

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SCOUT ENERGY MANAGEMENT, LLC, and
CHEVRON U.S.A. INC.,
Petitioners,

v.

PILOT INTELLECTUAL PROPERTY, LLC,
Patent Owner.

Case IPR2024-00385
Patent 8,505,332 B1

**PATENT OWNER'S SUR-REPLY
TO PETITIONERS' REPLY
TO PATENT OWNER'S PRELIMINARY RESPONSE**

Pursuant to the Board's email of June 6, 2024, Patent Owner files this authorized Sur-Reply to Petitioners' Reply to Patent Owner's Preliminary Response.

The No Use of Cryogenic Conditions Limitation in the Challenged Claims Was Added in Response to the Examiner's Goddin-based Rejections, to Distinguish the '332 Patent Process from the Ryan/Holmes Process, Which is Petitioners' Asserted Art

The Goddin patent describes two alternative processes for CO₂ removal, including a first stage using membranes for removal of CO₂, and a second stage using either: 1) cryogenic distillation; or 2) CO₂ solution absorption. The cryogenic distillation process alternative is shown in Goddin Figure 11, and described in detail at 16:1-18:26. Ex. 2003. The CO₂ solution absorption process alternative is shown in Goddin Figure 12, and described in detail at 18:27-20:34. Ex. 2003.

In Goddin's first alternative, the second stage is the Ryan/Holmes cryogenic distillation process. Petitioners in their Reply make no attempt to counter Patent Owner's Exhibit 2004 Table of Similarities, which demonstrates in detail the striking similarities between the Goddin Figure 11 cryogenic distillation process and the three-column Ryan/Holmes process, which is the Petitioners' Asserted Art. The Table of Similarities shows that the input, process, and output for each of the three distillation columns in Goddin are the same as those in the three-column Ryan/Holmes process, regardless of whether Goddin, or the Patent Examiner using Goddin as the basis for rejections, identified the process by name.

In response to the Examiner's rejections based on Goddin, amendments were made to the '332 Patent claims specifically to distinguish the claimed invention from Goddin, including the negative limitations suggested by the Examiner to specify that

the ‘332 Patent process does not use cryogenic conditions, membranes, or CO₂ recovery solvents.

The no use of membranes limitation was added to distinguish the ‘332 Patent process from the first stage of the Goddin process, shown in both Figures 11 and 12, which uses membranes. The no use of CO₂ recovery solvents limitation was added to distinguish the ‘332 Patent process from the second alternative for the second stage of the Goddin process, shown in Figure 12, which uses CO₂ solution absorption. The no use of cryogenic conditions limitation was added to distinguish the ‘332 Patent process from the first alternative for the second stage of the Goddin process, shown in Figure 11, which uses the Ryan/Holmes cryogenic distillation process.

Petitioners in their Reply recognize the fact that the no use of cryogenic conditions limitation was added specifically to distinguish the ‘332 Patent process from the Goddin Figure 11 cryogenic distillation process, but refuse to accept that this Goddin Figure 11 cryogenic distillation process is the three-column Ryan/Holmes process that is Petitioners’ Asserted Art. As shown in Patent Owner’s Exhibit 2004 Table of Similarities, there is no question that the Goddin Figure 11 cryogenic distillation process is the three-column Ryan/Holmes process, which is the Petitioners’ Asserted Art.

Goddin’s claimed improvement of the three-column Ryan/Holmes process, by adding a membrane to the front end of the process, does not negate the fact that it is still a three-column Ryan/Holmes process. *See* Ex. 2004, Table of Similarities.

Thus, the first part of the *Advanced Bionics* framework is met, and Petitioners’

failure to even attempt to establish, or even argue, that the Examiner erred in its evaluation of the Ryan/Holmes art, compels the conclusion that the Board should exercise its discretion to deny institution under Section 325(d).

