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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EARL T. ROBINSON, FRANCIS S. LAU, and DWAIN DODSON[1]

Appeal 2013-001638
Application 12/492,477
Technology Center 1700

Before PETER F. KRATZ, KAREN M. HASTINGS, and WESLEY B. DERRICK, *Administrative Patent Judges*.

DERRICK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Primary Examiner's rejection of claims 1, 2, 7, 8, and 11–20[2] as unpatentable for obviousness over Goldstein et al. (U.S. Patent No. 4,348,487, issued September 7, 1982) in view of Inoue et al. (US 2004/0180971 A1, published

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[1] According to Appellants, the Real Party in Interest is GreatPoint Energy, Inc. App. Br. 1.

[2] Appellants also list claims 21 and 22 in the Claims Appendix (App. Br. 26–27), but these claims are not identified as rejected in the Final Office Action or in Appellants' listing of pending and rejected claims (*id.* at 1) or as claims whose rejection is appealed (*id.*; Reply Br. 3–4). In the event of further prosecution, the Examiner needs to consider whether claims 21 and 22 should also be rejected under 35 U.S.C. § 103(a); noting that rejected claims 17 and 18 contain similar subject matter as claims 21 and 22. Two related Applications on Appeal are identified by Appellants. App. Br. 1.

September 16, 2004), Breu (U.S. Patent No. 5,225,044, issued July 6, 1993), and Kustes et al. (U.S. Patent No. 4,540,681, issued September 10, 1985). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF CASE

Appellants' invention relates to a system with three gasification reactors for converting carbonaceous feedstock into a plurality of gases and generating a methane product stream from the plurality of gases. Spec. Abstract.

Independent claim 1 is illustrative of the claimed invention[3] (emphasis added):

> 1. A gasification system to generate a plurality of gases from a catalyzed carbonaceous feedstock, and a methane product stream from the plurality of gases, the system comprising:
>
> (a) a first, a second and a third gasifying reactor unit, wherein each gasifying reactor unit independently comprises:
>
> (A1) a reaction chamber in which a catalyzed carbonaceous feedstock and steam are converted to (i) a plurality of gaseous products comprising methane, hydrogen, carbon monoxide, carbon dioxide, hydrogen sulfide and unreacted steam, (ii) unreacted carbonaceous fines; and (iii) a solid char product comprising entrained catalyst;
>
> (A2) a feed inlet to supply the catalyzed carbonaceous feedstock into the reaction chamber;

[3] As all claims are subject to the same rejection and Appellants do not separately argue the patentability of individual claims, we determine the Appeal as to all claims on the basis of claim 1. 37 C.F.R. § 39(c)(1)(iv).

(A3) a steam inlet to supply steam into the reaction chamber;

(A4) a hot gas outlet to exhaust a hot first gas stream out of the reaction chamber, the hot first gas stream comprising the plurality of gaseous products;

(A5) a char outlet to withdraw the solid char product from the reaction chamber; and

(A6) a fines remover unit to remove at least a substantial portion of the unreacted carbonaceous fines that may be entrained in the hot first gas stream;

(b) (1) *a single catalyst loading unit* to supply the catalyzed carbonaceous feedstock to the feed inlets of the first, second and third gasifying reactor units, or

(2) a first catalyst loading unit and a second catalyst loading unit to supply the catalyzed carbonaceous feedstock to the feed inlets of the first, second and third gasifying reactor units, wherein each catalyst loading unit independently comprises:

(B1) a loading tank to receive carbonaceous particulates and load catalyst onto the carbonaceous particulates to form the catalyzed carbonaceous feedstock; and

(B2) a dryer to thermally treat the catalyzed carbonaceous feedstock to reduce moisture content;

(c) (1) *when only the single catalyst loading unit is present, a single carbonaceous material processing unit* to supply the carbonaceous particulates to the loading tank of the single catalyst loading unit, or

