UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* JOOST J. BRASZ and BRUCE P. BIEDERMAN

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Appeal No. 2006-1959
Application No. 10/293,711
Technology Center 3700

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ON BRIEF

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Before OWENS, CRAWFORD and BAHR, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal from the examiner's rejection of claims 1-3, 6-10, 12-15 and 18-21 under 35 U.S.C. § 103. The provisional obviousness-type double patenting rejection set forth in the final rejection (mailed April 5, 2005) was not repeated in the examiner's answer (mailed October 18, 2005). We thus presume that this rejection has been overcome by the Terminal Dislaimer filed May 12, 2005 and that claims 4, 5, 11, 16, 17 and 22 stand objected to as depending from a rejected claim and are not involved in this appeal.

We AFFIRM-IN-PART.

## BACKGROUND

The appellants' invention relates to an organic Rankine cycle system and methods and apparatus for using such Rankine cycle system (specification, p. 1). A copy of the claims under appeal is set forth in the appendix to the appellants' brief.

The examiner relies upon the following as evidence of unpatentability:

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| Amir | US 4,458,493 | Jul. 10, 1984 |
| Brasz | US 5,266,002 | Nov. 30, 1993 |
| Hay | US 6,393,840 B1 | May 28, 2002 (Mar. 1, 2000) |
| Hanna | US 6,598,397 B2 | Jul. 29, 2003 (Aug. 10, 2001) |

The following rejections are before us for review.

Claims 1, 9 and 13 stand rejected under 35 U.S.C. § 103 as being unpatentable over Amir in view of Hanna.

Claims 6-8, 12 and 18-21 stand rejected under 35 U.S.C. § 103 as being unpatentable over Amir in view of Hanna and Hay.

Claims 2, 3, 10, 14 and 15 stand rejected under 35 U.S.C. § 103 as being unpatentable over Amir in view of Hanna and Brasz.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding this appeal, we make reference to the examiner's answer for the examiner's complete reasoning in support of the rejections and to the appellants' brief (filed August 25, 2005) and reply brief (filed November 29, 2005) for the appellants' arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the following determinations.

With respect to the rejection of claims 1, 9 and 13 as being unpatentable over Amir in view of Hanna, the appellants have elected to argue all of the claims together as a single group. Therefore, in accordance with 37 CFR § 41.37(c)(1)(vii), we have selected claim 1 as the representative claim to decide the appeal of this rejection, with claims 9 and 13 standing or falling therewith.

Amir discloses an organic Rankine cycle wherein a pump P is used to circulate liquid organic fluid, such as Freon, to a boiler 24 where waste heat is absorbed by the refrigerant to vaporize the refrigerant, with the vaporized organic fluid passing first through a plurality of nozzles (nozzle box 58 and nozzles 64) and then through a turbine 28, with the resulting cooled vapor then passing through a condenser 38 for condensing the vapor to a liquid. The appellants do not appear to contest the examiner's determination that Amir discloses all of the limitations of claim 1 with the exception of the refrigerant being R-245fa.

The examiner relies on Hanna as evidence that R-245fa was known in the art at the time of appellants' invention as a refrigerant for use in organic Rankine cycles. In particular, Hanna teaches:

> The organic working fluid is preferably either a halocarbon refrigerant or a naturally-occurring hydrocarbon. Examples of the former include R-245fa, while examples of the latter include some of the alkanes, such as isopentane. Other known working fluids and refrigerants, despite exhibiting attractive thermodynamic properties, are precluded for other reasons. For example, R-11 is one of a class of refrigerants now banned in most of the world for environmental reasons [col. 3, ll. 42-50].

According to the examiner, it would have been obvious to one of ordinary skill in the art at the time appellants' invention was made to use R-245fa as the working fluid in Amir's system for the purpose of achieving the appropriate work output due to the special characteristics of that working fluid (answer, p. 4). Additionally, the examiner reasons that one skilled in the art would have been motivated to use a refrigerant such as R-245fa because it is more environmentally friendly, even if its use in the Amir system may result in a reduction in efficiency (answer, p. 9).

