

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 31

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT A. KEPPEL, SCOTT F.
MITCHELL and MICHAEL J. MUMMEY

Appeal No. 94-3287
Application 07/835,152¹

ON BRIEF

Before KIMLIN, GARRIS and WARREN, Administrative Patent Judges.
GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal from the final rejection of claims 1 through 11, 26² and 27. The only other claims remaining in the application, which are claims 12 through 25, stand

¹ Application for patent filed February 13, 1992.

² Claim 26 contains a minor informality in that the subject referred to by the phrase "about 1.7%" is not specifically identified. Consistent with the appellants' specification including appealed claim 1, we interpret the claim 26 phrase "about 1.7%" as though it read --about 1.7% by volume n-butane--. This informality should be corrected in any further prosecution that may occur.

Appeal No. 94-3287
Application 07/835,152

withdrawn from further consideration by the examiner as being directed to non-elected inventions.

The subject matter on appeal relates to a process for the manufacture of maleic anhydride in a reactor, the feed flow channel of which contains an autoignition suppression agent in contact with the n-butane and air reactant mixture. The agent comprises an ignition inhibiting component selected from the group consisting of acid sites and trivalent phosphorus. This appealed subject matter is adequately illustrated by independent claims 1, 26 and 27 which read as follows:

1. In a process for the manufacture of maleic anhydride by catalytic oxidation of n-butane over a vanadium/phosphorus oxide catalyst comprising mixing n-butane with an oxygen-containing gas and passing the resulting mixture over said catalyst in a catalytic reaction zone, the improvement which comprises:

mixing n-butane and air in a reactor feed flow channel to produce a mixture containing at least about 1.7% by volume n-butane at a pressure of at least about 20 psig, said feed flow channel containing an autoignition suppression agent in contact with said mixture, said autoignition suppression agent comprising an ignition inhibiting component selected from the group consisting of acid sites and trivalent phosphorus.

26. In a process for the manufacture of maleic anhydride by catalytic oxidation of n-butane over a vanadium/phosphorus oxide catalyst comprising mixing n-butane with air and passing the resulting mixture over said catalyst in a catalytic reaction zone, the improvement which comprises:

Appeal No. 94-3287
Application 07/835,152

mixing n-butane and air in a reactor feed flow channel having a surface to volume ratio of not greater than about 4 m^{-1} to produce a mixture containing at least about 1.7%, said feed flow channel containing an autoignition suppression agent in contact with said mixture, said autoignition suppression agent comprising an ignition inhibiting component selected from the group consisting of acid sites and trivalent phosphorus.

27. In a process for the manufacture of maleic anhydride by catalytic oxidation of n-butane over a vanadium/phosphorus oxide catalyst comprising mixing n-butane with air and passing the resulting mixture over said catalyst in a catalytic reaction zone, the improvement which comprises:

mixing n-butane and air in a reactor feed flow channel to produce a mixture containing at least about 1.8% by volume n-butane and hydrocarbons having a boiling point higher than n-butane in a proportion of at least about 2% by volume based on n-butane content, said feed flow channel containing an autoignition suppression agent in contact with said mixture, said autoignition suppression agent comprising an ignition inhibiting component selected from the group consisting of acid sites and trivalent phosphorus.

The reference relied upon by the examiner as evidence of obviousness is:

Umemura et al. (Umemura)
(Japanese Kokai)

54-46713

Apr. 12, 1979

Appeal No. 94-3287
Application 07/835,152

All of the claims on appeal are rejected under 35 USC § 103 as being unpatentable over Umemura.³

We refer to the Briefs and to the Answers for a complete exposition of the respective viewpoints advocated by the appellants and the examiner concerning the above-noted rejection.

For the reasons which follow, we will not sustain this rejection.

The problem addressed by the here claimed invention relates to autoignition in a process for the manufacture of maleic anhydride. This problem is solved by providing the feed flow channel of the process reactor with an ignition inhibiting component selected from the group consisting of acid sites and trivalent phosphorus which acts as an autoignition suppression agent. Specifically, the agent is deposited on the interior wall of the feed flow channel and suppresses autoignition of the n-

³ The examiner dropped his previous rejection in the final Office action based on Umemura under 35 USC § 102 in favor of a new rejection in the Answer based on Umemura under 35 USC § 103. As correctly indicated on pages 15 and 16 of the Reply Brief, the examiner on pages 2 and 3 of the Answer has erroneously identified claim 27 as being previously rather than newly rejected under § 103. However, this error is harmless since the appellants have not been prejudiced thereby.

