

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

Paper No. 14

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RICHARD L. ANDERSON
and
BRUCE B. RANDOLPH

Appeal No. 1998-2622
Application No. 08/530,684

ON BRIEF

Before PAK, WALTZ, and PAWLIKOWSKI, **Administrative Patent Judges**.

WALTZ, **Administrative Patent Judge**.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 11, which are the only claims pending in this application.

Appellants disclose that processing of an alkylation reactor effluent produced by the catalytic alkylation of olefins by isoparaffins using a hydrogen halide catalyst in a

sulfone diluent requires the subsequent removal of the sulfone from the hydrocarbon stream, i.e., reduction of the amount of sulfone from about 4000 ppmw to less than about 100 ppmw (specification, pages 1-2). According to appellants, their invention is directed to a method of removing sulfone¹ from a liquid hydrocarbon stream including the steps of mixing the liquid hydrocarbon stream with liquid hydrofluoric acid (HF) and separating this admixture into a hydrocarbon phase and an acid phase, where the hydrocarbon phase has a concentration of sulfone less than the concentration of sulfone in the liquid hydrocarbon stream (Brief, page 2).

Claim 1 is illustrative of the subject matter on appeal and a copy of this claim is reproduced below:

1. A method for removing sulfone from a liquid hydrocarbon stream, said liquid hydrocarbon stream having a concentration of sulfone in the range of from about 150 ppmw to about 4000 ppmw, said method comprises the steps of:

mixing within a mixing zone said liquid hydrocarbon stream with a liquid acid, said liquid acid comprising HF, to form an admixture of said liquid hydrocarbon stream and said liquid acid;

¹Appellants disclose a general formula defining the sulfones suitable for use in their invention (specification, page 9, l. 11 *et seq.*).

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passing said admixture to a phase separation zone wherein said admixture is separated into at least two liquid phases including a hydrocarbon phase, having

a concentration of sulfone less than said concentration of sulfone in said liquid hydrocarbon stream, and an acid phase, having a concentration of sulfone.

The examiner has relied upon the following reference as evidence of obviousness:

Siskin et al. (Siskin) 3,957,628 May 18, 1976

Claims 1 through 11 stand rejected under 35 U.S.C. § 103 as unpatentable over Siskin (Answer, page 3). We reverse the examiner's rejection for reasons which follow.

OPINION

The examiner finds that Siskin teaches a process for removing organic sulfur compounds including those containing oxygen from a liquid hydrocarbon feedstock comprising the steps of contacting the liquid hydrocarbon feedstock with liquid HF in any suitable apparatus followed by separation of the product into two phases using any suitable method, where one phase is a substantially sulfur-free hydrocarbon raffinate and the second phase is a sulfur-containing HF extract

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(Answer, pages 3-4). The examiner further finds that the difference between Siskin and the claimed subject matter is that Siskin does not specifically teach removal of sulfones (*id.* at page 4).

From these findings, the examiner concludes that it would have been obvious to one having ordinary skill in the art at the time the invention was made "to have modified the process of Siskin to specifically remove sulfone from a hydrocarbon feedstock because Siskin has taught the removal of a general class of organic sulfur compounds containing oxygen which would be recognized by an artisan skilled in the art to include sulfone and with the expectation of achieving similar results." (*Id.*).

Siskin teaches the "virtual quantitative removal of organic sulfur . . . compounds" by contacting a liquid hydrocarbon feedstock with hydrogen fluoride (col. 1, ll. 57-61). Irregardless of the interpretation of the Siskin disclosure of removing organic groups such as oxygen and nitrogen, we agree with the examiner that removal of "organic sulfur compounds" by Siskin is generic to the claimed removal

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of sulfones (see col. 2, l. 51-col. 3, l. 14). However, the mere generic disclosure of removing organic sulfur compounds from a liquid hydrocarbon feedstock is not sufficient to establish a *prima facie* case of obviousness. See *In re Baird*, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994); *In re Jones*, 958 F.2d 347, 350, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992). There must be a showing of a suggestion or motivation to modify the teachings of the reference to the claimed subject matter in order to support an obviousness conclusion. *B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996). This suggestion or motivation may be derived from the prior art reference itself, from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved. See *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996).

Siskin itself only suggests that the organic sulfur compounds may include sulfides, mercaptans, disulfides and

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thiophenes (col. 2, ll. 63-65).² According to appellants, a recently discovered alkylation catalyst mixture contains a hydrogen halide component in a sulfone diluent. After use of this catalyst mixture in the alkylation of olefins by isoparaffins, the alkylate product contains a concentration of sulfone which is undesirable and must be removed because of the use of the alkylate as a gasoline blending material (specification, pages 1-2). On this record, the examiner has not shown, by convincing reasoning or evidence, that sulfones would have been present in the liquid hydrocarbon feedstock of Siskin. Siskin discloses a process for refining sulfur, oxygen and nitrogen contaminated hydrocarbon feedstocks (col. 1, ll. 6-8). Siskin discloses that sulfur compounds are present as impurities in the hydrocarbon feedstocks and must be removed since these impurities tend to poison or deactivate the acidic catalysts used in subsequent reactions such as reforming, alkylation, isomerization and the like (col. 1, ll. 19-29). Therefore, on this record, the examiner has failed to

²All of these classes of compounds disclosed by Siskin contain sulfur only attached to carbon or hydrogen, i.e., they do not contain the -SO₂- functional group.

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show any suggestion or motivation why one of ordinary skill in the art would have modified the process of Siskin to remove sulfone compounds.

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For the foregoing reasons, we determine that the examiner has not established a *prima facie* case of obviousness in view of the reference evidence. Accordingly, the rejection of claims 1 through 11 under 35 U.S.C. § 103 as unpatentable over Siskin cannot be sustained.

The decision of the examiner is reversed.

REVERSED

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CHUNG K. PAK)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
THOMAS A. WALTZ)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
BEVERLY A. PAWLIKOWSKI)	
Administrative Patent Judge)	

TAW:hh

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*RICHMOND PHILLIPS
HITCHCOCK & FISH
P.O. BOX 2443
BARTLESVILLE, OK 74005*