

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(2) is not binding precedent of the Board.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. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DWAYNE R. SENN, LYLE R. KALLENBACH
and BRENT J. BERTUS

Appeal No. 1996-3423
Application No. 08/314,471

ON BRIEF

Before WINTERS, WILLIAM F. SMITH and LORIN,
Administrative Patent Judges.

LORIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the
final rejection of claims 31, 32, 34, 37-39 and 46-51,
all the claims pending in the application.

There are two independent claims, 37 and 46. Claim

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46 distinguishes over claim 37 in, for example, limiting the contact of the zeolite-containing catalytic cracking catalyst with zirconium, antimony and boron compounds to a time prior to the process for catalytically cracking a hydrocarbon-containing oil. Claim 37 is representative:

37. In a process for catalytically cracking a hydrocarbon-containing oil feed, which contains in excess of about 0.01 ppm nickel and in excess of about 0.01 ppm vanadium and has an initial boiling point of at least about 400°F, substantially in the absence of added hydrogen gas, in the presence of a zeolite-containing catalytic cracking catalyst in a catalytic cracking zone at a temperature in the range of about 800-1200°F, wherein at least one zirconium compound and at least one antimony compound are added to said oil feed to as to provide a concentration of about 0.1-5,000 ppm added zirconium and about 0.1-5,000 ppm added antimony in said oil feed and to incorporate at least about 0.01 weight-% zirconium and at least about 0.01 weight-% antimony into said catalytic cracking catalyst in said catalytic cracking zone, the improvement which comprises additionally adding at least one boron compound to said oil feed so as to provide a concentration of about 0.1-5,000 ppm added boron in said oil feed and to additionally incorporate at least about 0.005 weight-% boron into said catalytic cracking catalyst in said catalytic cracking zone, thereby causing an increase of the combined yield of gasoline and light cycle oil produced in said process.

The references relied upon by the examiner are:

Singleton	4,192,770	Mar. 11, 1980
Hettinger, Jr.	4,424,116	Jan. 3, 1984

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Boston	4,495,064	Jan. 22, 1985
Senn 3, 1995	5,378,349	Jan.

The rejections are:

Claims 31, 32, 34, 37-39 and 46-51 are rejected under 35 U.S.C. § 103 as being unpatentable over Senn in view of Singleton.

Claims 31, 32, 34, 37-39 and 46-51 are rejected under 35 U.S.C. § 103 as being unpatentable over Hettinger in view of Singleton and Boston.

Decision

In rendering our decision, we have considered the entire specification and record.

Claims 31, 32, 34, 37-39 and 46-51 are rejected under 35 U.S.C. § 103 as being unpatentable over Senn in view of Singleton.

We begin our review of this rejection by analyzing representative claim 37.

The claim is in Jepson¹-type format. As such, "appellants impliedly admit that the subject matter recited in combination in the preamble (i.e., up to 'the improvement being') is old in the art," In re Ehrreich,

¹ Ex parte Jepson, 1917 Dec. Comm'r Pats. 62 (Comm'r Pats. 1917).

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590 F.2d 902, 909, 200 USPQ 504, 510 (CCPA 1979). In fact, appellants² explicitly admit that the subject matter of the preamble is taught in Senn, the primary reference.

That subject matter is:

a process for catalytically cracking a hydrocarbon-containing oil feed in the presence of a zeolite catalyst;

in which the oil feed contains nickel and vanadium; and, in which antimony and zirconium compounds are added to the oil feed in order to incorporate a certain amount of these metals into the zeolite catalyst.

In accordance with the "improvement"-portion of the claim, a boron compound is additionally introduced to the oil feed so that a certain amount of it is incorporated in the zeolite catalyst.

At the end of the claim we find another important limitation: "thereby causing an increase of the combined yield of gasoline and light cycle oil produced in said process." This is something the prima facie case of

² "The preamble states what is taught by a single reference (Senn; US Patent 5,378,349; cited to the USPTO)." Brief, sentence bridging pp. 3-4.

