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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/758,429	02/04/2013	Mario C. Baldassari	17421/142001	3111

80911 7590 08/20/2020

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EXAMINER	
DOYLE, BRANDI M	

ART UNIT	PAPER NUMBER
1771	

NOTIFICATION DATE	DELIVERY MODE
08/20/2020	ELECTRONIC

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARIO C. BALDASSARI, UJJAL K. MUKHERJEE, ANN-MARIE OLSEN, AND MARVIN I. GREENE

Appeal 2019-005277
Application 13/758,429
Technology Center 1700

Before JEFFREY B. ROBERTSON, WHITNEY N. WILSON, and LILAN REN, *Administrative Patent Judges.*

ROBERTSON, *Administrative Patent Judge.*

DECISION ON APPEAL[1]

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[2] appeals from the Examiner's decision to reject claims 1–4 and 7–22. *See* Appeal Br. 5.[3] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

CLAIMED SUBJECT MATTER

Appellant states the invention relates to hydroconversion processes, and more specifically, solvent deasphalting of a residuum hydrocarbon feedstock, processing the resulting deasphalted oil (DAO) in a residue desulfurization unit and a residue hydrocracking unit. Spec. ¶ 1. Claim 1, reproduced below, is illustrative of the claimed subject matter (Appeal Br., Claims Appendix 29):

> 1. A process for upgrading residuum hydrocarbons, the process comprising:
>
> solvent deasphalting a residuum hydrocarbon fraction to produce a deasphalted oil fraction and an asphalt fraction;

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[1] This Decision includes citations to the following documents: Specification filed February 4, 2013 ("Spec."); Final Office Action mailed November 24, 2017 ("Final Act."); Appeal Brief filed December 18, 2018 and corrected on January 28, 2019 ("Appeal Br."); Examiner's Answer mailed May 1, 2019 ("Ans."); and Reply Brief filed July 1, 2019 ("Reply Br.").

[2] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Lummus Technology Inc., a wholly owned subsidiary of McDermott International, Inc. Appeal Br. 2.

[3] Appellant does not list the Examiner's rejections of claims 10–12 in the Appeal Brief, but appears to acknowledge such rejections in the Reply Brief. *See* Reply Br. 2.

feeding the asphalt fraction, as produced in the solvent deasphalting, to a first ebullated bed hydrocracking reactor system;

contacting the produced asphalt fraction and hydrogen with a first catalyst in the first ebullated bed hydrocracking reactor system;

recovering an effluent from the first ebullated bed hydrocracking reactor system;

fractionating the effluent from the first ebu1lated bed hydrocracking reactor system to recover one or more hydrocarbon fractions;

contacting the deasphalted oil fraction and hydrogen with a second catalyst in a fixed bed residue hydrodesulfurization unit, wherein the deasphalted oil fraction has a metals content of less than about 80 wppm and a Conradson Carbon Residue (CCR) content of less than about 10 wt%;

recovering an effluent from the fixed bed residue hydrodesulfurization unit;

contacting the fixed bed residue hydrodesulfurization unit effluent or a portion thereof with a third catalyst in a second ebullated bed hydrocracking reactor system.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Higashi	US 5,779,992	July 14, 1998
Morel et al. hereinafter "Morel"	US 6,447,671 B1	Sept. 10, 2002
Colyar et al. hereinafter "Colyar"	US 2006/0118463 A1	June 8, 2006

REJECTIONS

1. The Examiner rejected claims 1, 4, 7, 10–12, 15–19, 21, and 22 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Colyar and Higashi. Final Act. 6–11.
2. The Examiner rejected claims 2, 3, 8, 9, 13, 14, and 20 under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Colyar, Higashi, and Morel. Final Act. 11–13.

OPINION

Rejection 1

Appellant presents separate arguments with respect to claims 1, 7,[4] and 11. *See* Appeal Br. 6, 24–27. We select claims 1, 7, and 11 as representative for disposition of this rejection, with the patentability of the other claims standing or falling with claim 1, 7, and 11. 37 C.F.R. § 41.37(c)(1)(iv).

Claim 1

The Examiner's Rejection

The Examiner found Colyar discloses a process for upgrading atmospheric or vacuum residue from heavy crude oils using an integrated deasphalting-hydroprocessing method including solvent deasphalting the residue feed to produce a deasphalted oil (DAO) fraction and an asphaltene fraction. Final Act. 6, citing Colyar ¶¶ 1, 4, 24–26. The Examiner found Colyar discloses further treating the deasphalted oil from the solvent deasphalter in a fixed bed hydrotreater/hydrocracker or in an ebullated-bed

[4] As pointed out by the Examiner in the Answer, Appellant referred to claim 7 as claim 17 in the Appeal Brief. Ans. 24, Appeal Br. 25.

