

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* GARY S. METCALF  
and WILLIAM E. WHITE

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Appeal No. 2006-1792  
Application 10/329,665

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ON BRIEF

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Before PAK, WARREN and GAUDETTE, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

*Decision on Appeal*

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner finally rejecting claims 1 through 3 and 5 through 35, all of the claims in the application.

Claim 1 illustrates appellants' invention of a method of insulating a structure of a rocket motor, and is representative of the claims on appeal:

1. A method of insulating a structure of a rocket motor, comprising:  
disposing at least one layer of a curable ablative insulating material on at least one surface of a rocket motor structure, the curable ablative insulative material comprising acrylonitrile butadiene rubber, zinc borate, phenol formaldehyde resin, zinc oxide, tetramethyl thiuram disulfide, and stearic acids; and  
curing the at least one layer of the curable ablative insulative material.

The references relied on by the examiner are:

Whelan	3,663,496	May 16, 1972
Duryea	4,820,576	Apr. 11, 1989
Russell	4,959,110	Sep. 25, 1990
Brownell et al. (Brownell) (published World Intellectual Property Organization Application)	WO 94/25267	Nov. 10, 1994
Yasuma (published unexamined Japanese patent application)	08-134327 A	May 28, 1996
Nanaumi (published unexamined Japanese patent application)	10-330583 A	Dec. 15, 1998

Phyllis A. Lyday (Lyday), "Boron," Mineral Yearbook, USGS, pp. 1-11 (1995).

The examiner has rejected appealed claims 1 through 3 and 5 through 35 under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art in the written description in the specification ([0020] through [0025]) in view of Whelan, Russell, Lyday and any one of Brownell, Duryea, Nanaumi or Yasuma (answer, pages 3-10).

Appellants argue claim 1 with respect to the grouping of claims 1 through 3, 5 through 14, 16 through 32, 34 and 35, and claim 15 with respect to the grouping of claims 15 and 33 (brief, pages 7 and 14). Accordingly, we decide this appeal based on these claims 1 and 15. 37 CFR § 41.37(c)(1)(vii) (September 2004).

We affirm.

We refer to the answer and to the brief and reply brief for a complete exposition of the positions advanced by the examiner and appellants.

#### *Opinion*

We have carefully reviewed the record on this appeal and based thereon find ourselves in agreement with the supported position advanced by the examiner that, *prima facie*, the claimed method of insulating a structure of a rocket motor encompassed by appealed claims 1 and 15 would have been obvious over the combined teachings of the admitted prior art, Whelan, Russell, Lyday, Brownell, Duryea, Nanaumi and Yasuma to one of ordinary skill in this art at the time the claimed invention was made. Accordingly, since a *prima facie* case of obviousness has been established by the examiner, we again evaluate all of the evidence of obviousness and nonobviousness based on the record as a whole, giving due consideration to the weight of

appellant's arguments in the brief and reply brief. *See generally, In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

We agree with the examiner's findings of fact from the references and conclusions of law based on this substantial evidence as set forth in the answer, to which we add the following for emphasis.

The principal issue in this appeal is whether one of ordinary skill in this art would have found in the combined teachings of the admitted prior art and the applied references the motivation to interchange the powdered boric acid in the prior art curable ablative insulative material acknowledged in specification Table 1 ([0021]) with zinc borate in the reasonable expectation of obtaining a curable ablative insulative material which can be disposed as at least one layer on at least one surface of a rocket motor structure and cured to form an insulative layer on said surface as known for the acknowledged prior art curable ablative material.