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obviousness must also address.³ The claimed process is directed not to any objective but to a particular one, that is, to increasing the combined yield of gasoline and light cycle oil. This necessarily means that appellants are limiting the scope of the claim to obtain this result. Since all the claims on appeal contain this limitation, it is dispositive of the prima facie case of obviousness for all the claims.

The claimed method, therefore, in simplified terms, calls for improving the catalytic cracking process of a known oil feed containing nickel, vanadium, antimony and zirconium, by adding boron "thereby causing an increase of the combined yield of gasoline and light cycle oil produced in said process." It is with this construction of the claim in mind that we now analyze the rejection for obviousness.

³ "... all *factual* differences which may be properly noted in any portion of a claim must be included within the basis for comparison with the prior art if we are to properly evaluate the *differences* between the invention defined in a claim and the teachings of a reference. The command of 35 U.S.C. ' 103 is to compare the invention as a *whole* with the prior art. Absent a failure of the applicant to comply with 35 U.S.C. ' 112, we think every portion of the appealed claims must be considered in determining the invention as a whole in arriving at our decision as to obviousness required by a rejection under section 103." In re Duva, 387 F.2d 402, 407, 156 USPQ 90, 94 (CCPA 1967).

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The rejection is over Senn in view of Singleton. Singleton, according to the examiner, "discloses that boron compounds may be used to passivate zeolite-containing catalytic cracking catalysts" (examiner's answer, p. 4). Based on this, the examiner concludes:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the cracking process of Senn by incorporating a boron compound into the catalyst as suggested by Singleton because boron, antimony, and zirconium compounds are known to passivate cracking catalysts and a person of ordinary skill in the art would expect a mixture of compounds to passivate a catalyst in an additive or cumulative manner.

Examiner's answer, p. 5. We note that increasing the combined yield of gasoline and light cycle oil is not mentioned in the body of the rejection. As we have discussed, this is a limitation in the claim. As such, a prima facie case of obviousness must explain why it would have been obvious to one with ordinary skill in the art looking at Senn and Singleton to employ the boron, zirconium and antimony passivating agents in a manner which would increase the combined yield of gasoline and light cycle oil. We do note however that examiner does address this issue in the rebuttal to appellants' arguments in the brief.

Appellants' arguments raise the very issue of whether the prior art suggests employing the boron, zirconium and antimony passivating agents to increase the combined yield of gasoline and light cycle oil. Appellants focus on the fact that the claimed process employs a three-component passivating agent, i.e., boron, zirconium and antimony, in contrast to Singleton's single-component passivating agent (i.e., boron) and that, relying on Tables I (p. 15) and II (p. 18) of the specification, it produces an unexpected increase in combined yield of gasoline and light cycle oil as compared to the process using boron alone, as in Singleton, or any two of the boron, zirconium and antimony passivating agents of Senn and Singleton (brief, pp. 4-5).

Examiner rebuts appellants' arguments on the grounds that Singleton indicates that *gasoline* yields increase with the addition of boron, citing column 4, lines 59-65 and column 7, lines 24-31 as well as Table 1 of column 6. Furthermore, "it appears as if the Singleton gasoline product encompasses at least a substantial portion of the claimed combined gasoline and light cycle oil product"

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(examiner's answer, p. 8). In other words, examiner takes the position that, in view of Singleton, an increase in gasoline yield would be an expected result from adding boron to the Senn process, and, since an increase in gasoline yield would be expected, it follows that a similar increase in combined gasoline and light cycle oil product would also be expected.

We have carefully reviewed examiner's and appellants' positions. On balance, for the following reasons, we find that the evidence weighs in favor of appellants' position.

Assuming *arguendo* that Singleton, indicates that *gasoline* yield is increased, we do not find that the reference teaches or suggests that the "combined gasoline and light cycle oil" yield will also increase. There is nothing in the reference that tells one way or another in what direction this yield would go. It is not true, as examiner has reasoned, that "because the Singleton gasoline product yield increases with the inclusion of a boron compound in the cracking process, it would be expected that the combined yield of gasoline and light cycle oil would also increase" (examiner's answer, top p.

