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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 20

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte STEVEN G. SCHON

Appeal No. 1996-2320
Application 08/221,224[1]

ON BRIEF

Before WINTERS, DOWNEY and OWENS, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the examiner's nonfinal, third

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[1] Application for patent filed March 31, 1994.

rejection of claim 1.[2] Claims 2-15, which are the only other claims remaining in the application, have been indicated allowable by the examiner.

THE INVENTION

Appellant's claimed invention is directed toward a process for making a product consisting essentially of alkane sulfonic acid and/or alkane sulfonyl chloride in a continuous reactor containing stationary mixing elements to promote plug flow. Claim 1, which is the only claim on appeal, reads as follows:

> 1. A process for the preparation of a product consisting essentially of alkane sulfonic acid, alkane sulfonyl chloride or mixtures thereof comprising continuously reacting a compound of the formula RSX, where X is hydrogen or a radical of the formula-SR^1 and R and R^1 are alkyl groups having one to 20 carbon atoms, with at least a stoichiometric amount of chlorine in a reaction zone free of moving, mechanical agitating means and containing aqueous hydrochloric acid at a reactant feedrate at least sufficient to achieve a vigorous evolution of hydrochloride gas, passing the contents of said reaction zone through, and in contact with stationary mixing elements to promote plug-flow, withdrawing hydrochloride gas, and separately withdrawing said product from the reactor.

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[2] The board has jurisdiction as discussed in *Ex parte Lemoine*, 46 USPQ2d 1432 (Bd. Pat. App. & Int. 1995).

THE REFERENCES

Guertin 3,626,004 Dec. 7, 1971

Koch Engineering Company, Inc. (Koch) brochure, *Static Mixing Technology* 1-12 (1991).

Abstract of Donald M. Marske, "Chlorine contact chamber design. Field evaluation", 120 *Water Sewage Works* 70-77 (1973), 78 *Chemical Abstracts* 245-46, abstract no. 139934m (1973).

THE REJECTION

Claim 1 stands rejected under 35 U.S.C. § 103 as being unpatentable over Guertin in view of Koch and Marske.

OPINION

We have carefully considered all of the arguments advanced by appellant and the examiner and agree with appellant that the aforementioned rejection is not well founded. Accordingly, we reverse this rejection. Under the provisions of 37 CFR § 1.196(b), we enter a new rejection of claims 1-4 and 8-15.

There is no dispute that Guertin discloses all of the

elements of appellant's claim 1 except the use of stationary mixing elements to promote plug flow.

The examiner argues that "Koch teaches that the presence of baffles in a hollow tube reactor will produce mixing, but there is no indication by Koch that such mixing is of the *plug flow* type" (answer, page 3). The examiner, therefore, relies upon Marske.

Marske teaches that in chambers for contacting water sewage with chlorine, longitudinal baffles are more efficient than cross baffles, and plug flow is best achieved with a high length to width ratio. The examiner argues that the references indicate that if Koch's static mixers were placed in Guertin's reactor, mixing would occur, and Marske indicates that this mixing would be plug flow (answer, page 5). Apparently, the examiner overlooked the teaching on page 7 of Koch regarding use of his static mixing units to produce plug flow.

The examiner provides no explanation as to why one of ordinary skill in the art would have desired plug flow in Guertin's reactor, or why, to obtain that plug flow, such a

person would have combined Koch's disclosure of static mixers with Marske's disclosure regarding using a high length to width ratio in a water sewage chlorination chamber to obtain plug flow. It is clear that the motivation relied upon by the examiner for combining the references so as to arrive at appellant's claimed process comes solely from the description of appellant's process in his specification. Thus, the examiner used impermissible hindsight when rejecting the claims. *See W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984); *In re Rothermel*, 276 F.2d 393, 396, 125 USPQ 328, 331 (CCPA 1960). Accordingly, we reverse the examiner's rejection.

Under the provisions of 37 CFR § 1.196(b), we enter the following new ground of rejection.

Claims 1-4 and 8-15 are rejected under 35 U.S.C. § 103 as being unpatentable over Guertin in view of Koch.

Claim 1: Guertin discloses a process for making alkyl sulfonyl chlorides (col. 1, lines 3-4) by continuously reacting a compound of the formula RSX, where X is hydrogen or a radical of the formula SR’ and R and R’ are alkyl groups having one to 20 carbon atoms (col. 1, lines 52-56), with at least a stoichiometric amount of chlorine in a reaction zone free of a mechanical agitation device and containing aqueous hydrochloric acid at a feed rate at least sufficient to achieve a vigorous evolution of hydrochloride gas (col. 1, lines 33-43; col. 2, lines 17-19). The product and hydrochloride gas are separately withdrawn from the reactor (col. 2, line 69 - col. 3, line 7).

Guertin does not disclose use of stationary mixing elements in the reactor to promote plug flow. However, Koch discloses (page 7) that “[s]tatic mixing units provide the radial mixing and plug flow needed to perform continuous chemical reactions.” Koch teaches (page 7) that “[a]n empty pipe makes a poor continuous reactor because the material in the center of the pipe travels at nearly twice the average product velocity, while the material at the wall travels much slower” such that material in the center exits before it is

fully reacted and, because the material at the wall travels so slowly, product can build up on the wall and possibly degrade. Koch teaches that "[b]y inducing radial mixing, the Koch static mixing unit provides plug flow and uniformity in viscosity, molecular weight, temperature, and degree of reaction. This eliminates product buildup while raising throughput and yield." *See id*. Another advantage of Koch's static mixers, Koch discloses, is that "a homogeneous mix is achieved in just a few pipe diameters" (page 9). Koch further teaches that in gas liquid reactions, which is the type in Guertin's process, use of a static mixer breaks the gas into fine bubbles which are uniformly dispersed throughout the liquid such that there is excellent gas-liquid contact in a small volume, and mass transfer efficiency is high (page 12).

