

The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHRISTOPHE NEDEZ,
JEAN-FRANCOIS CHAPAT and
JEAN-LOUIS RAY

Appeal 2007-3383
Application 10/452,939
Technology Center 1700

Decided: September 25, 2007

Before BRADLEY R. GARRIS, PETER F. KRATZ, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 the final rejection of claims 1-6, 8, 9, 12-31, 34, and 38-42. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

INTRODUCTION

Appellants claim a process for eliminating sulphur from a feed containing hydrogen sulphide and minimal traces of benzene, toluene and/or xylene (Specification 1). The method comprises having two reactors in series wherein in each reactor there is a first, protective catalyst followed by a second catalyst (catalyst A) (Specification 6; claims 1 and 38).

Claims 1 and 38 are illustrative:

1. A process for eliminating sulphur from a feed containing hydrogen sulphide, sulphur dioxide, carbon oxysulphide and/or carbon sulphide and a minimal quantity of benzene, toluene and/or xylenes, said process comprising:

introducing said feed into a reaction zone comprising two reactors in series, each reactor containing a bed with a first catalyst, and recovering elemental sulphur and an effluent that is at least partially free of sulphur,

wherein said first catalyst can be the same or different in each reactor and is at least one catalyst containing a support comprising at least one compound selected from the group consisting of alumina, titanium oxide and zirconia, the support further comprising at least one doping element selected from the group consisting of iron, cobalt, nickel, copper and vanadium,

each of said reactors further comprises a bed with a catalyst A which is different from said first catalyst and can be the same or different in each reactor, wherein in each reactor said first catalyst is disposed upstream of catalyst A and acts as a protective layer for said catalyst A, and

wherein said feed contains 50-50,000 volume ppm of benzene, toluene and/or xylenes.

38. A process for eliminating sulphur from a feed containing hydrogen sulphide, sulphur dioxide, carbon oxysulphide and/or carbon sulphide and a minimal quantity of benzene, toluene and/or xylenes, said process comprising:

introducing said feed into a reaction zone comprising two reactors in series, each reactor containing a bed with a first catalyst, and recovering elemental sulphur and an effluent that is at least partially free of sulphur,

wherein said first catalyst can be the same or different in each reactor and is at least one catalyst containing a support comprising at least one compound selected from the group consisting of alumina, titanium oxide and zirconia, the support further comprising at least one doping element selected from the group consisting of iron, cobalt, nickel, copper and vanadium,

each of said reactors further comprises a bed with a catalyst A which is different from said first catalyst, and can be the same or different in each reactor, wherein, in each reactor, said first catalyst is disposed upstream of catalyst A and acts as a protective layer for said catalyst A, and

wherein said feed contains 50-50,000 volume ppm of benzene, toluene and/or xylenes, and said feed contains 200 ppm or less of O₂.

The Examiner relies on the following prior art references as evidence of unpatentability:

Michel	US 3,939,250	Feb. 17, 1976
Tellier	US 4,192,857	Mar. 11, 1980
Voirin	US 4,605,546	Aug. 12, 1986
Burmaster	US 6,776,974 B1	Aug. 17, 2004

The rejections as presented by the Examiner are as follows:

1. Claims 1, 3, 5, 6, 8, 13, 15-22, 28-31 and 34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tellier in view of Burmaster and Michel.
2. Claims 38, 40, and 42 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tellier in view of Burmaster and Michel.

3. Claims 2, 4, 9, 12, 14, 23-27, 39, and 41 are rejected under 35 U.S.C. § 103(a) over Tellier in view of Burmaster, Michel and Voirin.

With regard to claim 1, the Examiner finds that Tellier discloses all that is in claim 1, except for two reactors in series and the feed containing 50-50,000 volume ppm of benzene, toluene and/or xylenes (Answer 5). The Examiner finds that Burmaster discloses that it is known in the sulphur recovery art that aromatic hydrocarbons such as toluene, benzene and xylenes contaminate catalysts and that it is generally desirable to decrease the feed concentration of aromatic hydrocarbons to about 200 volume ppm (Burmaster, col. 3, ll. 4-26; col. 7, ll. 6-9) (Answer 5-6). Moreover, the Examiner finds that Michel discloses that it is known in the sulphur recovery art that the Claus process uses a series of catalytic stages and condensers (Michel, col. 1, ll. 35-45) (Answer 6-7).