9). There is no evidence that a direct parallel exists between gasoline yields and yields of the combined gasoline and light oil products. Evidence of such a parallel is essential if one is to make the jump from an increase in yield for gasoline to the increase in yield for the combined gasoline/light cycle oil that the claimed process requires.

Compounding this lack of direction is that it is not at all clear from reading these references that even the *gasoline* yield would be expected to increase. Although examiner has directed our attention to passages in Singleton disclosing an increase in gasoline yield due to the incorporation of boron, a perusal of the Tables of Singleton reveals that a more complicated set of factors is at work. Example 5 (col. 6, line 64) appears to contradict the cited disclosures by showing a lower gasoline yield for a catalyst with boron than without. Also, example 9 differs from example 10 only in that example 10 includes boron, and yet their gasoline yields are identical. It is difficult to tell from this disclosure what type of yield to expect if boron is

incorporated in an even more complicated process like that of Senn where there are two other passivating agents. It makes it very difficult to predict the outcome the combined gasoline/light cycle oil yield.

Our ability to predict the combined gasoline/light cycle oil yield from the addition of boron is not made easier by Senn, which does disclose yields of gasoline and light cycle oil. Yields are disclosed for catalyst additives zirconium, antimony and tungsten and combinations of zirconium/antimony and antimony/tungsten (see Tables I, II, and III, columns 9-12) but, again, the increase in yield is not merely the result of combining passivating agents. For instance, Catalyst H with 800 ppm antimony and 600 ppm zirconium (Table II) has a combined yield of 65.8, the same yield obtained by Catalyst A (Table I) with 4800 ppm antimony. This suggests that the amount of a passivating agent is a factor to be considered when seeking to obtain an increase in the combined yield. It is this and other factors which are embodied in the claims through the phrase: "thereby causing an increase of the combined yield of gasoline and light cycle oil produced in said

process". In our view, Senn provides no assistance in our ability to reasonably predict the outcome of adding Singleton's boron to its catalytic process. Such a prediction is not made any easier by the general unpredictability of these types of catalytic processes.

Further weighing in favor of the nonobviousness of appellants' claimed invention is data from the specification (Tables I and II, pp. 15 and 18, respectively) put forward as evidence of unexpected results. The results show an increase in gasoline/light cycle oil yields when the claimed three-component passivating agent is employed. It shows that, under certain circumstances, the use of zirconium, antimony and boron, yield higher combined gasoline/light cycle oil yields than when each is used separately or in combination of two passivating agents. We see nothing in these results that would cast doubt on that conclusion and examiner has not raised any questions about it.

Consequently, given that the claimed process is narrowly limited to producing an increase in the combined yield of gasoline/light cycle oil, which is neither taught or suggested by the prior art combination nor

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predictive from the prior art disclosures, and that there is an uncontested showing of unexpected results from using the claimed three-component passivating agent as a means of increasing the combined yield of gasoline/light cycle oil, on balance we find that the evidence weighs in favor of a finding of nonobviousness over the prior art combination. For this reason, the rejection is reversed.

Claims 31, 32, 34, 37-39 and 46-51 are rejected under 35 U.S.C. § 103 as being unpatentable over Hettinger in view of Singleton and Boston.

This rejection is similar to the first rejection and is reversed for the same reasons. Where Senn, in the earlier rejection taught the zirconium and antimony passivating agents, here Hettinger teaches the zirconium and Boston teaches the antimony agents. Singleton, as in the other rejection, is applied to show that adding a boron as an additional passivating agent would have been obvious to one of ordinary skill but, as in the previous rejection, it does not teach or suggest the claimed increase in the combined yield of gasoline/light cycle oil and we can not predict from their disclosures that this will occur. The showing of unexpected results is

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equally applicable in overcoming this rejection.
Accordingly, the evidence weighs in favor of the
nonobviousness of the claimed
invention over the prior art and, as a result, the
rejection is reversed.

REVERSED

SHERMAN D. WINTERS)	
Administrative Patent Judge)	
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