 1 in amounts overlapping the claimed ranges. *Compare* Appeal Br. 5, *with* Final Act. 3. Nor is there any dispute that Hoerold’s Example 3 teaches a composition containing those components within the ranges required by claim 1. *See* Hoerold Example 3, Table 3 (containing 49.7 wt% polyalkylene terephthalate (polybutylene terephthalate (PBT)), 30 wt% glass fibers, 13.3 wt% metal dialkylphosphinate (aluminum salt of diethylphosphinic acid (DEPAL)), 3.4 wt% melamine-based flame retardant (melamine polyphosphate), and 3.3 wt% bis(phenoxy)phosphazene (SPB 100 phosphazene)).

Appellant and the Examiner further agree that Hoerold mentions an impact modifier as a useful additive. *Compare* Appeal Br. 5, *with* Final Act. 3. As acknowledged by Appellant, Hoerold discloses additives in the amount of 0.1–3 wt% as component (F). Appeal Br. 5; Hoerold ¶ 26.

Component (F) preferably comprises at least one lubricant and mold release agent, but can also comprise further additives including impact modifiers. Hoerold ¶¶ 79–80. Hoerold describes impact modifiers as “very generally copolymers preferably composed of” at least two of a group that includes olefinic monomers such as ethylene. Hoerold ¶ 82. Hoerold, however, does not list 1-octene amongst the olefinic monomers to be included in the copolymer impact modifier. Thus, the Examiner turns to Guo. Final Act. 3–4.

There is no dispute that Guo suggests using a grafted copolymer of poly(ethylene/1-octene) (POE) and maleic anhydride (MAH), which is abbreviated as POE-g-MAH, to toughen polybutylene terephthalate (PBT). *Compare* Appeal Br. 5, with Final Act. 3. The Examiner finds that the ordinary artisan “would have been motivated to have selected the ethylene /1-octene copolymer of Guo as the impact modifier of choice in Hoerold for improved mechanical properties due to the interfacial adhesion between PBT and the ethylene/1-octene copolymer” and because POE was known to impart good UV resistance, mechanical properties, and rheological properties due to its molecular configuration. Final Act. 3.

Appellant contends that the combination of Hoerold and Guo fails to teach or suggest all the limitations of claim 1 because Guo only teaches compositions having 20 wt% POE or POE-g-MAH, which is much higher than the 5 wt% maximum of Appellant’s claim 1. Appeal Br. 5. Appellant also contends that because Hoerold limits additives such as impact modifiers to 0.1–3 wt% of the composition and Guo teaches adding 20 wt% of the impact modifier POE or POE-g-MAH to PBT and Hoerold’s example compositions have higher notched impact strengths than Guo’s blends, the

ordinary artisan would not have selected POE for use in Hoerold's compositions. Appeal Br. 6. Also, Appellant contends that there would have been no reasonable expectation of success due to Guo's teaching of using a higher concentration and the absence of disclosure concerning the effect on flame retardancy. Appeal Br. 6–7.

Weighing the evidence as a whole while taking into account the persuasiveness of Appellant's arguments, we determine a preponderance of the evidence supports the findings of the Examiner. Hoerold teaches limiting additives such as impact modifiers to 0.1–3 wt% of the composition. Hoerold also suggests that impact modifiers containing ethylene-containing copolymers are useable. Hoerold ¶ 82. Thus, the ordinary artisan would have reasonably expected ethylene-containing copolymer-type impact modifiers to be compatible with the flame retardant composition of Hoerold in amounts within the 0.1–3 wt% range specified in Hoerold.