Appeal No. 94-3287
Application 07/835,152

butane/air mixture flowing therethrough. As a result of this suppression, the appellants' claimed process can be operated under certain process conditions (e.g., higher pressures such as 20 psig to thereby effect greater yields) which would promote an autoignition problem in the absence of the aforementioned agent.

Although Umemura is directed to a process for the manufacture of maleic anhydride, this reference does not address the problem of autoignition. Instead, Umemura is concerned with a drawback arising from use of a carbon steel reactor in a maleic anhydride process. This drawback involves the oxidation of hydrocarbon reactant and maleic anhydride product on the interior wall of such a reactor thereby resulting in low yield. According to Umemura, this drawback is eliminated by treating the interior of the carbon steel reactor with a phosphorus compound such as a certain phosphate, phosphine, or phosphite compound. Umemura characterizes his invention with the following language in the first full paragraph on page 3 of the translation copy:

Regarding the method for manufacturing maleic anhydride using the above-mentioned carbon steel reactor, this invention provides an extremely simple and effective method for treatment of the reactor that makes the manufacture of high yields of maleic anhydride possible with virtually no wasteful

Appeal No. 94-3287
Application 07/835,152

consumption of unsaturated or saturated hydrocarbon, the raw material, and maleic anhydride, the product, caused during the reaction on the inside wall of the reactor.

The appealed claims distinguish over Umemura by limitations involving the previously mentioned certain process conditions. More specifically, independent claims 1, 26 and 27 respectively contain limitations directed to certain pressures, surface to volume ratios, and hydrocarbon mixtures which are not taught by Umemura. The examiner at least implicitly concludes that it would have been obvious to operate Umemura's process under these conditions. We cannot agree.

To support an obviousness conclusion under § 103, a reference must contain enabling methodology for practicing the claimed invention, a suggestion to modify the prior art to practice the claimed invention, and evidence suggesting that it would be successful. In re O'Farrell, 853 F.2d 894, 902, 7 USPQ2d 1673, 1680 (Fed. Cir. 1988). In the case before us, the Umemura reference evidence adduced by the examiner does not provide the suggestion and expectation of success which are essential components of a proper obviousness conclusion.

Concerning the issue of suggestion, we emphasize that Umemura contains no disclosure regarding the specific, previously

Appeal No. 94-3287
Application 07/835,152

mentioned process conditions claimed by the appellants. For all we know based on this reference evidence, these conditions are both novel and nonobvious.

Moreover, it is our view that the Umemura reference fails to provide any basis for a reasonable expectation of success with respect to operating a maleic anhydride process under the aforementioned conditions. In this regard, it is important to appreciate that these process conditions tend to create the autoignition problem addressed by the appellants. Absent a recognition of this problem, no basis exists for reasonably expecting that the problem would be successfully avoided via Umemura's invention.

Apparently, the examiner believes that the drawback taught by Umemura of manufacturing maleic anhydride in a carbon steel reactor "is generic to the auto-ignition problem recited in the instant claims" (Answer, page 2) and accordingly that "[o]ne of ordinary skill in the art from reading the reference would know that coating the entire surface of the reactor where n-butane and oxygen are in contact at high temperature would lead to the [appellants'] disclosed advantages" (Supplemental Answer, page 2). However, the examiner has proffered utterly no evidence or scientific reasoning in support of this belief. As a

Appeal No. 94-3287
Application 07/835,152

consequence, the record before us is evidentially inadequate to support a conclusion that one with ordinary skill in the art would have regarded Umemura as relating to the autoignition problem under consideration and concomitantly as providing a reasonable expectation of successfully overcoming this problem.

For the above stated reasons, the examiner's § 103 rejection of claims 1 through 11, 26 and 27 as being unpatentable over Umemura cannot be sustained.

The decision of the examiner is reversed.

REVERSED

)	
EDWARD C. KIMLIN)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
BRADLEY R. GARRIS)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
CHARLES F. WARREN)	

Appeal No. 94-3287
Application 07/835,152

Administrative Patent Judge)

Russell R. Stolle
Huntsman Corporation
P.O. Box 15730
Austin, Texas 78761