T-Star unit. *Id.* at 6–7, citing Colyar Abstr., ¶¶ 21, 24, 31, 38, 47, 49, 56, Figure. The Examiner found Colyar discloses sending the DAO to a hydrocracking unit, fractionating the hydroprocessed DAO effluent stream to obtain one or more hydrocarbon fractions. *Id.* at 7, citing Colyar ¶¶ Abstr., Figure, ¶¶ 38, 55, 56. The Examiner found Colyar discloses when the DAO is heavier, it is typically more prudent to send the DAO to an ebullated-bed for hydrotreatment/hydrocracking, but the selection of reactor design is based on a number of criteria including type of feedstock, desired conversion percentage, flexibility, run, length, product quality, etc. *Id.* citing Colyar, ¶ 57. The Examiner found Colyar discloses two-hydroconversion ebullated bed reactors may be in series. *Id.* citing Colyar, ¶ 65.

The Examiner found that although Colyar discloses using both fixed bed hydrotreating and hydrocracking reactors and ebullated bed hydrotreating and hydrocracking reactors for processing the DAO fraction, Colyar does not expressly disclose an embodiment using both, with the DAO first hydrotreated for hydrodesulphurization in a fixed bed reactor followed by hydrocracking in a second ebullated-bed reactor. *Id.* at 8.

The Examiner found that Higashi discloses a process for hydrotreating heavy oil fractions using a combination of fixed- and suspended-bed (including ebullated-bed type suspended reactors). *Id.*, citing Higashi, Abstr., Fig. 1, col. 5, ll. 50–52, claim 5. The Examiner found Higashi discloses treating heavy oil feeds preferably where 80% have a boiling point higher than 343 °C and contain metals in an amount of 30 ppm or greater. *Id.* citing Higashi, col. 4, ll. 24–38. The Examiner found Higashi discloses that a feedstock is first passed through one or more fixed-bed hydrotreating reactors to remove impurities such as sulfur and metals, and then passed to

one or more ebullated-bed reactors for further hydrotreating to removed low reactivity impurities, and where desired, subjecting the feed to hydrocracking. *Id.* citing Higashi, col. 3, ll. 4–19, 35–58, col. 4, ll. 32–38, col. 6, ll. 59–63, col. 7, ll. 14–49, Figs. 1, 5, and 6. The Examiner found Higashi discloses that through use of such a combination of fixed-bed reactor(s) upstream of ebullated-bed type reactor(s), desired conversion is achieved while minimizing product degradation, minimizing coking, plugging, and other drawbacks associated with using only fixed-bed reactors, only ebullated-bed reactors, or ebullated-bed reactors upstream of fixed-bed reactors. *Id.* at 8–9, citing Higashi, col. 1, l. 22 – col. 2, l. 60, col. 4, ll. 39–50, col. 6, ll. 21–45, col. 16, l. 61 – col. 17, l. 10.

The Examiner found the DAO feed examples in Colyar have boiling and metal contents within the ranges of Higashi. *Id.* at 9. The Examiner determined that it would have been obvious to have used the combination of fixed and ebullated-bed reactors disclosed in Higashi for treating the DAO in the process disclosed in Colyar for the benefit of achieving the desired conversion while minimizing product degradation, coking, and plugging. *Id.* The Examiner determined it would have been obvious to have combined the prior art fixed-bed treating with ebullated-bed hydrocracking according to known methods to yield predictable results. *Id.*

Appellant's Contentions

Appellant argues the fixed bed hydrotreater reactor or T_Star Unit disclosed in Colyar is not the same as the claimed fixed bed residue hydrodesulfurization unit. Appeal Br. 7. Appellant argues the fixed bed hydrotreator reactor or T_Star Unit disclosed in Colyar converts the

deasphalted oil stream and/or cleans the deasphalted oils stream to be fed to the fluid catalytic cracking (FCC) unit. *Id.* Appellant contends it would not have been obvious to have placed a fixed bed residue hydrodesulfurization unit upstream of a residue FCC because both process vacuum residue such that it would not have been obvious to have placed one residue hydrocracking unit directly after another. *Id.*; *see id.* at 15.

