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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PHILLIP C. BADGER

Appeal 2011-009338
Application 11/480,914
Technology Center 1700

Before BRADLEY R. GARRIS, ROMULO H. DELMENDO, and GRACE KARAFFA OBERMANN, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge.*

DECISION ON APPEAL

The Appellant[1] seeks our review under 35 U.S.C. § 134(a) of a rejection of claims 2, 3, and 6-16.[2] We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

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[1] The Appellant is identified as the real party in interest. Appeal Brief filed December 6, 2010 ("App. Br.") 1.

[2] Claim 1 was canceled by amendment on September 13, 2010.

STATEMENT OF THE CASE

The invention relates to "a system for the conversion of carbonaceous feedstocks into useful sources for energy, chemicals, or other materials." Specification ("Spec.") 3, ll. 2-4. According to the Appellant, the carbonaceous feedstocks may be selected from a wide variety of carbonaceous materials including, but not limited to, wood, wood residues, manure, tires, heavy hydrocarbons, or coal fines. Spec. 10, ll. 3-11. Figure 2 of the subject application is reproduced below:

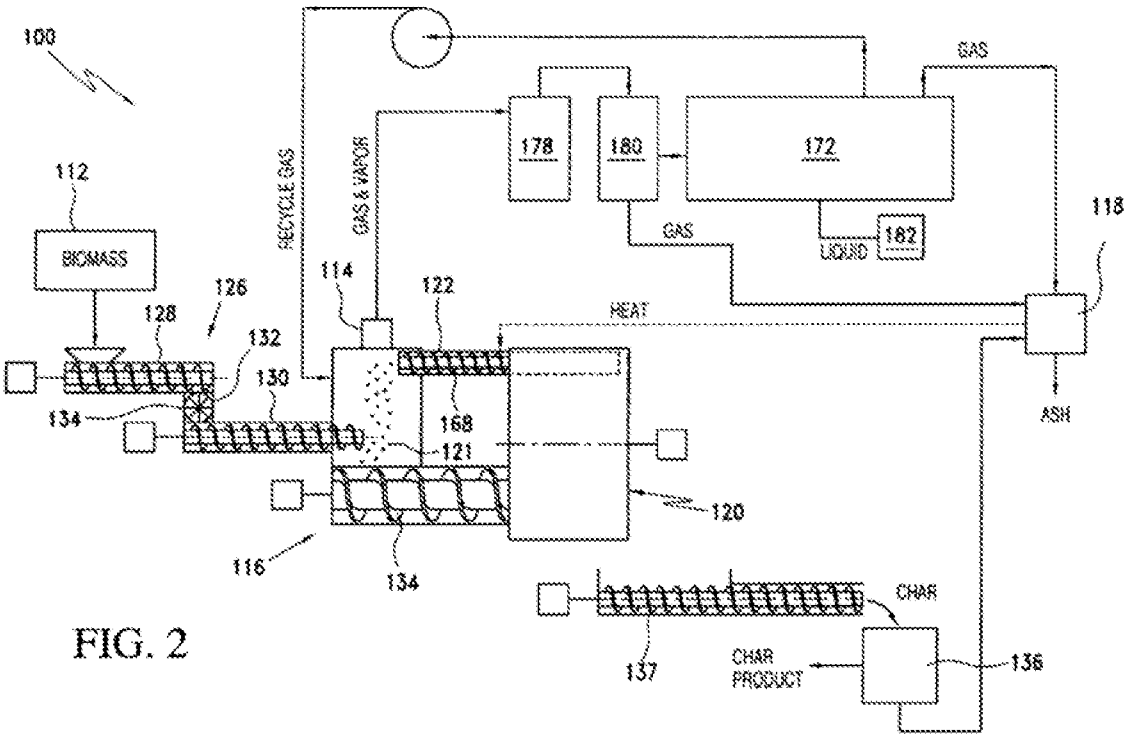

FIG. 2

Figure 2 above illustrates a preferred embodiment of the invention in the form of a "system 100 for the pyrolytic conversion of carbonaceous

feedstock (such as waste carbonaceous materials including biomass) into useful sources for energy, chemicals, and other materials, for example liquids, char and gases used in the production of energy." Spec. 9, l. 19 to 10, l. 3. In this embodiment, dried carbonaceous feedstock is fed into a storage hopper 112 and subsequently injected (by action of a rotating feed auger 126) into or above a bed of downwardly flowing heat carrier 121 in a pyrolytic reactor chamber 116; char, ash, and the heat carrier 121 exit the pyrolytic reactor chamber 116 via a separation and recovery mechanism 120 where the heat carrier 121 is recovered for further use via heat exchanger 122 in the form of a jacketed auger and separated from the char; the char is passed to a char storage hopper 136 via an auger 137; a portion of the char is removed from the hopper 137 and sent to char/syngas burner (furnace) 118 as needed for process heat; and gas and vapor depart the pyrolytic reactor chamber 116 via a tube 114 into char trap 178, a tar trap 180,and a condenser system 172. *See generally* Spec. 10-20.