Based on these findings the Examiner concludes that it would have been obvious to minimize the amount of benzene, toluene and xylenes in the feed gas as disclosed by Burmaster and to use more than one reactor in series as taught by Michel with Tellier's process of recovering sulphur because Tellier discloses using several reactors in series and to avoid contaminating the catalyst (Answer 6 and 7).

The only difference between claim 1 and claim 38 is the added recitation that the "feed contains 200 ppm or less of O₂." Accordingly, the Examiner applies the same motivation as noted above with regard to claim 1 to the rejection of claim 38 over Tellier in view of Burmaster and Michel. The Examiner further concludes that it would have been obvious in the combination of Tellier in view of Burmaster and Michel to have 200 ppm or

less of O₂ in the feed in view of Tellier's disclosure that "the object of the Tellier invention "is to overcome the disadvantage of the sensitivity of CLAUS catalysts to oxygen . . . in which the traditional catalyst for sulphur production is protected against the **possible** presence of oxygen in the treated gas"" (Answer 8).

Appellants separately argue independent claims 1 and 38. Accordingly, dependent claims 2-6, 8, 9, 12-31, and 34, which directly or ultimately depend on claim 1, stand or fall with claim 1. Dependent claims 39-42, which directly or ultimately depend on claim 38, stand or fall with claim 38.

OPINION

35 U.S.C. § 103(a) REJECTIONS OF INDEPENDENT CLAIMS 1 AND 38 OVER TELLIER IN VIEW OF BURMASTER AND MICHEL

Appellants argue that neither Tellier, Burmaster, nor Michel discloses "a reaction zone comprising two reactors in series, each reactor containing a bed with a first catalyst" or "each of said reactors further comprises a bed with a catalyst A . . . wherein in each reactor said first catalyst is disposed upstream of catalyst A and acts as a protective layer for catalyst A" as recited in claims 1 and 38 (Br. 3). While acknowledging that Tellier discloses the use of a single catalyst bed acting as a protective layer, Appellants further argue that there would have been no motivation to add at least one additional protective layer catalyst bed in such processes because Tellier discloses that a single protective layer catalyst bed is sufficient (Br. 4). Appellants also argue that since Tellier discloses in Example 1 that 99.35 to 99.8% of the oxygen is removed, it would be unnecessary and uneconomical to add additional deoxidation catalyst due to the added cost

and complexity (Br. 6). Appellants contend that Tellier only discloses placing a single bed of protective catalyst (F) before the traditional reactors containing the traditional catalysts (A) (i.e., F-A-A-A arrangement) such that Tellier does not teach using a series of reactors containing both the protective catalyst (F) followed by the traditional catalyst (A) in each reactor (i.e., F-A-F-A arrangement) (Br. 4-5).

Appellants attach to the Brief in the Evidence Appendix a Declaration of Slavik Kasztelan (the Kasztelan Declaration) filed on October 11, 2005 as part of a response to the Examiner's Office Action. Appellants argue that the Kasztelan Declaration establishes a "significantly improved result in the conversion of CS₂" by using the claimed F-A-F-A catalyst arrangement instead of the prior art F-A catalyst arrangement. Appellants argue that the Kasztelan Declaration is commensurate with the claimed invention because the evidence provided in the Kasztelan Declaration is "representative of the advantage of the claimed invention over the closest prior art on the primary point of novelty [i.e., using a F-A-F-A catalyst arrangement instead of single preliminary oxidation step as disclosed by Tellier]" (Br. 7). Appellants also contend that the Kazstelan Declaration compares the claimed invention to the closest prior art, Tellier, in that the F-A catalyst arrangement represented by "Case 1" in the Kasztelan Declaration is representative of Tellier's disclosed invention (Br. 7-8).