(2) when the first and second catalyst loading units are present, (i) a single carbonaceous material processing unit to supply the carbonaceous particulates to the loading tanks of the first and second catalyst loading units, or (ii) a first and a second carbonaceous material processing unit to supply the carbonaceous particulates to the loading tanks of the first and second catalyst loading units,

wherein each carbonaceous material processing unit independently comprises:

(C1) a receiver to receive and store a carbonaceous material; and

(C2) a grinder in communication with the receiver to grind the carbonaceous material into the carbonaceous particulates;

(d) (1) *a single heat exchanger unit* to remove heat energy from the hot first gas streams from the first, second and third gasifying reactor units to generate steam and produce a single cooled first gas stream, or

(2) a first and a second heat exchanger unit to remove heat energy from the hot first gas streams from the first, second and third gasifying reactor units to generate steam and produce a first cooled first gas stream and a second cooled first gas stream, or

(3) a first, a second and a third heat exchanger unit to remove heat energy from the hot first gas stream from the first, second and third gasifying reactor units to generate steam and produce a first cooled first gas stream, a second cooled first gas stream, and a third cooled first gas stream;

(e) (1) *when only the single heat exchanger unit is present, a single acid gas remover unit* to remove at least a substantial portion of the carbon dioxide and at least a substantial portion of the hydrogen sulfide from the single cooled first gas stream, *to produce a single acid gas-depleted gas stream* comprising at least a substantial portion of the methane, at least a substantial portion of the hydrogen, and, optionally, at least a portion of the carbon monoxide from the single cooled first gas stream, or

(2) when only the first and second heat exchanger units are present, (i) a single acid gas remover unit to remove at least a substantial portion of the carbon dioxide and at least a substantial portion of the hydrogen sulfide from the first and second cooled first gas streams, to produce a single acid gas-depleted gas stream comprising at least a substantial portion of the methane, at least a substantial portion of the hydrogen, and,

optionally, at least a portion of the carbon monoxide from the first and second cooled gas streams, or (ii) a first and a second acid gas remover unit to remove at least a substantial portion of the carbon dioxide and at least a substantial portion of the hydrogen sulfide from the first and second cooled first gas streams, to produce a first acid gas-depleted gas stream and a second acid gas-depleted gas stream comprising at least a substantial portion of the methane, at least a substantial portion of the hydrogen, and, optionally, at least a portion of the carbon monoxide from the first and second cooled gas streams, or

(3) when the first, second and third heat exchanger units are present, (i) a single acid gas remover unit to remove at least a substantial portion of the carbon dioxide and at least a substantial portion of the hydrogen sulfide from the first, second and third cooled gas streams, to produce a single acid gas-depleted gas stream comprising at least a substantial portion of the methane, at least a substantial portion of the hydrogen, and, optionally, at least a portion of the carbon monoxide from the first, second and third cooled gas streams, or (ii) a first and a second acid gas remover unit to remove at least a substantial portion of the carbon dioxide and at least a substantial portion of the hydrogen sulfide from the first, second and third cooled first gas streams, to produce a first acid gas-depleted gas stream and a second acid gas-depleted gas stream, wherein the first and second acid gas-depleted gas streams together comprise at least a substantial portion of the methane, at least a substantial portion of the hydrogen and, optionally, at least a portion of the carbon monoxide from the first, second and third cooled first gas streams, or (iii) a first, a second and a third acid gas remover unit to remove at least a substantial portion of the carbon dioxide and at least a substantial portion of the hydrogen sulfide from the first, second and third cooled first gas streams to produce a first acid gas-depleted gas stream, a second acid gas-depleted gas stream and a third acid gas-depleted gas stream, wherein the first, second and third acid gas-depleted gas streams together comprise at least a substantial portion of the methane, at least a substantial portion of the hydrogen, and, optionally, at least a

portion of the carbon monoxide from the first, second and third cooled first gas stream;