The No Use of CO₂ Recovery Solvents Limitation,
Added in Response to the Examiner's Goddin-based Rejections,
Is Not Limited to Be Only One Particular Type of CO₂ Recovery Solvent

In addition to refusing to accept the fact that the no use of cryogenic conditions limitation was added specifically to distinguish the '332 Patent process from the Ryan/Holmes process that is Petitioners' Asserted Art, Petitioners assert that the no use of CO₂ recovery solvents limitation was defined to be only the particular type of CO₂ recovery solvents used in the Goddin Figure 12 alternative, which uses CO₂ solution absorption. While the no use of CO₂ recovery solvents was added to distinguish the '332 Patent process from the Goddin CO₂ solution absorption alternative process, the purpose of the amendment does not thereby limit the meaning of the "CO₂ recovery solvents" to only one particular type of solvent used for recovery of CO₂.

Solvents used for recovery of CO₂ can include other types of solvents, including the hydrocarbon solvents used in the Goddin Figure 11 Ryan/Holmes cryogenic distillation process. The fact that Patent Owner during prosecution did not note that the hydrocarbon solvents used in the Goddin Figure 11 Ryan/Holmes cryogenic distillation process are also CO₂ recovery solvents is not an assertion that those solvents are not CO₂ recovery solvents. Patent applicants are not required to exhaust all available avenues for responding to an Examiner's rejections.

Just like Patent Owner limited arguments distinguishing its amended claims

from the Ryan/Holmes process to the no use of cryogenic conditions, by not expanding the arguments to assert the no use of CO₂ recovery solvents limitation to further distinguish its amended claims from the Ryan/Holmes process, Patent Owner did not argue that the Ryan/Holmes process “teaches away” from the ‘332 Patent process. In addition to presenting its negative limitations of no use of cryogenic conditions, membranes, or CO₂ recovery solvents as distinguishing the amended ‘332 Patent claims from Goddin, Patent Owner could have further argued that the Goddin Figure 11 Ryan/Holmes process teaches away from the ‘332 Patent process, as presented in detail in Section VII of the Patent Owner’s Preliminary Response in this matter.

While the Ryan/Holmes process (including the Goddin Figure 11 cryogenic distillation process) uses additives and extensive process equipment to improve the process of separating methane and ethane from carbon dioxide recycle streams, the ‘332 Patent process improves the process of recovering NGLs from carbon dioxide recycle streams by “disregarding the recovery” of methane and ethane from the carbon dioxide recycle stream.

While dependent Claims 4 and 7 of the ‘332 Patent explicitly recite the Prim process “disregarding the recovery” of methane and ethane from the carbon dioxide recycle stream, by specifically requiring that “the sweet NGL rich stream comprises ... no more than 1 molar percent ethane,” and requiring that “the sour NGL rich stream comprises ... no more than 5 molar percent ethane,” independent Claim 1 implicitly recites the Prim process “disregarding the recovery” of methane and ethane from the carbon dioxide recycle stream, by excluding the use of cryogenic

conditions and CO₂ recovery solvents.

As noted in the POPR, the Ryan/Holmes cryogenic distillation process use of hydrocarbon solvents makes the recovery of methane and ethane possible, by avoiding carbon dioxide freezing (solidification) in the separation of methane from carbon dioxide, and allowing for the separation of ethane from carbon dioxide, by eliminating the formation of what is known as the ethane-carbon dioxide “azeotrope” which otherwise would preclude a separation of ethane from carbon dioxide. *See* POPR at 1-2, 33-34. Without the use of cryogenic conditions and CO₂ recovery solvents, as used in the Ryan/Holmes process, and excluded from use in all of the challenged claims of the ‘332 Patent, recovery of methane and ethane from the carbon dioxide recycle stream is not possible in a distillation process. *See id.*

The Patent Owner’s limitation of its arguments in prosecution, by not asserting that the Ryan/Holmes process teaches away from the “332 Patent process, does not operate as a waiver or forfeiture of the argument, just like the Patent Owner’s limitation of its arguments in prosecution by not noting that the hydrocarbon solvents used in the Goddin Figure 11 Ryan/Holmes cryogenic distillation process are CO₂ recovery solvents, is not an assertion that those hydrocarbon solvents are not CO₂ recovery solvents, and does not define CO₂ recovery solvents to be only the particular type of CO₂ recovery solvents used in the Goddin Figure 12 alternative (CO₂ solution absorption).