Representative claim 6 is reproduced below (with bracketed drawing reference numerals and italics highlighting key disputed limitations added):

> 6. A *fast pyrolysis system* for the conversion of carbonaceous feedstocks into useful sources for energy, chemicals, or other materials, comprises:
>
> a reactor chamber [116] for receiving carbonaceous feedstock and heat carrier [121] for processing of the feedstock in the generation of useful sources for energy, chemicals, or other materials, *the reactor chamber* [116] *heating the feedstock in conjunction with a heat carrier* [121] *composed of*

> *a particulate heat exchange material in an oxygen depleted environment*;
>
> a char separation and recovery mechanism [120] linked to the reactor chamber [116] for separating char produced as a result of processing of feedstock within the reactor chamber [116] from the heat carrier [121];
>
> a condenser [172] in communication with the reactor chamber [116] for receiving gas and vapor from the reactor chamber [116], wherein the condenser [172] includes a fractional condensation column; and
>
> *a furnace* [118] *linked to the char separation and recovery mechanism* [120] *providing energy for operation of the system.*

App. Br. 32 (Claims App'x.).

The Examiner rejected the claims under 35 U.S.C. § 103(a) as follows:

I. Claims 6 and 13 as unpatentable over Wolcott[3] and Scott;[4]

II. Claims 2, 3, 7-11, and 14-16 as unpatentable over Wolcott, Scott, and Solbakken;[5] and

III. Claim 12 as unpatentable over Wolcott, Scott, Solbakken, and Masemore.[6]

Examiner's Answer entered January 28, 2011 ("Ans.") 3-18.

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[3] U.S. Patent 4,246,093 issued January 20, 1981.
[4] U.S. Patent Application Publication 2004/0237957 A1 published December 2, 2004.
[5] U.S. Patent 4,284,616 issued August 18, 1981.
[6] U.S. Patent Application Publication 2004/0182001 A1 published September 23, 2004.

DISCUSSION[7]

I.

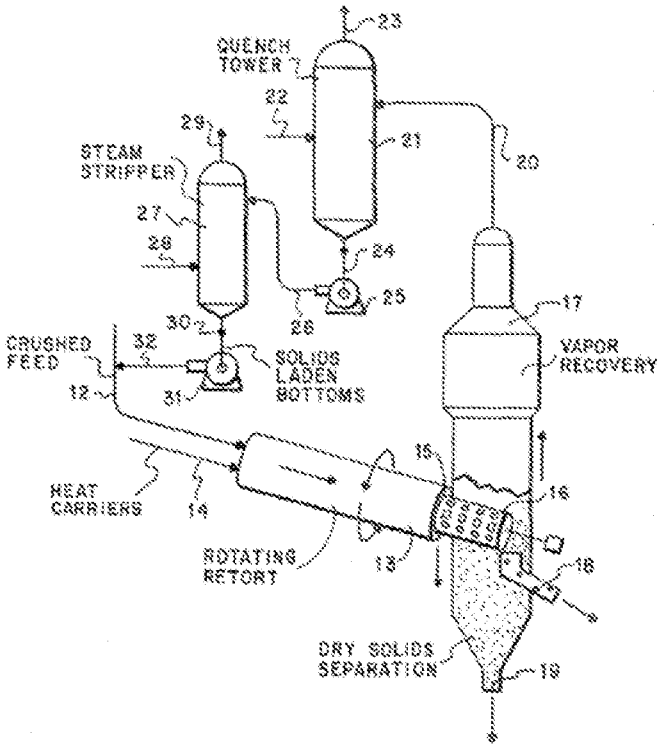
We start with Rejection I. The Examiner indicated in the statement of rejection that claim 1 stands rejected. Ans. 3. As noted above, however, claim 1 was canceled by amendment. Therefore, claims 6 and 13 are the only claims subject to this ground of rejection.

Claim 6:

Wolcott describes an apparatus for retorting crushed solid carbonaceous material from coal, oil shale, or tar sands mine at temperatures of between 700ºF and 1,200ºF using heated solids to provide at least 50% of the heat for the retort to produce a retort effluent mixture of carbonaceous oil vapors (oil gases and mist) and hydrocarbon gases. Col. 1, ll. 55-61.

