

LLB

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 28

11/11/95

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

MAILED

Ex parte ISRAR UL-HAQUE
and DAVID L. TRIMM

OCT 31 1995

Appeal No. 93-4386
Application 07/887,610¹

**PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES**

HEARD: October 11, 1995

Before JOHN D. SMITH, GARRIS, and WARREN, Administrative Patent Judges.

JOHN D. SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 12 through 19. Claim 12 is representative and is reproduced below:

¹ Application for patent filed May 22, 1992. According to appellants, the application is a continuation of Application 07/743,120, filed August 9, 1991, now abandoned.

Appeal No. 93-4386
Application 07/887,610

12. A process for the production of hydrogen and/or carbon monoxide rich gases by steam reforming of a hydrocarbon feedstock, the process comprising the step of contacting the hydrocarbon feedstock and steam with a catalyst comprising nickel as a main catalytic component, a refractory carrier material for the nickel, and at least one catalytic element for the steam reforming of the hydrogen feedstock, the element being selected from the group consisting of germanium, tin, lead, arsenic, antimony and bismuth.

The references of record relied upon by the examiner

are:

McMahon	3,567,411	Mar. 2, 1971
Sowards	3,666,412	May 30, 1972
Banks et al. (Banks)	4,216,123	Aug. 5, 1980

A reference relied upon by appellants is:

Williams	2,119,566	June 7, 1938
----------	-----------	--------------

Claims 12, 13, 15, and 18 stand rejected under 35 U.S.C. § 102(b) as anticipated by Sowards. Each of the appealed claims also stand rejected under 35 U.S.C. § 103 as unpatentable over Sowards, Banks in view of Sowards, or McMahon in view of Sowards.

Appeal No. 93-4386
Application 07/887,610

We reverse the anticipation rejection under 35 U.S.C. § 102(b). We affirm the 35 U.S.C. § 103 rejections as to claims 12, 13 and 15 through 19. We reverse these rejections as to claim 14.

The subject matter on appeal is directed to a process for producing hydrogen and/or carbon monoxide by steam reforming of a hydrocarbon gas (e.g., methane or a higher hydrocarbon) utilizing a refractory carrier material supported catalyst comprising nickel as a main component in combination with a catalytic element from the group consisting of germanium, tin, lead, arsenic, antimony, or bismuth. Appellants have allegedly discovered that such a combined catalyst system significantly reduces carbon formation on the pores of the catalyst without significantly decreasing the catalyst efficiency in the claimed process of steam reforming of hydrocarbon feedstock.

At the outset, we observe that the Sowards reference, whether applied as a "primary" or "secondary" reference, provides the principal evidence for finding the appealed claims unpatentable. In this regard, Sowards discloses and claims the use of a catalyst of "one or more" metals selected from the class of, inter alia, nickel, germanium, tin, and lead which catalyst may be used in various processes such as steam reforming of methane. See claim 1 of the Sowards patent.

Appeal No. 93-4386
Application 07/887,610

Appellants emphasize that the sole working example of Sowards directed to a methane steam reforming process (Example 2) utilizes a nickel catalyst having thoria dispersed therein. Further, appellants argue that there are six possible processes and 105 different pairs of chemical elements (binary mixtures) covered by Sowards' claim 1, which results in 630 possible combinations of chemical element pairs and processes, not including the use of the catalytic elements separately and multi-component combinations other than pairs. Nevertheless, as argued by the examiner, the Sowards' "one or more metals" claim language at the very least suggests the use of binary catalytic mixtures of the elements specified by Sowards. However, for an anticipation rejection under 35 U.S.C. § 102 to be proper, the prior art reference must clearly and unequivocally disclose the claimed subject matter without any need for picking or choosing disclosures within the reference. In re Arkley, 455 F.2d 586, 172 USPQ 524 (CCPA 1972). Here, it is our view that the selection of a nickel binary mixture containing either germanium, tin, or lead to be used as a catalyst system for steam reforming of hydrocarbons from the disclosure (i.e., claim 1 of Sowards) involves too much "picking and choosing" to support an anticipation rejection. Thus, we reverse the examiner's anticipation rejection of claims 12, 13, 15, and 18.

Appeal No. 93-4386
Application 07/887,610

We reach a different result when we consider the rejections of the appealed claims for obviousness. Notwithstanding the numerous possible combinations of binary catalysts covered by the Sowards patent, we find that each is suggested in the sense of 35 U.S.C. § 103. We recognize that where a prior art disclosure is extremely broad, a prima facie case of obviousness may not arise, In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), but we do not consider the breadth of Sowards' disclosure to be in this category. Compare Merck & Co. v. Biocraft Labs. Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.) cert. denied, 493 U.S. 975 (1989) wherein the fact that the applied prior art reference disclosed a "multitude of combinations" (1,200 binary mixtures) did not "render any particular formulation less obvious". See 874 F.2d at 807, 10 USPQ2d at 1846. Moreover, here, each of the other relied upon references, like Sowards, indicates a preference for the use of nickel as a primary catalytic component for steam reforming of hydrocarbons. Compare McMahon's abstract and working examples and the working examples of Banks. Thus the Sowards' "one or more metals" language, particularly when interpreted in light of

McMahon and Banks, would have led one of ordinary skill in the art to select nickel binary combination catalyst systems, i.e., a much smaller range of possible binary combinations than the 105 total possible binary combinations envisioned by Sowards' claims.