Appellant acknowledges that Colyar discloses deasphalted oil fraction feeds having a metals content of less than 100 wppm, such as the feeds recited in claim 1, should be processed in a fixed bed hydrotreater. *Id.* at 8, citing Colyar ¶¶ 38, 43. Appellant argues Colyar discloses feeds having higher levels of contaminants, particularly CCR and metals, are difficult for a fixed-bed system and are typically processed in an ebullated T_Star unit. *Id.* at 11, 16–17. Appellant argues Colyar discloses problems with fixed-bed technologies treating heavy charges, which teaches away from sending a heavy feed through a fixed bed. *Id.* at 9, citing Colyar ¶¶ 57, 58; *see id.* at 17–18. In other words, Appellant argues that in view of Colyar, if a DAO fraction is first processed in a fixed bed reactor it would contain lower levels of contaminants, such that the obtained effluent would not subsequently be processed in an ebullated reactor, which Colyar discloses is used for treating heavy charges.

Appellant argues Colyar teaches fixed bed hydrotreating or ebullated bed hydrocracker, but not both as recited in claim 1, such that if Colyar were to be modified as suggested by the Examiner, the principle of operation would be changed as Colyar is only interested in providing a feedstock to the FCC. *Id.* at 9–10.

Appellant argues further the hydrocracking in Higashi cited by the Examiner is merely a side reaction and Higashi is concerned with the removal of metals, sulfur, and nitrogen from a heavy oil, not a DAO feed. *Id.* at 11–12.

Appellant argues unexpected results in using an ebullated hydrocracker bed after a fixed bed desulfurization reactor for treating a DAO stream, namely, reducing sulfur and nitrogen and adding hydrogen to the DAO results in an easier hydrocracking process with higher conversion. *Id.* at 14–15. Appellant argues a technical advantage over Colyar in increased feedstock conversion while maintaining low sulfur content in the products. *Id.* at 18–19.

Issue

The dispositive issue with respect to this rejection is:

Did the Examiner err in determining the process for upgrading residuum hydrocarbons recited in claim 1 would have been obvious over Colyar and Higashi?

Discussion

We are not persuaded by Appellant's arguments that the combinations of Colyar and Higashi fails to render obvious subjecting a DAO fraction to a combination of a fixed bed residue hydrodesulfurization unit and an ebullated bed hydrocracking reactor system as recited in claim 1. Although Appellant contends that the fixed bed hydrotreater reactor or T_Star Unit disclosed in Colyar is not the same as the claimed fixed bed residue hydrosulfurization unit, Appellant has not sufficiently explained why such is

the case. Colyar expressly discloses the DAO stream is introduced into a classical fixed-bed hydrotreater/hydrocracker reactor "where it is processed to reduce contaminant levels and increase hydrogen content" and to "upgrade the feedstock." Colyar, ¶¶ 21, 38, 39, 46, 47. In this regard, as the Examiner points out, Colyar discloses also the fixed-bed "hydrocracking step" includes "an initial hydrotreatment step to reduce nitrogen and sulfur contents of the feed being processed by the hydrocracking catalyst" and may include a "two-stage configuration with a separation step between the first and the second stages." Final Act. 6–7; Ans. 14–15; Colyar ¶ 47.

Higashi discloses a process for treating heavy oils containing impurities including metals, sulfur, and nitrogen compounds. Higashi, col. 1, ll. 9–13. Higashi discloses first feeding a heavy oil to a fixed bed reactor with a hydrotreating catalyst to remove impurities such as sulfur (step (a)), and then feeding the hydrotreated heavy oil to a suspended-bed reactor, such as an ebullated reactor, to further hydrotreat or hydrocrack the hydrotreated heavy oil (step (b)). *Id.* at col. 2, l. 63 – col. 3, l. 19; col. 5, ll. 49–52; col. 6, ll. 58–62; col. 7, ll. 13–14; Tables 1–8; Figs. 1, 5. Higashi's disclosure is consistent with Colyar's two-step process involving hydrotreating followed by hydrocracking discussed above. In addition, Colyar discloses further hydrocracking of the DAO stream takes place in an FCC unit. Colyar, Fig. 1. Thus, we are not persuaded by Appellant's argument that it would not have been obvious to have placed a fixed bed residue hydrodesulfurization unit upstream of a residue FCC.