Appellants submit that the admitted prior art does not identify boric acid as a flame retardant and neither Whelan nor Russell suggest adding a flame retardant to the admitted prior art composition (brief, page 9; reply brief, pages 4-5). In this respect, Appellants contend that "[a]t most, the Admitted Art suggests the use of boric acid in a material composition used as an insulative material with rocket components" and thus, "there is no disclosure that boric acid may be substituted with another 'flame retardant' material" which supports the examiner's position (reply brief, pages 4-5). Appellants further submit that although the combined teachings of Lyday, Brownell, Duryea, Nanaumi and Yasuma disclose that both zinc borate and boric acid can be used as flame retardants, such disclosure would not have suggested "that a 'flame retardant' must be used in an insulative material for rocket motor linings and rocket nozzles," and thus there is no suggestion or motivation to combine these references with the admitted prior art, Whelan, Russell (reply brief, pages 5-8; brief, pages 10-14). In this respect, appellants point out that "while Lyday teaches that zinc borate is widely used as a flame retardant in plastics, Lyday does not provide examples of plastic compositions in which the zinc borate is used," and that Brownell, Duryea, Nanaumi and Yasuma teach the use of zinc borate as a flame retardant but would not have suggested using the same in a composition similar to that claimed (brief, pages 10-11). Appellants also argue that the nature of the problem solved by appellants is "to

create an ablative material for use in rocket motors” which is not the problem addressed by any of Lyday, Brownell, Duryea, Nanaumi and Yasuma which would not have disclosed ablative compositions (*id.*, pages 12-13). With respect to claim 15, Appellants submit that the amount of boric acid used in the admitted prior art composition would not have suggested the amount of zinc borate to be used in such composition because of the difference in molecular weight of the compounds (*id.*, pages 14-15).

Appellants further submit that the claimed composition is disclosed in the written description in the specification to provide “surprising results” with respect to slowing the material aging rate and producing less water during the curing process which results in fewer failures in material and may reduce unwanted voids in the material, respectively, and alleges that these results are “unexpected” (reply brief, pages 8-9; see specification, [0072]-[0073]).

The Examiner maintains that one of ordinary skill in this art following the combined teachings of Lyday, Brownell, Duryea, Nanaumi and Yasuma would have used zinc borate as a flame retardant in plastic compositions (answer, page 8). The examiner finds that “in the art of flame retardants, it was known that boric acid was a common flame retardant material associated with cellulose products while zinc borate was a common flame retardant material associated with plastics as evidenced by Lyday,” and Brownell, Duryea, Nanaumi and Yasuma would have “suggested that zinc borate would have been added as a flame retardant’ to phenolic based compositions (*id.*, pages 8-9). On this basis, the examiner determines that one of ordinary skill in the art would have used zinc borate in place of boric acid in the admitted prior art composition because “zinc borates were commonly employed with phenolic resins (the main thermosetting component of the mixture used for insulation) in the process of lining a rocket motor nozzle” disclosed by Whelan and Russell (*id.*, page 9). With respect to claim 15, the examiner determines that the “specific amounts of [zinc borate] would have been determined by routine experimentation (*id.*, page 10). With respect to appellants’ arguments, the examiner contends that one of ordinary skill in the art would have been motivated to substitute zinc borate for boric acid because zinc borate was successfully used as a flame retardant in phenolic resin compositions by Brownell, Duryea, Nanaumi and Yasuma, and thus would have reasonably expected that the substitution of zinc borate for boric acid in the admitted prior art composition would have been recognized as the interchange of two materials which are known to be

equivalently useful as flame retardants (*id.*, page 12). The examiner submits that in view of the references, one of ordinary skill in the art would have expected that zinc borate “would have worked adequately in place of the boric acid” in the admitted prior art composition (*id.*, pages 13-14). The examiner further maintains that the determination of the amount of zinc borate to use would have been determined by one of ordinary skill in the art through routine experimentation (*id.*, pages 15-16).