(f) (1) *when only the single acid gas-depleted gas stream is present, a single methane removal unit* to separate and recover methane from the single acid gas-depleted gas stream, *to produce a single methane-depleted gas stream* and *a single methane product stream*, the single methane product stream comprising at least a substantial portion of the methane from the single acid gas-depleted stream, or

(2) when only the first and second acid gas-depleted gas streams are present, (i) a single methane removal unit to separate and recover methane from the first and second acid gas-depleted gas streams, to produce a single methane-depleted gas stream and a single methane product stream, the single methane product stream comprising at least a substantial portion of the methane from the first and second acid gas-depleted streams, or (ii) a first and a second methane removal unit to separate and recover methane from the first and second acid gas-depleted gas streams, to produce a first methane-depleted gas stream and a first methane product stream, and a second methane-depleted gas stream and a second methane product stream, the first and second methane product streams together comprising at least a substantial portion of the methane from the first and second acid gas-depleted streams, or

(3) when the first, second and third acid gas-depleted gas streams are present, (i) a single methane removal unit to separate and recover methane from the first, second and third acid gas-depleted gas streams, to produce a single methane-depleted gas stream and a single methane product stream, the single methane product stream comprising at least a substantial portion of the methane from the first, second and third acid gas-depleted streams, or (ii) a first and a second methane removal unit to separate and recover methane from the first, second and third acid gas-depleted gas streams, to produce a first methane-depleted gas stream and a first methane product stream, and a second methane-depleted gas stream and a second methane product stream, the first and second methane product streams together comprising at least a substantial portion of the methane

from the first, second and third acid gas-depleted streams, or (iii) a first, a second and a third methane removal unit to separate and recover methane from the first, second and third acid gas-depleted gas streams, to produce a first methane-depleted gas stream and a first methane product stream, a second methane-depleted gas stream and a second methane product stream, and a third methane-depleted gas stream and a third methane product stream, the first, second and third methane product stream together comprising at least a substantial portion of the methane from the first, second and third acid gas-depleted streams; and

(g) (1) *a single steam source* to supply steam to the first, second and third gasifying reactor units, or

(2) a first and a second steam source to supply steam to the first, second, and third gasifying reactor units; or

(3) a first, a second and a third steam source to supply steam to the first, second and third gasifying reactor units;

and wherein the system further comprises (r) *a sour shift unit* between a heat exchanger unit and an acid gas remover unit, to contact a cooled first gas stream with an aqueous medium under conditions suitable to convert at least a portion of carbon monoxide in the cooled first gas stream to carbon dioxide; and *a trim methanator* to enrich methane in an acid-gas depleted gas stream.

ANALYSIS

We have reviewed the Examiner's rejection under 35 U.S.C. § 103(a) in light of arguments advanced by Appellants in the Appeal Brief and Reply Brief, but are not persuaded the Examiner erred reversibly in concluding the claims are unpatentable, essentially for the reasons expressed in the Final

Office Action and the Examiner's Answer, which we adopt.[4] *See* Final Action 2–8; Ans. 2–3. We add the following for emphasis.

The Examiner has determined , *inter alia*, that Goldstein discloses a gasification system nearly identical to that claimed (Final Action 2–5 (citing Goldstein Figure, particularly for the portion of Goldstein's process/system up through the methane removal unit)), but does not explicitly disclose duplicating the various structures, or a subset of the structures, and their arrangement in parallel where duplicated (*id.* at 4–5). The Examiner concludes that duplicating any or all of these parts would have been obvious to one of ordinary skill because it would allow for duplicated parts to be taken offline for maintenance without disrupting operations and "duplicating any or all of these structures would increase the capacity of the claimed system." *Id.* at 5 (citing Breu col. 4, ll. 9–14).

As to other differences, the Examiner finds that while Goldstein teaches gasifying carbonaceous material to produce methane, it does not explicitly disclose a grinder to pulverize the feed material prior to its use or a shift reactor and methanator to increase production of methane. *Id.* at 6.