We are unpersuaded by Appellant's argument that it would not have been obvious to have placed a fixed-bed hydrotreater upstream to an ebullated bed hydrocracker in view of the difference in feed oil between

Colyar and Higashi and Colyar's disclosure of circumstances where ebullated reactors are favored over fixed bed reactors. In particular, Colyar discloses that even in the case of C_3/C_4 solvent, the DAO fixed bed hydrotreater "operates at conditions similar to those used to treat a heavy vacuum gas oil feedstock" and "upgrade[s] the feedstock of which 90 wt. % if the compounds have an initial boiling point above 650 °F (343 °C)." Colyar ¶¶ 38, 39. Colyar discloses the DAO stream that enters the fixed-bed reactor contains less than 100 wppm of metals and that a guard bed or reactor can be located before the fixed-bed of hydroprocessing catalyst to reduce asphaltene content as well as metal content. Colyar ¶ 43. Higashi discloses the heavy oil "preferably contains a fraction having a boiling point higher than 343 °C in an amount of at least 80%." Higashi, col. 4, ll. 23–25. Higashi does not particularly limit the heavy oil and discloses examples including "vacuum gas oil, crude oil, atmospheric distillation residue, and vacuum distillation residue." *Id.* at col. 4, ll. 29–31.

Although we appreciate Colyar's disclosure that "it is typically more prudent" in the case where a C_5 or heavier solvent is used in the SDA Unit, to send the resulting DAO stream to an Ebullated-bed for hydrotreatment/hydrocracking (Colyar ¶ 56), as the Examiner points out, Colyar discloses also that "[t]he decision to utilize a fixed-bed or ebullated-bed reactor design is based on a number of criteria including type of feedstock, desired conversion percentage, flexibility, run length, product quality, etc." *Id.* at ¶ 57. In the context of the proposed combination of Colyar and Higashi, such factors would take into account Colyar's disclosure of a hydrocracking step to produce middle distillates (Colyar ¶¶ 46, 47) in view of Higashi's disclosure that hydrocracking is done in the

suspended (ebullated) reactor of step (b) after hydrotreating (Colyar, col. 6, ll. 58–62; col. 7, ll. 13–14). *See* Ans. 20. For these reasons, we are not persuaded by the Appellant's position that Colyar teaches away from the Examiner's combination or the statements made in the Mukherjee Declaration,[5] which does not appear to acknowledge these disclosures in Colyar and Higashi. Mukherjee Decl. ¶¶ 12–15.

Accordingly, we are of the view that the Examiner's reasoning for including a fixed bed reactor followed by an ebullated reactor in the combined hydrotreating/hydrocracking step disclosed in Colyar in view of Higashi is sufficiently supported by the record.

As to Appellant's argument that the combination of an ebullated hydrocracker bed after a fixed bed desulfurization reactor for treating a DAO stream produces unexpected results by reducing sulfur and nitrogen and adding hydrogen to the DAO results in an easier hydrocracking process with higher conversion, we agree with the Examiner's assessment that Appellant has not provided a sufficient showing that these benefits obtained from the process would have been unexpected. Ans. 20–21. That is, Appellant has failed to sufficiently explain why one of ordinary skill in the art would not have expected easier and higher conversion in further hydrocracking when there are fewer impurities present in the feed.

As a result, we affirm the Examiner's rejection of claims 1, 19, 21, and 22.

[5] Declaration Pursuant to 37 C.F.R. § 1.132 of Ujjal K. Mukherjee dated August 24, 2017.

Claims 4, 7, 11, 12, and 15–18

Although Appellant lists a number of claims under this heading, Appellant discusses only claims 7 and 11. Appeal Br. 24–26. Accordingly, as discussed above, we limit our discussion to claims 7 and 11.

Claim 7

Claim 7, depends from claim 4 and recites "wherein the effluent from the first ebullated bed hydrocracking reactor system and the second ebullated bed hydrocracking reactor system are fractionated in a common fractionation system."

The Examiner found Colyar does not teach fractionating the effluent from the asphalt hydroconversion reactors and DAO hydroconversion reactors of Colyar in a common fractionation unit. Final Act. 10. The Examiner found both systems are used to convert the fractions of a vacuum residue into lighter products. *Id.*, citing Colyar, ¶¶ 44, 46, 53, 70, 77, Table 5. The Examiner determined it would have been obvious to use a common fractionation column to distill effluents from hydroconversion of the vacuum residue asphalt and DAO to recover common product streams of naphtha, gasoline, diesel, distillates, gas oil, while minimizing capital cost and without obtaining new or unexpected results. *Id.*

Appellant contends the Examiner's rationale to use a common separation system is misguided, because one of ordinary skill in the art would recognize that such a system would need to be larger and more complex, and operate under more robust conditions than individual separation trains. *Id.* at 25. Appellant contends it would not have been obvious that the common separation train would yield the same, acceptable, or desirable product quality as a result of different conditions. *Id.* at 25–26.