We find substantial evidence in the record supporting the examiner’s position. We cannot agree with Appellants that one of ordinary skill in this art would not have recognized that powdered boric acid was present in the admitted prior art ablative insulative composition for a rocket motor for its well known function as a flame retardant, given the known environment of a rocket motor (see specification, e.g., [0003]). Indeed, appellants have not established that this person would have reasonably considered boric acid to serve another function in that composition. On this basis alone, we agree with the examiner that, *prima facie*, one of ordinary skill in this art would have substituted zinc borate for boric acid in the admitted prior art ablative insulative composition on the basis that each is a known boron containing flame retardant as evinced on this record by Lyday and by Nanaumi, in the reasonable expectation of obtaining an ablative insulative composition with the same or similar properties which would perform in the known methods of insulating a rocket motor evidenced by Whelan and Russell in the same or similar manner since all other ingredients of the compositions are the same. We are reinforced in our view by the additional evidence in Lyday that zinc borate is more suited as a flame retardant in plastics than boric acid, the further evidence in Brownell, Duryea, Nanaumi and Yasuma adduced by the Examiner that zinc borate is useful as a flame retardant in compositions containing phenolic resins, and that Nanaumi would have disclosed that both of these boron compounds can be used in such compositions for that purpose. With respect to claim 15, we agree with the examiner that one of ordinary skill in this art would have determined the workable or optimum range for zinc borate in the composition. *See In re Aller*, 220 F.2d 454, 456-58, 105 USPQ 233, 235-37 (CCPA 1955) (“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”).

Accordingly, we determine that one of ordinary skill in this art routinely following the combined teachings of the admitted prior art, Whelan, Russell, Lyday, Brownell, Duryea, Nanaumi and Yasuma would have reasonably arrived at the claimed invention encompassed by claims 1 and 15, including each and every limitation thereof arranged as required therein, without recourse to Appellants' specification. *See generally, In re Kahn*, 441 F.3d 977, 985-89, 78 USPQ2d 1329, 1334-38 (Fed. Cir. 2006); *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991) (citing *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988)); *In re Keller*, 642 F.2d 413, 425-26, 208 USPQ 871, 881-82 (CCPA 1981); *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 Siebentritt*, 372 F.2d 566, 567-68, 152 USPQ 618, 619 (CCPA 1967) (express suggestion to interchange methods which achieve the same or similar results is not necessary to establish obviousness); *see also In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d 1673, 1680-81 (Fed. Cir. 1988) ("Obviousness does not require absolute predictability of success. . . . There is always at least a possibility of unexpected results, that would then provide an objective basis for showing the invention, although apparently obvious, was in law nonobvious. [Citations omitted.] For obviousness under § 103, all that is required is a reasonable expectation of success. [Citations omitted.]").

We are not persuaded otherwise by Appellants' arguments. Contrary to Appellants' contentions, the Examiner has established that one of ordinary skill in this art would have combined the references as applied on the basis the disclosures therein address the matter of flame retardants in compositions containing phenolic resins which is the kind of resin contained by the admitted prior art composition. *See generally, Kahn*, 441 F.3d at 985-89, 78 USPQ2d at 1334-38. Furthermore, the suggestion to combine and modify prior art to obtain a particular result does not have to be predicated on solving a problem, and can result from the exercise of ordinary skill by one in the art in order to obtain the same or similar result. *See generally, Siebentritt*, 372 F.2d at 567-68, 152 USPQ at 619. With respect to claim 15, the determination of a workable or optimum amount of an ingredient in a composition by one of ordinary skill in the art would have been based on the contribution of the ingredient to the purpose served by the composition as determined by routine experimentation, and not on the molecular weight of the ingredient. *See Aller*, 220 F.2d at 456-58, 105 USPQ at 235-37.

Finally, appellants have not carried their burden of submitting an explanation or evidence establishing the practical significance of the “surprising results” relied on vis-à-vis the teachings of the applied references and why the results would have been considered unexpected by one of ordinary skill in this art. *See generally, 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). Indeed, one of ordinary skill in this art would have recognized that boric acid and zinc borate contain and lose water differently, and thus it is not apparent on this record that the results reported by Appellants are more than the results reasonably expected by this person from the use of zinc borate in place of boric acid.

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 the admitted prior art, Whelan, Russell, Lyday, Brownell, Duryea, Nanaumi and Yasuma with appellants’ countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1 through 3 and 5 through 35 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The examiner’s decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (2005).

*AFFIRMED*