Petitioners’ Ryan/Holmes Process Asserted Art Uses Cryogenic Distillation,
Aided by CO₂ Recovery Solvents, to Remove CO₂

Petitioners devote the bulk of pages 4-9 of their Reply to an argument that

their Ryan/Holmes process Asserted Art is different from Goddin because the Asserted Art does not use CO₂ solution absorption. But Patent Owner is not asserting that Petitioners' Ryan/Holmes Asserted Art uses CO₂ solution absorption. Instead, Patent Owner asserts that Petitioners' Ryan/Holmes Asserted Art uses cryogenic distillation, aided by CO₂ recovery solvents, to remove CO₂.

Petitioners rely on their overly narrow proposed construction of CO₂ recovery solvents, narrowed to be limited to only CO₂ solution absorption, then proceed to distinguish their Ryan/Holmes Asserted Art as different from the Goddin second stage Figure 12 alternative that uses CO₂ solution absorption to remove CO₂. By setting up this strawman to shoot down, Petitioners sidestep Patent Owner's actual argument, which is that Petitioners' Ryan/Holmes Asserted Art is the same as the Goddin second stage Figure 11 alternative that uses cryogenic distillation and CO₂ recovery solvents. *See* Ex. 2004, Table of Similarities.

To the Extent That Petitioners are Proposing That the Board Adopt the Canada Re-Examination's Use of a General Dictionary Definition of "Cryogenic" to Define the Cryogenic Conditions Limitation in the Challenged Claims, The Board May Also Consider Other Canada Re-Examination Findings for Matters at Issue in this Proceeding

Patent Owner included in its Updated Mandatory Notices a Re-examination proceeding for a foreign patent related to the '332 Patent, in which the Canada Re-examination Board used a general dictionary definition for cryogenic as from -238°F to absolute zero (-460°F), "the temperature at which molecular motion comes as close as theoretically possible to ceasing completely." Ex. 2013 at 6, 137. Neither side in this Re-examination proceeding proposed or disputed this definition, and the Re-examination was resolved through distinguishing and amending claims on other

bases.

The Canada Re-examination Board's use of a general dictionary definition, rather than a gas processing industry-specific technical treatise definition, applied a range of temperatures so far below the freezing point of CO₂ that removal of CO₂ through distillation would be rendered impossible by freezing of the CO₂. In contrast, Patent Owner reiterates its proposed construction of "cryogenic conditions" in this proceeding as defined by the GPA Engineering Data Book as "below minus 50°F." Ex. 2005 at 1-4; Ex. 2001 at ¶55; POPR at 17-19.

Petitioners cite to the Canada Re-examination in their Reply at page 3, footnote 1. To the extent that Petitioners are proposing that the Board adopt the Canada Re-Examination's general dictionary definition of cryogenic to define the cryogenic conditions limitation in the challenged claims of the '332 Patent, the Board may also consider other findings in the Canada Re-examination for matters at issue in this proceeding.

For example, the Canada Re-examination Board found that cryogenic conditions are conventionally used for isolating methane and ethane in a carbon dioxide recycle stream, and on that basis found that a patent asserted in the Re-examination does not use cryogenic conditions because it does not describe isolating either methane or ethane. Ex. 2013 at 262-64, 308. This supports Patent Owner's position in this proceeding, in asserting that the Petitioners' Ryan/Holmes Asserted Art uses cryogenic conditions (cryogenic distillation) to accomplish its focus on recovery of methane and ethane, and is distinctly different from the '332 Patent process going in the opposite direction by "disregarding the recovery" of methane

and ethane from the carbon dioxide recycle stream.

Patent Owner asserts that the Petitioners' Ryan/Holmes Asserted Art "teaches away" from the Prim '332 Patent process. While the Ryan/Holmes process uses additives and extensive process equipment to improve the process of separating methane and ethane from carbon dioxide recycle streams, the innovative process described and claimed in the '332 Patent improves the process of recovering NGLs from carbon dioxide recycle streams by "disregarding the recovery" of methane and ethane from the carbon dioxide recycle stream, to recover NGLs "with relatively little process equipment or energy." See POPR at Section VII.

Patent Owner argues that because the Ryan/Holmes process "teaches away" from the Prim '332 Patent process, a person of ordinary skill in the art would not be motivated to modify or combine the Ryan/Holmes process with other teachings to develop the Prim '332 Patent process. The Ryan/Holmes process therefore cannot be the basis for an obviousness finding as asserted by Petitioners in each of their six obviousness grounds.