We are not persuaded by Appellant's arguments. As to the complexity of a common unit we agree with the Examiner that, a common separation unit, which will require larger capacity than two separate units, will not necessarily require the same volume and physical space as two units. Ans. 24. In addition, the Examiner further explains the use of common fraction unit is known in the art and if such common fraction unit requires a special design that is non-obvious, the Specification does not sufficiently describe such a unit. Ans. 24–25.

We are unpersuaded by Appellant's argument that it would not have been obvious to obtain the same or acceptable product quality using common separation train. Appellant's contentions that a new equilibrium state would be reaches as a result of the Examiner's combination, which "is not a trivial exercise for a person of ordinary skill in the art" (Appeal Br. 26), is not supported by objective evidence and is insufficient to rebut the Examiner's reasoning that common fraction units are known in the art, and the conversion products include middle distillates in the same ranges. Ans. 24–25.

Claim 11

Claim 11 depends from claim 1, and recites that the process "results in a hydrocarbon conversion in the range from about 40 wt% to about 75 wt%, sulfur removal is in the range from about 40 wt% to about 80 wt%, metals removal is in the range from about 60 wt% to about 85 wt% and Conradson Carbon Residue (CCR) removal is in the range from about 30 wt% to about 65 wt%."

The Examiner found Colyar discloses examples where the residue conversion falls within the range recited in claim 11, but Colyar does not disclose the sulfur removal, metals removal, or CCR removal recited therein. Final Act. 10. The Examiner found that because Colyar discloses operating the asphalt ebullated-bed reactor(s) under the same or overlapping conditions as disclosed in the Specification, it would have been expected that the same sulfur, metal, and CCR removal would be achieved in the process of Colyar. *Id.* at 10–11. The Examiner determined also that it would have been obvious to have optimized the number of beds, catalyst, and reaction conditions as taught in Colyar, to achieved the desired product quality. *Id.* at 11, citing Colyar, Table 1, Table 2, ¶¶ 64–73.

Appellant contends that because Colyar does not disclose using the required reactors and separation train in the claims, the Examiner's position that product quality may be maintained is misguided. *Id.* at 26. Appellant argues that even if the combination with Higashi was appropriate, there is nothing to suggest that product quality would be maintained with the new rejection scheme. *Id.* Appellant argues that in view of the Examiner's position that Colyar discloses the desired sulfur removal, CCR removal, there would not be a reason to modify Colyar as suggested by the Examiner. *Id.* at 26–27.

We are not persuaded by Appellant's argument largely for similar reasons as discussed above for claim 7. *See* Ans. 25. As to Appellant's position that if Colyar alone achieved the desired result, there would be no reason to look to Higashi, we agree with the Examiner, that Higashi discloses an improved process for hydrotreating and hydrocracking

deasphalted oil as discussed above, thus providing reasons for making the modification. Ans. 25–26.

Rejection 2

Appellant presents separate arguments with respect to claims 2, 3, 8, 9, 13, 14, and 20 subject to this rejection. *See* Appeal Br. 6, 21–24. We select claims 2, 3, 8, 13, 14, and 20 as representative for disposition of this rejection, with the patentability of the other claims standing or falling with claims 2, 3, 8, 13, 14, and 20. 37 C.F.R. § 41.37(c)(1)(iv).

Claim 20

The Examiner's Rejection

Claim 20 recites a process similar to claim 1, and additionally recites "wherein a fuel oil produced via the fractionation of the second ebullated bed hydrocracking reaction system effluent has a sulfur content of 0.75 wt% or less."

In rejecting claim 20 as obvious over the combination of Colyar, Higashi, and Morel, the Examiner found Colyar does not disclose a fuel oil having a sulfur content of 0.75% or less. Final Act. 12. The Examiner found Higashi discloses obtaining effluent having 0.3% sulfur and Morel discloses a reduction in sulfur content from 5.39 wt% to 0.9 wt%. *Id.* at 12–13, citing Higashi, Table 3; Morel Table 1c, col. 14, ll. 20–40. The Examiner found Colyar, Higashi, and Morel all disclose treating feeds for the purpose of removing impurities, including sulfur. *Id.* at 13. The Examiner determined it would have been obvious to design the catalyst,

operating conditions, and series of reactors to achieve the desired quality product, including the sulfur content. *Id.* The Examiner determined Morel and Higashi provide for such a reduction in sulfur content. *Id.*

Appellant's contentions

Appellant relies on the alleged deficiencies of Colyar discussed above, and further argues that the combined teachings of Colyar, Higashi, and Morel do not disclose a fuel oil produced via fractionation of a second ebullated bed hydrocracking reaction system effluent has a sulfur content of 0.75% or less. Appeal Br. 20–21.