Koch, therefore, would have fairly suggested, to one of ordinary skill in the art, using a static mixer in Guertin's reactor so that the benefits of use of a static mixer discussed above, including the benefits resulting from plug flow, are obtained.

Appellant argues that the examples in his specification indicate that his process produces an unexpected result, which is a reduction in undesirable oxidizable impurities (brief, pages 6-7). As indicated in appellant's specification (page 7, lines 5-13), these oxidizable impurities are unreacted components or compounds including intermediates which are produced during the process. Koch's disclosure (page 7) that material in an empty pipe, which was used in appellant's comparative examples, results in unreacted material at the center exiting before it is fully reacted, whereas use of a static mixer produces uniform plug flow, indicates that appellant's observation that less unreacted feed and intermediates exit the reactor when a static mixer is used is an expected result rather than an unexpected result. "Expected beneficial results are evidence of obviousness of a claimed invention, just as unexpected beneficial results are evidence of unobviousness." *In re Skoll*, 523 F.2d 1392, 1397, 187 USPQ 481, 484 (CCPA 1975); *In re Skoner*, 517 F.2d 947, 950, 186 USPQ 80, 82 (CCPA 1975); *In re Gershon*, 372 F.2d 535, 537, 152 USPQ 602, 604 (CCPA 1967).

Claim 2: The above discussion of claim 1 applies to the elements of claim 2 which are in claim 1. In addition, Koch teaches that the static mixers can fit vessels of any size and shape (page 1) and can be made of intersecting corrugated sheets forming open channels (page 2) which direct fluid radially (page 7).

Claim 3: Adjacent Koch static mixers are positioned 90E relative to each other (page 2).

Claim 4: Appellant's statement that the product is *predominantly* alkyl sulfonyl chloride when made at a temperature of about -10 to about 50EC, and contains alkyl sulfonic acid in a major amount when a higher reaction temperature of about 85 to 115EC is used (specification, page 6, lines 16-20), indicates that Guertin's product, which is made at a temperature of about -10 to about 50EC (col. 1, lines 40-41), contains some alkyl sulfonic acid. Guertin's R can be C_{1-20} alkyl, which encompasses C_{1-6}, and Guertin's X can be hydrogen (col. 1, lines 52-55).

Claim 8: Guertin's product is alkyl sulfonyl chloride

(col. 1, lines 3-4). Guertin's R can be C_{1-20} alkyl, which encompasses C_{1-6}, and Guertin's X can be hydrogen (col. 1, lines 52-55).

Claim 9: Guertin's temperature range is about -10 to about 50EC (col. 1, lines 40-41).

Claim 10: Guertin's feed rate range is at least about 0.005 lbmole/hr-ft^3, preferably about 0.005 to about 0.03 lbmole/hr-ft^3 (col. 3, lines 40-46). Depending on the length of the reactor, this range may be lower than appellant's recited range of about 0.5 to about 8.0 lbmole/hr-ft^2. However, the teaching by Koch that use of a static mixer provides "consistent, predictable mixing performance, regardless of flow rate or equipment dimensions" (page 2) would have fairly suggested, to one of ordinary skill in the art, using higher feed rates, such as those recited by appellant, when Guertin's reactor contains a static mixer.

Claim 11: Guertin teaches that R can be methyl (col. 1, line 55).

Claim 12: Appellant's statement that the product is *predominantly* alkyl sulfonyl chloride when made at a

temperature of about -10 to about 50EC, which is the temperature range used by Guertin (col. 1, line 41), but contains alkyl sulfonic acid in a major amount when a higher reaction temperature of about 85 to 115EC is used (specification, page 6, lines 16-20), indicates

that Guertin's product is predominantly alkyl sulfonyl chloride, but contains alkyl sulfonic acid. Guertin's R can be C_{1-20} alkyl, which encompasses C_{1-6}, and Guertin's X can be hydrogen (col. 1, lines 52-55).

Claim 13: The upper limit, i.e., about 50EC, of Guertin's temperature range includes temperatures somewhat in excess of 50EC because "about", as used by Guertin, evidently permits some tolerance. *See In re Ayers*, 154 F.2d 182, 185, 69 USPQ 109, 112, (CCPA 1946).

Claim 14: The limitation recited in this claim would have been fairly suggested to one of ordinary skill in the art for the reason given above regarding claim 10.

Claim 15: Guertin teaches that R can be methyl (col. 1, line 55).

We do not reject claims 5-7 because we do not find in Guertin a disclosure or suggestion of using a reaction temperature of about 85 to about 115EC.

DECISION

The rejection of claim 1 under 35 U.S.C. § 103 over Guertin in view of Koch and Marske is reversed. Under the provisions of 37 CFR § 1.196(b), a new rejection of claims 1-4 and 8-15 has been entered.

REVERSED, 37 CFR § 1.196(b)

SHERMAN D. WINTERS)
Administrative Patent Judge)
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MARY F. DOWNEY) BOARD OF

PATENT

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	)	
	)	
TERRY J. OWENS	)	
Administrative Patent Judge	)	

Robert G. Hoffmann
Elf Atochem North America, Inc.
Patent Department
2000 Market Street
Philadelphia, PA 19103-3222

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