As another related example, the Canada Re-examination Board found no incentive (motivation) to combine a Ryan/Holmes process patent with another asserted patent, because the Ryan/Holmes process patent separated methane from the carbon dioxide recycle stream, while the other patent did not separate the methane, leaving the methane in the carbon dioxide recycle stream. See Ex. 2013 at 8 (describing the Ryan/Holmes process patent as separating the methane from the carbon dioxide recycle stream); *id.* at 268-69, 308, 310, 374-76 (finding no incentive (motivation) to combine the Ryan/Holmes process patent with the other asserted

patent, because the other asserted patent “specifically teaches keeping methane in the overhead gas [the carbon dioxide recycle stream].”) These findings further support Patent Owner’s assertions in this matter that there is no motivation to modify or combine the Petitioners’ Ryan/Holmes process Asserted Art with other teachings to develop the Prim ‘332 Patent process, because the Ryan/Holmes process is focused on recovery of methane and ethane, while the Prim ‘332 Patent process goes in the opposite direction by “disregarding the recovery” of methane and ethane.

Patent Owner’s Proposed Construction of “CO₂ Recovery Solvents” According to Its Plain and Ordinary Meaning as “Solvents Used for Recovery of Carbon Dioxide” Does Not Encompass the Reflux/Reboil Recirculation of Hydrocarbons (Reflux/ Reboil are Basic and Necessary Steps Used in All Distillation Processes)

While Petitioners throughout their Reply propose an overly narrow construction of “CO₂ Recovery Solvents” to be limited to only one type of CO₂ recovery solvent (CO₂ solution absorption), by rendering meaningless the “Recovery” portion of the claim term, and improperly narrowing the claim limitation to encompass only processes that absorb the CO₂ into a solvent (CO₂ solvents), Petitioners conclude their Reply with an overly broad mischaracterization of Patent Owner’s proposed construction of “CO₂ Recovery Solvents.”

Patent Owner proposes that “CO₂ Recovery Solvents” be construed according to its plain and ordinary meaning: “solvents used for recovery of carbon dioxide.” In the Ryan/Holmes process, hydrocarbon solvents are used for recovery of carbon dioxide. In the three-column Ryan/Holmes process, hydrocarbon solvents are separated in the additive recovery column (Ex. 2004, Column 3), and recycled into the CO₂ recovery column (Ex. 2004, Column 2), operating as solvents used for

recovery of CO₂ in the CO₂ recovery column. Patent Owner in the POPR at pages 20-21 notes that these Ryan/Holmes hydrocarbon solvents are referred to as additives, agents, liquid hydrocarbon streams, recycled hydrocarbon streams, absorbent oil, stream 10 and stream 32 (in Soldati), recirculating hydrocarbons, and lean oil throughout the various patents and journal articles cited in this matter. Each of these various terms used to refer to the Ryan/Holmes hydrocarbon solvents, which is the critical component of the Ryan/Holmes process that makes possible its cryogenic distillation recovery of methane and ethane, are always referring to the Ryan/Holmes hydrocarbon solvents, not reflux or reboil, which are basic and necessary components of every distillation process, in which the reflux recirculates the overhead stream, and the reboil recirculates the bottom stream.

Petitioners overbroadly mischaracterize Patent Owner's reference to the various terms used to refer to the Ryan/Holmes hydrocarbon solvents to assert that Patent Owner's proposed construction of "CO₂ Recovery Solvents" could encompass "all fluids that could aid in the recovery of CO₂" (Reply at 8), even those such as reflux and reboil recirculations not functioning as solvents. Not true, Patent Owner's proposed construction is limited to "solvents used for recovery of carbon dioxide."¹

¹ Patent Owner further notes that its proposed construction of "CO₂ Recovery Solvents" does not encompass "dehydration solvents," which are used to dehydrate the carbon dioxide recycle stream in preparation for recovery of carbon dioxide. *See* '332 Patent dependent Claim 2, reciting the dehydration step.

Respectfully submitted this 20th day of June, 2024.

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e), I hereby certify that on June 20, 2024 the foregoing *Patent Owner's Sur-Reply to Petitioners' Reply to Patent Owner's Preliminary Response* is being served electronically by agreement of the parties, by e-mail to the following counsel of record.

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