The Examiner finds Inoue also discloses a system for gasifying a carbonaceous material to produce a synthesis gas, and that Inoue teaches a grinder to pulverize feed material to increase surface area and the reaction efficiency. *Id.* at 5–6.The Examiner finds Kustes also discloses a gasification system to produce methane and teaches a shift reactor (24) and a methanator (30) to increase methane production, explaining that the shift

[4] Rather than reiterate all arguments of Appellants and the Examiner, we refer to the Final Office Action (mailed March 8, 2012), the Appeal Brief (filed July 18, 2012), the Answer (mailed September 12, 2012), and the Reply Brief (filed November 6, 2012).

reactor adjusts the composition of the synthesis gas to be favorable for conversion by the methanator into methane. *Id.* at 6. (citing Kustes col. 4, ll. 34–47).[5]

The Examiner concludes one of ordinary skill would have found it obvious to one of ordinary skill to further modify modified Goldstein (i.e., the portion of Goldstein's process/system up through the methane removal unit with duplication of a subset of structures and their arrangement in parallel) by adding the grinder of Inoue to increase the surface area of the carbonaceous material thereby increasing reaction efficiency (*id.* at 5–6) and the shift reactor and methanator of Kustes to produce more methane (*id.* at 6).

Appellants argue that the Examiner has failed to establish a prima facie case of obviousness because Goldstein teaches away from the claimed invention, one of ordinary skill would not combine the cited references, and the combination does not teach or suggest all claim limitations.

In their "teaching away" argument, Appellants emphasize that Goldstein is "directed to the ultimate production of a methanol product stream (along with a methane product stream) . . . as opposed to an 'optimized' methane product stream as required by the present claims." App. Br. 9. Appellants argue that to provide the methanol stream, Goldstein

[5] The Final Office Action omits the column number, but we find this error harmless as the relevant teaching is readily found in the cited reference. Further, we find the relied-upon teaching undisputed – Appellants do not contest Kustes teaches use of a shift reactor and methanator to produce more methane. *See, e.g.*, App. Br. 12. Indeed, Goldstein discloses the use of a water gas shift and methanator units are known prior art options for producing methane as a product from synthesis gas obtained from catalytic gasification of coal or similar carbonaceous materials (col. 1, ll. 19–25).

requires both a methanol production unit and that there is "substantial carbon monoxide content (as well as hydrogen content) in the feed stream to the methanol production unit." *Id.* Appellants also argue Goldstein teaches an optional treatment to steam reform some methane into carbon monoxide and hydrogen (syngas). *Id.* at 10. Appellants argue that removing carbon dioxide at any place in Goldstein's process would negatively impact its operation. *Id.* at 10–11; Reply Br. 5–6. Appellants then argue that Goldstein teaches away from the claimed invention because the claimed invention "includes two unit operations specifically designed to consume (and thus materially deplete) carbon monoxide content . . . the sour shift unit and the trim methanation unit," App. Br. 10; *see also* Reply Br. 6.

Whether the prior art teaches away from the claimed invention is a question of fact. *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006); *In re Harris*, 409 F.3d 1339, 1341 (Fed. Cir. 2005). It is well established that a prior art reference must be considered in its entirety, i.e., as a whole, when determining if it would lead one of ordinary skill in the art away from the claimed invention. *W.L. Gore & Assoc, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983); *cf. Para–Ordnance Manufacturing, Inc. v. SGS Importers International, Inc.*, 73 F.3d 1085, 1090 (Fed. Cir. 1995) (to teach away, a reference must state that a feature "should not" or "cannot" be used in combination with other features in the prior art.).

Having considered the record before us, we are not persuaded that Goldstein teaches away from the claimed invention. We find the Examiner's reliance on Goldstein was for its teaching of the portion of Goldstein's process/system through the methane removal unit (76) and

provision of a methane stream (77) and methane depleted stream (78), i.e., a syngas stream. Final Action 2–4; Ans. 2. While the syngas stream in unmodified Goldstein is used as the feed stream in the methanol production unit, in the relied-upon combination of, *inter alia*, Goldstein and Kustes, syngas is used as the feed stream for a methanator to produce additional methane. In this regard, representative appealed claim 1 employs the open "comprising" transitional term and is open to including other system components. Thus, claim 1 embraces a gasification/methanol production line of components such as employed in the methanol synthesis production line of Goldstein in addition to the gasification/methane synthesis line of unit operations called for in representative claim 1. After all, both methane and methanol are desirable products.