Hanna's identification of R-245fa as a suitable working fluid because of its recognized attractive thermodynamic properties, and relative environmental friendliness, establishes a reasonable basis to support the examiner's conclusion that its use in a Rankine-cycle power plant of the type taught by Amir would have been obvious to one of ordinary skill in the art. As evidenced by the discussion of refrigerants by Hanna noted above, refrigerants are selected not solely on the basis of attractive thermodynamic properties or efficiency, but also on the basis of whether they are objectionable or banned for environmental reasons.

The appellants' brief, at page 5, provides argument that the Amir turbine concept is not compatible with R-245fa because it requires the diameter of the axial first stage rotor to be larger than the inlet diameter of the second stage radial inflow rotor, thereby limiting efficient turbine operation to pressure ratios less than those required in typical organic Rankine-cycle applications when using this fluid. The appellants, however, have not supported this assertion with evidence or a complete technical explanation as to why this is necessarily the case. An attorney's arguments in a brief cannot take the place of evidence. *In re Pearson*, 494 F.2d 1399, 1405, 181 USPQ 641, 646 (CCPA 1974). Moreover, the appellants have not offered any comparison between the efficiency attainable using the disclosed Freon in the Amir system and that attainable using R-245fa in the Amir system in place of the Freon or asserted that any resulting decrease in efficiency is sufficiently great as to outweigh the social pressures for improving the environment (see reply brief, p. 3).

In light of the above, the rejection of claim 1, as well as claims 9 and 13 standing or falling therewith, is sustained. Inasmuch as the appellants have not separately argued the patentability of claims 6, 8, 12, 18, 20 and 21 apart from claim 1, the rejection of these claims as being unpatentable over Amir in view of Hanna and Hay is also sustained (*see In re Young*, 927 F.2d 588, 590, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991); *In re Wood*, 582 F.2d 638, 642, 199 USPQ 137, 140 (CCPA 1978)).

With regard to the rejection of claims 7 and 19 as being unpatentable over Amir in view of Hanna and Hay, the appellants' only argument is that, "although the Hay reference does disclose a rankine cycle being heated by the waste heat from an internal combustion engine 12 it does not show or suggest the extraction of heat from the exhaust of an internal combustion [engine] as recited in claims 7 and 19" (brief, p. 7). This argument is not well taken in light of Hay's express discussion (col. 1, ll. 27-31) in the background section of the patent of waste heat recovery systems in which "hot engine coolant and hot engine exhaust gas are circulated through heat exchangers to vaporize a working fluid before the same enters a vapor engine for providing extra power to the main internal combustion engine." In view of this well-known practice of recovering heat from the hot engine coolant and exhaust gas of internal combustion engines, it would have been obvious to utilize the organic Rankine cycle of Amir to recover heat from either the hot engine coolant or exhaust from an internal combustion engine. The rejection is sustained.

The rejection of claims 2, 3, 10[1], 14 and 15 as being unpatentable over Amir in view of Hanna and Brasz, however, is not sustained. The examiner's rejection of these claims is grounded in part on the examiner's determination that it would have been obvious to a person having ordinary skill in the art "to use diffuser having vane, pipe and frustoconical shape in Amir et al as taught by Brasz for the purpose of achieving appropriate work input due to the

[1] The examiner's inclusion of claim 10 in this rejection without also including claim 11 from which it depends is somewhat puzzling, but this is of no moment in light of our disposition of this rejection.

special characteristics of said diffuser" (answer, p. 4). The teaching by Brasz of a *diffuser* 13 at the outlet of a *compressor* would have provided absolutely no suggestion to use such a diffuser structure as a *nozzle* at the inlet of the Amir *turbine*.

## CONCLUSION

To summarize, the rejections of claims 1, 9 and 13 as being unpatentable over Amir in view of Hanna and claims 6-8, 12 and 18-21 as being unpatentable over Amir in view of Hanna and Hay are sustained. The rejection of claims 2, 3, 10, 14 and 15 as being unpatentable over Amir in view of Hanna and Brasz is not sustained. The examiner's decision is affirmed-in-part.

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

AFFIRMED-IN-PART

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| TERRY J. OWENS<br>Administrative Patent Judge | ) | |
| MURRIEL E. CRAWFORD<br>Administrative Patent Judge | ) | BOARD OF PATENT APPEALS AND INTERFERENCES |
| JENNIFER D. BAHR<br>Administrative Patent Judge | ) | |

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