Regarding the recitation in claim 38 that the oxygen content of the feed is 200 ppm or less, Appellants argue that the prior art fails to disclose such an oxygen content for the feed gas (Br. 8-9).

We have considered, and are unpersuaded by, Appellants' arguments and the evidence contained in the Kasztelan Declaration for the reasons below.

Tellier discloses that a weak point in the use of catalysts in the Claus process for recovering sulphur is that the catalyst is very sensitive to oxygen in the gas to be processed (Tellier, col. 1, ll. 37-47). Tellier discloses the following two embodiments to address the presence of oxygen: (1) modifying the Claus reactors where the sulphur is formed by replacing part of the traditional catalyst at the reactor inlet by an oxide catalyst containing transition metals, or (2) preceding the traditional Claus reactors with a deoxidation reactor charged with a catalyst containing a transition metal compound (Tellier, col. 2, ll. 12-29). Tellier discloses that the Claus process generally uses several converters (i.e., reactors) in series (Tellier, col. 1, ll. 19-21). Tellier further claims "at least one catalytic reaction zone [i.e., reactor] containing a deoxidation catalyst and a Claus oxide catalyst" (Tellier, claim 1).

Burmester discloses that it is known that Claus installations are susceptible to catalyst fouling and deactivation caused by hydrocarbons, especially aromatic hydrocarbons like benzene, toluene and xylenes (Burmester, col. 3, ll. 4-26).

Michel, like Tellier, discloses that it is known that the Claus reaction generally includes a series of catalytic stages (Michel, col. 1, ll. 35-45).

Based on these disclosures, the applied prior art would have provided motivation for combining Burmester's disclosure to decrease the amount of aromatic hydrocarbons in the feed gas and Michel's use of a series of multiple stages as is known in the Claus process with Tellier's method of

removing sulphur from a gas in order to prevent deactivation of the catalyst by the aromatic hydrocarbons (i.e., benzene, toluene and xylenes) and because use of such multiple stages are known in the Claus process as disclosed by both Michel and Tellier.

Moreover, contrary to Appellants' arguments, Tellier's first embodiment indicates that the "Claus reactors" (i.e., more than one reactor in the series of reactors) are modified to have a first, protecting deoxidation catalyst followed by traditional Claus catalyst (i.e., the series of reactors would have the F-A-F-A catalyst arrangement) (Tellier, col. 2, ll. 12-22). Tellier's claim to "at least one catalytic reaction zone having a deoxidation catalyst and the Claus oxide catalyst" further indicates that Tellier discloses multiple reactors in series having the deoxidation catalyst and the traditional Claus catalyst in each reactor of the series (i.e., the F-A-F-A catalyst arrangement) (Tellier, claim 1).

Regarding claim 38, the additional recitation that the "feed contains 200 ppm or less O₂" is suggested by Tellier. Tellier discloses that the oxygen in the feed may be "up to 5000 vpm" (i.e., zero to 5000 vpm) (Tellier col. 2, ll. 24-26). Moreover, Tellier's disclosure that oxygen is detrimental to the catalysts provides further suggestion to decrease the concentration of oxygen in the feed. Thus, Appellants' argument that the lowest amount Tellier discloses is 800 vpm in Example 8 is not persuasive.

We add that for independent claims 1 and 38, the Examiner relies on Tellier's disclosure to use a series of reactors as providing motivation for using a series of the reactors containing both deoxidation catalyst and traditional Claus catalyst (Answer 7). Michel, while bolstering the Examiner's position that it is known to use multiple catalytic stages in the

Claus process, was used by the Examiner for the disclosure to add condensers with the catalytic stages as required by Appellants' claim 13. In other words, Michel's disclosure of multiple catalytic stages appears to be redundant in view of Tellier's disclosure to use a series of reactors. In any event, we determine that the Examiner has established a *prima facie* case that claims 1 and 38 are obvious over the combination of Tellier in view Burmaster and Michel. Accordingly, Appellants bear the burden of rebutting the Examiner's *prima facie* case. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

Appellants filed the Kasztelan Declaration on October 11, 2005 to rebut the Examiner's *prima facie* case of obviousness presumably by attempting to establish unexpected results.¹ Objective evidence of nonobviousness must be commensurate in scope with the claims which the evidence is offered to support. *In re Clemens*, 622 F.2d 1029, 1036, 206 USPQ 289, 296 (CCPA 1980).