[7] In our discussion, we do not address new arguments, such as those based on new evidence, raised for the first time in the Reply Brief filed May 31, 2011. 37 C.F.R. §§ 41.37(c)(1)(vii) and 41.41(a)(2). *See also Ex parte Borden*, 93 USPQ2d 1473 (BPAI 2010) (informative).

Wolcott's sole figure is reproduced below:



Wolcott's figure depicts a system for carrying out a preferred sequence for handling and disposing of solids-laden bottoms in a retorting facility using recycled heat carriers to heat the retort. Col. 2, ll. 33-37. According to Wolcott, "normally solid carbonaceous organic matter in oil shale, coal or tar sands is *pyrolyzed* or retorted" (emphasis added) in the system.[8] Col. 2,

[8] Wolcott defines the term "retorting" as referring to the use of hot heat carriers to thermally convert the organic carbonaceous substances in oil shale, coal, or tar sands to oil vapors and gases, thus leaving solid particulate spent matrix or inorganic material, and does not include liquefaction processes using heated liquids or slurries or processes using combustion or hot gases to directly retort the carbonaceous matter. Col. 2, ll. 45-53.

ll. 41-45. Specifically, Wolcott teaches that crushed raw or fresh carbonaceous material is fed into rotating retort 13 via crushed feed inlet 12 and, at the same time, hot heat carrying retort solids at an average temperature of between 1,000ºF and 1,400ºF are fed by gravity or other mechanical means to the retort 13 via hot retort solids inlet pipe 14. Col. 2, l. 62 to col. 3, l. 3. Wolcott states that a mixture of vapor effluents and solids exits the retort at an elevated temperature and passes into revolving screen or trammel 16, which has openings or apertures sized to pass the heat carrier solids and the part of the spent matrix material that is equal to or smaller than the heat carriers. Col. 3, ll. 56-60. Wolcott further discloses that "[i]n the trommel, the gaseous and vaporous effluents containing a desired hydrocarbon value separate from the solids and at the same time, at least a portion of the larger spent matrix particles or agglomerates are separated from the remaining solids and pass outward through line 18." Col. 3, ll. 62-68. "The remaining solids [are said to] pass through the openings in the trommel and drop to the bottom of the vapor recovery section [17] to exit via solids exit line 19 where the solids are processed (not shown) *for recovery and reheating of the heat carriers*." Col. 3, l. 68 to col. 4, l. 4 (emphasis added). Additionally, Wolcott teaches that "[t]he carbonaceous feedstock *may* or may not be preheated by direct or indirect heating means." Col. 3, ll. 5-7 (emphasis added). Wolcott also discloses the use of a quench oil in quench tower 21 "to rapidly cool the oil vapors and remove the particulate inorganic matter entrained in the oil vapors." Col. 4, ll. 47-50.

As correctly acknowledged by the Examiner, Wolcott does not specifically disclose a furnace linked to a char separation and recovery mechanism to provide energy for operation of the system, as required by claim 6. Ans. 4.

Scott, however, discloses "a burner for generating heat from combustion of low grade fuels including biomass material such as animal manure and 'greenwaste' materials." ¶ [0002]. Scott teaches that primary combustion creates char, which in a secondary combustion zone is combined with volatile gases from the fuel to produce "a very high and efficient reaction." ¶ [0014].

Given the collective teachings of Wolcott and Scott, we find no error in the Examiner's conclusion that

> [i]t would have been obvious to one having ordinary skill in the art . . . to provide a furnace linked to the separation and recovery mechanism in Wolcott's apparatus, as taught by Scott, in order to produce a very high and efficient reaction and benefit from the energy of the reaction in support of the pyrolysis process in general.

Ans. 5. While Scott specifically mentions animal manure and "greenwaste" as the feedstock, its overall disclosure encompasses biomass materials in general and therefore a person skilled in the art would have considered its teachings where char is produced. In this regard, "[w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one." *KSR*

Int'l. Co. v. Teleflex Inc., 550 U.S. 398, 417 (2007). "If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *Id.*

In any event, the Appellant does not offer any reasonably specific arguments contesting the Examiner's reasoning that a person of ordinary skill in the art would have combined the teachings of Wolcott and Scott. App. Br. 11-16. Rather, the Appellant's principal contention is that the Examiner's rejection is flawed because "Wolcott does not disclose a reactor chamber for a fast pyrolysis system as claimed" but rather a retort. App. Br. 13. According to the Appellant, "[r]etorting is not *commonly* done within the North American scientific community with regard to fast pyrolysis procedures" and "*[i]n general*, the term 'retort' is used to describe a slow pyrolysis reactor such as used for charcoal production." *Id.* (emphases added). Specifically, the Appellant argues that "[b]y definition, a fast pyrolysis reaction must be completed within roughly 1 second and the vapors quenched in roughly 2 seconds," whereas Wolcott discloses a reactor residence time of 3 to 20 minutes. *Id.* at 14 (citing Wolcott's col. 3, ll. 50-51). The Appellant also argues that "[t]he claimed invention requires an oxygen depleted environment and Wolcott provides no disclosure regarding the oxygen content employed in conjunction with the retort." *Id.* at 13.

The Appellant's arguments in support of the patentability of claim 6 are ineffective to show reversible error in the Examiner's rejection. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011).

We agree with the Examiner that the manner of operating the claimed system does not confer patentability to the claims in the absence of evidence demonstrating that the prior art structure is incapable of being operated in the manner recited in the claims. Ans. 13-14. *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997) (holding that claims for conical dispensing top for popped popcorn unpatentable over prior art disclosing conical spout for open-ended containers, which contains all structural limitations recited in the claims); *In re Sinex*, 309 F.2d 488, 492 (CCPA 1962) (holding that a statement of intended use in a claim fails to distinguish over the prior art apparatus); *In re Wolfe*, 251 F.2d 854, 855 (CCPA 1958) ("The characterization of a massage device for 'dental' use, as distinguished from use on other parts of the body, is not a patentable distinction since in the apparatus claims before us it points to no structural difference."); *In re Hack*, 245 F.2d 246, 248 (CCPA 1957) (explaining that the grant of a patent on a composition or machine cannot be predicated on a new use of that composition or machine).

Moreover, as pointed out by the Examiner, Ans. 4, Wolcott explicitly states that "the normally solid carbonaceous organic matter in oil shale, coal or tar sands is *pyrolyzed* or retorted." Col. 2, ll. 41-45. Furthermore, as acknowledged by the Appellant at page 13 of the Appeal Brief, "pyrolysis may not require oxygen." Indeed, the Appellant does not assert that pyrolysis is normally performed in an oxygen-containing or oxygen-rich environment. Absent an explicit requirement for an oxygen atmosphere in

Wolcott, a person of ordinary skill in the art would have found it obvious to operate Wolcott's pyrolysis system under oxygen depleted conditions with the expectation that such conditions would yield successful results.

The Appellant's contention that the term "retort" is used to describe "a slow pyrolysis system" (and not a "fast pyrolysis system" as recited in claim 6) is mere attorney argument entitled to little or no probative weight. Here, claim 6 does not place any limitation on process variables such as the identity of the carbonaceous material, the amount and/or flow rate of the carbonaceous material, the size of the reactor chamber, or the conditions in the reactor chamber. The Appellant's opening brief fails to direct us to persuasive evidence demonstrating that Wolcott's system is incapable of operating as a "fast pyrolysis system" under oxygen depleted conditions in all situations falling within the scope of claim 6.

For these reasons, we uphold the Examiner's rejection of claim 6.

Claim 13:

The Appellant argues claim 13 in the section of the Appeal Brief addressing Rejection II. App. Br. 16, 18-20. Therefore, we address the Appellant's argument in support of claim 13 as part of our discussion of Rejection II below.

II.

Claim 2:

Claim 2 reads as follows:

> 2. A fast pyrolysis system for the conversion of carbonaceous feedstocks into useful sources for energy, chemicals, or other materials, comprises:
>
> a reactor chamber for receiving carbonaceous feedstock and heat carrier for processing of the feedstock in the generation of useful sources for energy, chemicals, or other materials, the reactor chamber heating the feedstock in conjunction with a heat carrier composed of a particulate heat exchange material in an oxygen depleted environment;
>
> a char separation and recovery mechanism linked to the reactor chamber for separating char produced as a result of processing of feedstock within the reactor chamber from the heat carrier;
>
> a condenser in communication with the reactor chamber for receiving gas and vapor from the reactor chamber;
>
> a furnace linked to the char separation mechanism providing energy for operation of the system; and
>
> *a heat exchanger through which heat carrier from the char separation and recovery mechanism is reheated and recirculated to the reactor chamber, wherein the heat exchanger is a jacketed auger through which heat from the furnace passes for heating the heat carrier as it is carried back to the reactor chamber.*

App. Br. 28 (emphasis added).

With respect to claim 2, the Examiner found that Wolcott does not describe the limitation highlighted in italics above. Ans. 6. To account for

this difference, the Examiner relied on Solbakken, which was found to teach the "use [of] a heat exchanger in the form of a jacketed auger/screw reactor in order to provide indirect heating through the walls of the jacketed auger." *Id.* (citing Solbakken's col. 1, l. 67 to col. 2, l. 2). The Examiner concluded that "it would have been obvious to one having ordinary skill in the art . . . to provide a heat exchanger in the form of a jacketed auger in Wolcott's apparatus, as taught by Solbakken, in order to provide indirect heating through the walls of the jacketed auger." *Id.*

The Appellant appears to rely on the same arguments offered in support of claim 6. App. Br. 16-17. We find these arguments unpersuasive for the same reasons given in our discussion of Rejection I.

The Appellant also argues that "[w]hile Solbakken does disclose the use of a jacketed screw reactor for indirect heating, this [reference] does not teach the very specific arrangement of the structure defined in claim 2." App. Br. 18. Specifically, the Appellant argues that the prior art references do not disclose the requirement in claim 2 "that heat from a furnace linked to the char separation mechanism be applied to the heat exchanger which carries the heat carrier back to the reactor chamber." *Id.*

We find no persuasive merit in the Appellant's position. Wolcott explicitly teaches recovery and reheating of the heat carrier. Col. 3, l. 68 to col. 4, l. 4. As stated in our discussion of Rejection I above, a person of ordinary skill in the art would have been prompted to provide a furnace that uses the Wolcott's char to supply process heat, including the heat required to

reheat the recovered heat carrier. The use of a heat exchanger in the form of a jacketed auger, as shown in Solbakken, in combination with a furnace to accomplish the goal stated in Wolcott would have been within the level of ordinary skill in the art as an obvious design choice. "When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *KSR*, 550 U.S. at 421.

For these reasons, we uphold the Examiner's rejection of claim 2.

Claim 13:

The Appellant argues that the "very specific relationship, wherein energy from the furnace is transferred to heat carrier via the heat exchanger while the heat carrier is transported from the separation and recovery mechanism to the reactor chamber, is neither disclosed nor suggested in the cited references." App. Br. 18-19.

We do not find the Appellant's argument to be an argument in support of separate patentability pursuant to 37 C.F.R. § 41.37(c)(1)(vii). *In re Lovin*, 652 F.3d 1349, 1356-57 (Fed. Cir. 2011).

Even if the argument were an argument in support of separate patentability, we do not find it persuasive for the same reasons given for claim 2.

Claims 3 & 14:

The Appellant relies on the same arguments offered in support of claims 2, 6, and 13. App. Br. 21-23. We find these arguments unpersuasive for the same reasons discussed above.

Claims 7 & 8:

The Appellant relies on the same arguments offered in support of claim 6. App. Br. 23. We find these arguments unpersuasive for the same reasons discussed above.

Claims 9-11, 15, & 16:

With respect to claims 9, 10, 15, and 16, the Appellant relies on the same argument offered in support of claims 2, 6, and 13. App. Br. 23-25, 26-27. Again, we find these arguments unpersuasive.

With respect to claim 11, which recites "a dr[y]er in communication with the reaction chamber, wherein a feed mechanism transfers the feedstock from the dryer to the reactor chamber," the Appellant argues that the Examiner's reliance on Scott is erroneous because Scott discloses the use of low grade fuels including biomass material such as animal manure and "greenwaste" materials, whereas Wolcott is concerned with crushed solid carbonaceous material from a coal, oil shale or tar sands. App. Br. 25. According to the Appellant, "the water content [in Wolcott's feedstock] is

very low and there would be no need for drying in the same manner as required by Scott. *Id.* at 25-26.

We find no reversible error in the Examiner's factual findings and legal conclusion as set forth in Answer at page 11. As we discussed above, Scott's overall disclosure is not limited to combustion of animal manure and "greenwaste" and, therefore, a person of ordinary skill in the art would have considered its teachings even in the context of Wolcott's disclosure.

III.

Claim 12:

The Appellant relies on the same arguments offered for claim 10, which in turn relies on the same arguments offered for claims 2, 6, and 13. App. Br. 27. For the reasons already stated, we find these arguments unpersuasive to show reversible error.

SUMMARY

The Examiner's rejection under 35 U.S.C. § 103(a) of claims 6 and 13 as unpatentable over Wolcott and Scott is affirmed.

The Examiner's rejection under 35 U.S.C. § 103(a) of claims 2, 3, 7-11, and 14-16 as unpatentable over Wolcott, Scott, and Solbakken is affirmed.

The Examiner's rejection under 35 U.S.C. § 103(a) of claim 12 as unpatentable over Wolcott, Scott, Solbakken, and Masemore is affirmed.

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

AFFIRMED

kmm