Guo provides evidence that POE and POE-g-MAH were known impact modifiers for use in PBT. Guo § 1 Intro. Although Guo reports on specific 80/20 blends, we agree with the Examiner that those of ordinary skill in the art would have used POE-g-MAH in amounts within the 0.1–3 wt% range as specified in Hoerold for its known function of improving mechanical properties such as impact strength. Although Guo reports on 80/20 PBT/POE and PBT/POE-g-MAH blends, Guo is a research paper investigating the effect of grafting POE with MAH on the mechanical properties of PBT/POE blends. Guo title. Guo investigates 80/20 blends of PBT/POE and PBT/POE-g-MAH with the objective of investigating the effect of changing the graft ratio on mechanical properties including impact strength. Guo is not concerned with obtaining the workable or optimized

concentration of POE and POE-g-MAH in a particular PBT composition or in a flame retardant and glass reinforced PBT such as that taught by Hoerold. The ordinary artisan would have followed the teachings of Hoerold as to concentration when adding POE-g-MAH or POE as an impact modifier to Hoerold's composition and would have performed routine experimentation in the context of Hoerold's composition to obtain the impact modification that would be predictable from the teachings of Guo. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

Appellant has not persuaded us that the Examiner reversibly erred in rejecting claims 1–4, 10–14, 16, 18 and 19 as obvious over Hoerold in view of Guo.

The Rejection of claims 7, 8, and 15

To reject claims 7, 8, and 15, the Examiner adds Ding. Final Act. 5–6.

Claim 7 requires the impact modifier of claim 1 further comprise a poly(alkylene iso-/terephthalate)-*b*-poly(alkylene ether). Claim 8 further limits the impact modifier of claim 7. Claim 15 further requires the composition of claim 1 comprise 0.5–3 wt% of a polyetherimide.

In rejecting claim 7, the Examiner acknowledges that Hoerold does not disclose adding poly(alkylene iso-/terephthalate)-*b*-poly(alkylene ether) and relies on the teaching in Ding of adding Hytrel 4056, a poly(alkylene iso-/terephthalate)-*b*-poly(alkylene ether), to a PBT composition also containing phosphorous flame retardants. Final Act. 5.

Appellant contends there would have been no reason to add the copolyesterether of Ding (poly(alkylene iso-/terephthalate)-*b*-poly(alkylene ether)) to the composition of Hoerold and Guo because doing so would not have increased the notched impact strength. Appeal Br. 8. But Appellant's argument ignores the Examiner's stated reason for making the combination, i.e., to increase tensile ductility to a satisfactory level while maintaining the UL94 V0 performance. Final Act. 6. It remains that it was known in the art to add Hytrel 4056 to PBT compositions containing phosphorous flame retardants. Given that fact, we agree with the Examiner that it would have been obvious to the ordinary artisan to so add Hytrel 4056 to Hoerold's similar composition to obtain the known properties of Hytrel 4056 in that composition.

Appellant does not advance any separate arguments against the Examiner's rejection of claims 8 and 15. Appeal Br. 8. Thus, we sustain the Examiner's rejection of claims 7, 8, and 15.

The Rejection of Claims 17 and 20

To reject claims 17 and 20, the Examiner further relies on Peters for a teaching of adding triphenylphosphine oxide for its synergistic effect on flame retardancy when used with phosphine compounds such as the DEPAL compound taught by Hoerold. Final Act. 7–8.

Appellant contends there would have been no reasonable expectation that the flame retardant of Peters, and the observed synergistic effect, would have also been realized in a flame retardant containing the other flame retardant compounds in the amounts of their claim. Appeal Br. 9–10. But Peters specifically states that using the phosphine compound with the phosphorous salt (e.g., DEPAL) will reduce the total amount of flame

retardant required based on the synergistic effect of using the two components together. Peters ¶ 6. Appellant provides no convincing evidence that the presence of other compounds in the composition would have been thought to interfere with the synergistic effect. Thus, Appellant has not persuaded us that the Examiner reversibly erred in finding a reason to include triphenylphosphine oxide along with DEPAL in the composition of Hoerold. We sustain the rejections of claims 17 and 20.

CONCLUSION

We sustain the Examiner's rejections.

DECISION

The Examiner's decision is affirmed.

TIME PERIOD FOR RESPONSE

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).

AFFIRMED