As the Examiner correctly states, the Kasztelan Declaration is not commensurate with the claimed invention (Answer 11). The Kasztelan Declaration is very specific regarding the type and amount of catalyst present in each of the catalyst beds. For example, "Case 2" indicates that the protective catalyst is catalyst C and the second catalyst in the bed is catalyst A, which the declarant indicates are described in Appellants' Specification (Kasztelan Declaration 2). Appellants' Specification describes catalyst C

¹ Appellants have never indicated that the results shown in the Kasztelan Declaration are unexpected. Furthermore, the declarant indicates that the evidence in the Kasztelan Declaration shows that the prior art does not "anticipate" the claimed invention instead of addressing the relevant issue of whether the evidence establishes nonobviousness of the claimed invention.

and catalyst A as being alumina impregnated with iron sulfate (catalyst C) and a TiO₂ catalyst with CaSO₄ (catalyst A), respectively (Specification 7). Furthermore, the Kasztelan Declaration indicates that the amounts of each of the catalysts are present in Reactors 1 and 2 as 50% of the volume (Kasztelan Declaration 2).

In contrast, Appellants' independent claims 1 and 38 do not specify the amount or type of catalyst used (claims 1 and 38). In fact, claims 1 and 38 do not specify the composition of catalyst A (i.e., the second catalyst).

Accordingly, we find the evidence of nonobviousness provided in the Kasztelan Declaration does not outweigh the prima facie case of obviousness established by the Examiner.

Accordingly, we affirm the Examiner's following rejections: (1) the § 103(a) rejection of claims 1, 3, 5, 6, 8, 13, 15-22, 28-31 and 34 over Tellier in view of Burmaster and Michel, and (2) the § 103(a) rejection of claims 38, 40, and 42 over Tellier in view of Burmaster and Michel.

35 U.S.C. § 103(a) REJECTION OVER TELLIER IN VIEW OF BURMASTER, MICHEL AND VOIRIN

Appellants do not separately argue the rejection of dependent claims 2, 4, 9, 12, 14, 23-27, 39, and 41 over Tellier in view of Burmaster, Michel and Voirin. Rather Appellants rely on their arguments made regarding the rejection of claim 1 from which dependent claims 2, 4, 9, 12, 14, 23-27, 39, and 41 ultimately depend.

As noted above, we are unpersuaded by Appellants' arguments and evidence regarding the rejection of claim 1 under § 103(a) over Tellier in view of Burmaster and Michel. Accordingly, we affirm the Examiner's § 103(a) rejection of claims 2, 4, 9, 12, 14, 23-27, 39, and 41 over Tellier in

Appeal 2007-3383
Application 10/452,939

view of Burmaster, Michel and Voirin for the same reasons we affirmed the Examiner's rejection of claim 1.

DECISION

We AFFIRM the Examiner's § 103(a) rejection of claims 1, 3, 5, 6, 8, 13, 15-22, 28-31 and 34 over Tellier in view of Barmaster and Michel.

We AFFIRM the Examiner's § 103(a) rejection of claims 38, 40, and 42 over Tellier in view of Barmaster and Michel.

We AFFIRM the Examiner's § 103(a) rejection of claims 2, 4, 9, 12, 14, 23-27, 39, and 41 over Tellier in view of Burmaster, Michel and Voirin

The Examiner's decision is affirmed.

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)(iv).

AFFIRMED

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Appeal 2007-3383
Application 10/452,939

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