Issue

Has Appellant demonstrated reversible error in the Examiner's position that a sulfur content of 0.75% or less as recited in claim 20 would have been obvious over Colyar, Higashi, and Morel?

Discussion

We are not persuaded by Appellant's arguments against Colyar and Higashi as discussed above. Although Appellant contends the sulfur content recited in claim 20 is not disclosed by the prior art, Appellant does not address the Examiner's rationale regarding modifying the disclosed systems in order to obtain the desired sulfur content such as disclosed in Higashi and Morel falling within the claimed range.

Accordingly, we affirm the Examiner's rejection.

Claims 2, 3, 8, 9, 13, and 14

Claims 2 and 3

Claim 2 depends from claim 1 and recites the process of claim 1 further comprises "mixing the asphalt fraction with a diluent to form a diluted asphalt fraction prior to the contacting." Claim 3 recites specific diluents. Appeal Br. 29.

The Examiner explained that Morel and Colyar disclose treating the same asphalt streams in the same ebullated bed hydroconversion reactor under overlapping conditions to achieve conversion of the asphalt through hydrocracking. Ans. 23. The Examiner found Morel teaches wherein the asphalt may be treated alone as in Colyar and where the asphalt may be treated with diluent. *Id.*; Final Act. 11. The Examiner found Colyar recognizes that co-processing allows conversion of a second feed, acknowledging that such recognition is with respect to the deasphalted oil reactors. *Id.* The Examiner determined it would have been obvious to process a blend of asphalt with a second feedstock/diluent in the asphalt ebullated-bed reactor of Colyar to do no more than obtain the predictable results of increasing the effluent produced by simultaneous hydroconversion of the asphalt and additional feed as known in the art. *Id.*; Final Act. 11–12.

Appellant argues the Examiner asserts that process steps are arbitrary and may be placed in order to fulfill a desired need, whereas the arrangement of process steps must be given the appropriate inventive weight by Examiner in view of the expert declaration. Appeal Br. 22.

We are not persuaded by Appellant's argument because it does not meaningfully explain why the Examiner's rationale is insufficient.

Claims 8, 13, and 14

The Examiner relies on similar rationale in order to reject claims 8, 13, and 14, as discussed above with respect to claim 20. Final Act. 12–13, Ans. 23.

Appellant contends the Examiner's reliance on Morel for the limitations of these claims is based on improper hindsight, where the process steps and conditions are arbitrary and may be placed in any order to fulfill a desired need. Appeal Br. 23.

We are not persuaded by Appellant's contentions for similar reasons as discussed above with respect to claim 20. Appellant does not meaningfully discuss the Examiner's rationale with particular reference to the limitations found in claims 8, 13, and 14.

Claim 13

Claim 13, depends from claim 4, and additionally recites "wherein a fuel oil produced via the fractionation of the second ebullated bed hydrocracking reaction system effluent has a sulfur content of 0.75 wt% or less."

Appellant additionally contends the vacuum distillate and residual fraction of Morel is not comparable to the claimed fuel oil because the base for heavy fuel oil contains multiple fractions. *Id.* at 24. Appellant argues that even if Morel discloses a sulfur content of 0.9 wt%, Morel does not disclose a sulfur content of a fuel oil produced via fractionation of a second ebullated bed hydrocracking reaction system effluent. *Id.*

We are not persuaded by Appellant's argument, because as the Examiner explains, when the same deasphalted oil feed is treated in the same

series of beds under the same conditions, the same sulfur removal would be expected to occur. Ans. 24. Moreover, we agree with the Examiner that it would have been obvious to have selected particular operating conditions from the disclosures of Colyar and Higashi in order to achieve the desired quality product where such prior art discloses operating beds specifically for the removal of sulfur compounds. *Id.*

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 4, 7, 10–12, 15–19, 21, 22	103	Colyar, Higashi	1, 4, 7, 10–12, 15–19, 21, 22	
2, 3, 8, 9, 13, 14, 20	103	Colyar, Higashi, Morel	2, 3, 8, 9, 13, 14, 20	
Overall Outcome			1–4, 7–22	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED