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DICKINSON WRIGHT PLLC 1825 EYE ST., NW SUITE 900 WASHINGTON, DC 20006			TANENBAUM, TZVI SAMUEL	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WILLIAM A. KELLEY

Appeal 2019-005077
Application 14/673,462
Technology Center 3700

Before MICHAEL C. ASTORINO, JAMES A. WORTH, and
AMEE A. SHAH, *Administrative Patent Judges*.

ASTORINO, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 23–36 and 47–54. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. The Appellant identifies the real party in interest as William A. Kelley. Appeal Br. 4.

STATEMENT OF THE CASE

Claimed Subject Matter

Claims 23, 29, and 50 are the independent claims on appeal.

Claim 23, reproduced below, is illustrative of the claimed subject matter.

23. A heat pump system comprising:
- a hot side heat exchanger that defines an inlet port and an outlet port, the hot side heat exchanger configured to exchange heat with ambient air on a hot side of the heat pump system;
 - a cold side heat exchanger that defines an inlet port and an outlet port;
 - a means for expanding gas and extracting work from expansion of gas, the means for expanding having an inlet port and an outlet port, the inlet port of the means for expanding coupled to the outlet port of the hot side heat exchanger, and the outlet port of the means for expanding coupled to the inlet port of the cold side heat exchanger;
 - a means for compressing gas coupled to the means for expanding, the means for compressing utilizing at least some of the work extracted by the means for expanding for compressing gas, the means for compressing having an inlet port and an outlet port, the inlet port of the means for compressing coupled to the outlet port of the cold side heat exchanger, and the outlet port of the means for compressing coupled to the inlet port of the hot side heat exchanger;
 - a means for adding mechanical work to the means for compressing gas, the means for adding mechanical work provides less than all the mechanical work used by the means for compressing gas; and
 - a means for transporting heat from the cold side heat exchanger to the hot side heat exchanger through the means for compressing, the means for transporting heat moves within an internal flow path of the heat pump system;

the heat pump system comprises a closed cycle, the means for transporting heat has a constant total mass and constant total volume, and the means for transporting heat remains in gas phase throughout the heat pump system.

Rejections

Claims 23–25, 28–31, 34, 35, and 47–49 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth (US 2014/0311167 A1, pub. Oct. 23, 2014) and Kikuchi et al. (US 2007/0101755 A1, pub. May 10, 2007) (“Kikuchi”).

Claims 26 and 33 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth, Kikuchi, and Robinson, Jr. et al. (US 4,009,587, iss. Mar. 1, 1977) (“Robinson”).

Claims 27 and 32 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth, Kikuchi, and Sauterleute (US 6,199,387 B1, iss. Mar. 13, 2001).

Claims 36, 50, 53, and 54 stand rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth, Kikuchi, and Okamoto et al. (US 2010/0275634 A1, pub. Nov. 4, 2010) (“Okamoto”).²

Claim 50 stands rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth, Kikuchi, Okamoto, and Bergman, Jr. et al. (US 5,524,442, iss. June 11, 1996) (“Bergman”).

² The heading for the rejection under 35 U.S.C. § 103 as unpatentable over Hugenroth, Kikuchi, and Okamoto omits claim 54 (Final Act. 16), but the Examiner analyzes claim 54 in the body of the rejection (*id.* at 20). Therefore, we understand claim 54 to be rejected by the Examiner under this ground of rejection.

Claim 51 stands rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth, Kikuchi, Okamoto, and Sauterleute.

Claim 52 stands rejected under 35 U.S.C. § 103 as being unpatentable over Hugenroth, Kikuchi, Okamoto, and Robinson.

ANALYSIS

Independent claim 23 recites “a hot side heat exchanger that defines an inlet port and an outlet port, the hot side heat exchanger configured to exchange heat with ambient air on a hot side of the heat pump system.” Appeal Br. 44.

For the rejection of claim 23, the Examiner finds that Hugenroth’s Ericsson cycle device includes “hot side heat exchanger 55 that defines an inlet port and an outlet port (not labeled).” Final Act. 4 (emphasis omitted) (citing Hugenroth Fig. 3); *see* Hugenroth ¶ 61. However, the Examiner also finds that Hugenroth’s device fails to teach “the hot side heat exchanger configured to exchange heat with ambient air on a hot side of the heat pump system.” Final Act. 5–6 (emphasis omitted).

The Examiner turns to Kikuchi’s disclosure to remedy Hugenroth’s deficiency. *Id.* at 6. The Examiner finds that Kikuchi’s Figure 2, “directed to a compressor-turbine type heat pump, teaches a hot side heat exchanger 120 configured to exchange heat with ambient air (e.g. via fan F).” *Id.* The Examiner determines “[i]t would have been obvious to one of ordinary skill in the art . . . to modify Hugenroth by Kikuchi with the motivation of obtaining a relatively simple and inexpensive method of rejecting heat and eliminating the need for a water cooler from the design.” *Id.*

The Appellant points out that Hugenroth's Ericsson cycle device is designed to avoid adiabatic behavior (i.e., "[t]he heat exchangers added by Hugenroth are to keep the device as close as possible to isothermal"). Reply Br. 15. The Appellant argues that the proposed modification would change Hugenroth's Ericsson cycle device — specifically, heat exchanger 55 — to operate adiabatically. *See* Appeal Br. 21–22; Reply Br. 9–11, 15. The Appellant's argument is persuasive.

The Examiner's rejection relies on the reasoning that a skilled artisan would have been motivated to replace Hugenroth's hot heat exchanger 55 with Kikuchi's hot side heat exchanger 120, which according to the Examiner is configured to exchange heat with ambient air (e.g., via fan F), in order to obtain a relatively simple and inexpensive method of rejecting heat and eliminating the need for a water cooler from the design. Final Act. 6. The Examiner acknowledges the Appellant's argument and appears to agree with Appellant that the proposed modification would change the isothermal behavior of Hugenroth's device to be adiabatic. *See* Ans. 5–6. However, the Examiner fails to adequately explain, on the record, why one of ordinary skill in the art would have modified Hugenroth's Ericsson cycle, which relies on isothermal or near isothermal behavior, to operate using a different type of thermodynamic cycle.

Thus, we do not sustain the Examiner's rejection of independent claim 23 as unpatentable over Hugenroth and Kikuchi. We likewise do not sustain the rejection of dependent claims 24, 25, 28, and 47–49 under the same ground of rejection.

The Examiner's rejection of independent claim 29 relies on the same findings and reasoning as discussed above. *See* Final Act. 11, Ans. 5–6. For

the reasons discussed above, we do not sustain the Examiner's rejection of independent claim 29 as unpatentable over Hugenroth and Kikuchi. We likewise do not sustain the rejection of dependent claims 30, 31, 34, and 35 under the same ground of rejection.

The Examiner's rejections of independent claim 50 rely on similar findings and reasoning as discussed above. *See* Final Act. 17–25, Ans. 5–6. The deficiency in these rejections is not cured by the additional findings and/or reasoning associated therewith. Thus, we do not sustain the Examiner's rejection of claim 50 as unpatentable over Hugenroth, Kikuchi, and Okamoto, or the Examiner's rejection of claim 50 as unpatentable over Hugenroth, Kikuchi, Okamoto, and Bergman.

The remaining rejections of dependent claims 26, 27, 32, 33, 36, and 51–54 also fail to include additional findings and/or reasoning that cures the deficiency in the rejections of the independent claims from which they depend.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
23–25, 28–31, 34, 35, 47–49	103	Hugenroth, Kikuchi		23–25, 28–31, 34, 35, 47–49
26, 33	103	Hugenroth, Kikuchi, Robinson		26, 33
27, 32	103	Hugenroth, Kikuchi, Sauterleute		27, 32
36, 50, 53, 54	103	Hugenroth, Kikuchi, Okamoto		36, 50, 53, 54

Appeal 2019-005077
Application 14/673,462

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
50	103	Hugenroth, Kikuchi, Okamoto, Bergman		50
51	103	Hugenroth, Kikuchi, Okamoto, Sauterleute		51
52	103	Hugenroth, Kikuchi, Okamoto, Robinson.		52
Overall Outcome				23–36, 47–54

REVERSED