Accordingly, we do not find the teachings of Goldstein directed to optimizing the syngas composition for the production of methanol constitute any manner of teaching away from optimizing the syngas composition for the production of methane. Nor do we find Goldstein's teaching of an optional treatment to reform some methane into carbon monoxide and hydrogen (App. Br. 10; Reply Br. 5) constitutes any teaching away as being optional it also teaches that it is not used.

In their argument why one of ordinary skill would not combine the references, Appellants argue that the system of Kustes would not be utilized or even considered for use with the system of either Goldstein or Inoue because it would deplete carbon monoxide used in both Goldstein and Inoue for the production of methanol. App. Br. 10–11. On this basis, Appellants argue that "[a]ny combination of the disclosure of Kustes et al. with the

other disclosures, therefore, cannot be legally or factually supported." *Id.* at 11.

We do not find this argument persuasive of reversible error because it does not address the rejection set forth by the Examiner. As we explain above, the Examiner relies on the collective teachings of the applied prior art including a portion of the system/process of Goldstein for its teaching of system/process to provide, *inter alia*, a feed stream of syngas. The Examiner relies on Kustes for its teaching of, *inter alia*, a shift reactor and methanator to optimize methane production from the syngas. The fact that Goldstein includes a methanol synthesis reactor to use the syngas falls short of showing one of ordinary skill would not look to Goldstein in the manner set forth by the Examiner. As to Inoue, the Examiner relies on it for its teaching of grinding feedstock (Final Action 7), which teaching is undisputed (App. Br. 11), and Appellants' arguments one of ordinary skill would not combine it with Goldstein and Kustes lacks merit.

In their argument that the combination of references does not teach or suggest all claim limitations, Appellants argue that the claimed invention is "an overall system configuration where certain units are duplicated and other units are combined . . . in order to achieve an integrated system that is both commercially functional and commercially feasible for the intended purpose" and that the invention is "more than just duplication of the central gasification reactors." *Id.* at 11–12. On this basis Appellants argue that the teaching of duplication to increase capacity in Breu falls short, as does the Examiner's reasoning, because "[t]he Examiner has provided no technical basis that would lead a person or [sic] ordinary skill . . . to make the choices set forth in the presently claimed invention." *Id.* at 12; *see also* Reply Br. 6.

Having considered the record before us, we find no reversible error in the Examiner's determination that combining or duplicating certain process units has no patentable significance unless a new and unexpected result is produced. Final Action 4–5, 8; Ans. 3. We find Appellants have not provided any evidence that there is any new or unexpected result, only attorney argument as to a "system that is both commercially functional and commercially feasible for the intended purpose" (App. Br. 12) and this lacks merit both because attorney argument is not evidence and because the claims are not so limited. Finally, we find that claim 1, which recites different numbers of elements in the alternative, encompasses a system where the only duplicated element may be the gasification reactor. *See* italicized text in representative claim 1 above. For these reasons and those set forth by the Examiner, we are unpersuaded the Examiner erred in finding one of ordinary skill would have found it obvious to duplicate or combine various known process units to arrive at the claimed invention.

In view of the foregoing, we determine that Appellants have not identified reversible error in the Examiner's conclusion that Goldstein, Kustes, Inoue, and Breu, would have suggested the system for preparing a methane stream from carbonaceous material as recited in the claims on appeal within the meaning of 35 U.S.C. § 103(a).

DECISION

We AFFIRM the Examiner's decision rejecting claims 1, 2, 7, 8, and 11–20.

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). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2010).

AFFIRMED

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