In their reply brief, appellants cite the Williams patent as mentioning that lead and tin are not catalysts for steam reforming of hydrocarbons, and appellants also refer to test results disclosed in their specification (Example 11) which "further confirm the reduced steam reforming activity of lead, antimony, tin, germanium and bismuth". However, what Williams reports is that various metals such as lead and tin are not catalysts for hydrocarbon steam reforming at higher temperatures because the higher temperatures change the physical form of the catalyst. Note Williams at column 2, lines 2 through 7. Moreover, appellants' data confirms that lead and tin possess catalytic activity, albeit "reduced" for hydrocarbon steam reforming.

Appellants emphasize that dependent claims 16 and 17 on appeal require relatively low weight percentages of the cocatalyst component based upon the amount of nickel. As noted by appellants, Sowards contains no express disclosure which

Appeal No. 93-4386
Application 07/887,610

includes germanium, tin, or lead at such low levels. However, Sowards' emphasis on the use of nickel as the primary catalytic component which is consistent with McMahon and Banks, fairly suggests that other cocatalytic components should be used in relatively lower weight percentage ranges. As noted by the examiner, it would have been within the skill of the art to optimize the relative amounts of such elements in a catalyst system containing nickel as the primary catalytic component for the steam reforming of hydrocarbons. With respect to dependent claim 19, although Sowards discloses only the steam reforming of methane, we note that McMahon clearly teaches the use of higher hydrocarbons as conventional feedstocks for the steam reforming process. See McMahon at column 1, lines 59 to column 2, line 41.

Thus, we are convinced that a strong inference of obviousness has been raised for the subject matter of claims 12, 13, 15 through 19 which recite the use of binary mixtures of nickel with lead, tin, or germanium. No art is of record which teaches the use of arsenic, antimony, or bismuth as a catalyst or promoter for hydrocarbon steam reforming. Thus, we agree with appellants that no prima facie case of obviousness has been raised for the subject matter of dependent claim 14. We therefore reverse the examiner's obviousness rejections of that claim.

Appeal No. 93-4386
Application 07/887,610

In rebuttal to the prima facie case of obviousness, raised for the subject matter of claims 12, 13, and 15 through 19, appellants refer to data of record demonstrating that the coke or carbon formation rate in the catalytic pores is significantly reduced when using the claimed combined catalyst systems. We agree with the examiner, however, that the reported data is not reasonably commensurate in scope with the claims before us. As noted by the examiner, appealed claims 12, 16, 18, and 19 do not specify the relative proportions of the nickel and the tin, germanium, or lead components which result in a lower coke or carbon formation. Moreover, none of the claims specify the specific refractory carrier materials utilized in the examples referred to in the specification. In this regard, the Williams patent reports that these types of materials promote the catalytic activity of nickel (note page 2, column 1, lines 2 through 57 of Williams).

Appellants also argue that the data of record supports a finding of an unexpected increase in the temperature at which carbon formation occurs, an advantage which is achieved without significantly compromising the effectiveness of the catalyst.

Appeal No. 93-4386
Application 07/887,610

However, appellants have presented no claims which are limited to a high temperature operating range for the steam reforming process. We recognize, as set forth in In re Estes, 420 F.2d 1397, 164 USPQ 519 (CCPA 1970), that advantages occurring from a claimed process need not be expressly recited in the claims when the result or advantage inherently occurs through the recited claim limitations. We see no limitations in the broad claims before us that satisfies the Estes requirement either with respect to reduced carbon formation or with respect to increased temperature at which carbon formation occurs. It is by now well settled that broadly drafted claims that are drawn to both obvious and nonobvious subject matter are nonetheless obvious within the meaning of 35 U.S.C. § 103. In re Mraz, 455 F.2d 1069, 173 USPQ 25 (CCPA 1972).

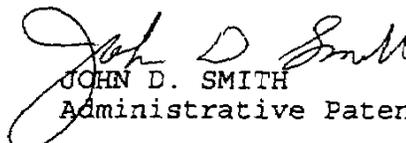
Having considered all of the evidence before us that bears on the issue of obviousness/nonobviousness, we find that the evidence of obviousness outweighs the evidence of nonobviousness for the subject matter defined by appealed claims 12, 13, and 15 through 19. We therefore affirm the examiner's rejections of these claims for obviousness (35 U.S.C. § 103).

Appeal No. 93-4386
Application 07/887,610

In summary, we reverse the examiner's anticipation rejection of certain claims based on the Sowards patent. We reverse the examiner's obviousness rejections as to dependent claim 14. We affirm the examiner's obviousness rejections as to claims 12, 13, and 15 through 19. Accordingly, the decision of the examiner is affirmed-in-part.

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

AFFIRMED-IN-PART


JOHN D. SMITH)
Administrative Patent Judge)
)
)

BRADLEY R. GARRIS)
Administrative Patent Judge)
)
)

CHARLES F. WARREN)
Administrative Patent Judge)

BOARD OF PATENT
APPEALS
AND
INTERFERENCES

Appeal No. 93-4386
Application 07/887,610

OSTROLENK, FABER, GERB,
& SUFFEN
1180 Avenue of the Americas
New York, NY 10036-8403