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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YASSER MOHAMED SAYED YACOUB and CHRISTIAN WINGE VIGILD

Appeal 2017-009884
Application 13/934,150[1]
Technology Center 3700

Before BRADLEY B. BAYAT, FREDERICK C. LANEY, and PAUL J. KORNICZKY, *Administrative Patent Judges*.

BAYAT, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants seek our review under 35 U.S.C. § 134(a) of the Examiner's decision rejecting claims 1–3, 6–8, 12–16, 18, 19, 21, and 22, which are all the claims pending in the Application. We have jurisdiction under 35 U.S.C. § 6(b). Appellants' counsel appeared for oral hearing on September 12, 2019.

We REVERSE.

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[1] Appellants identify "Ford Global Technologies, LLC" as the real party in interest. Appeal Br. 3 (filed Jan. 11, 2017).

STATEMENT OF THE CASE

Appellants' "disclosure relates to a method for the measurement of relative air humidity in a fresh air induction tube of an internal combustion engine." Spec. 1:9–10. Independent claim 1, reproduced below, is illustrative of the subject matter on appeal.

> 1. A method for measurement of relative air humidity in a fresh air induction tube of an internal combustion engine, comprising:
>
> measuring a concentration of oxygen in the fresh air induction tube by an oxygen sensor;
>
> determining a temperature in the fresh air induction tube;
>
> if the temperature in the fresh air induction tube is within a range, determining the relative air humidity at a controller as a function of the measured concentration of oxygen and the determined temperature, *without a humidity sensor*;
>
> if the temperature in the fresh air induction tube is below the range, calibrating the oxygen sensor by setting a current output value of the oxygen sensor equal to a predetermined concentration of oxygen, heating air in the fresh air induction tube to bring the temperature in the fresh air induction tube into the range, and then determining the relative air humidity at the controller as a function of the measured concentration of oxygen and the determined temperature, *without a humidity sensor*; and
>
> if the temperature in the fresh air induction tube is above the range, cooling the air in the fresh air induction tube to bring the temperature in the fresh air induction tube into the range and then determining the relative air humidity at the controller as a function of the measured concentration of oxygen and the determined temperature, *without a humidity sensor*.

Appeal Br. 33, Claims App. (emphasis added).

REJECTIONS[2]

Claims 1–3 and 7 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyake,[3] Ishida,[4] Zubeck,[5] ICT International,[6] Hart,[7] and Huang.[8]

Claim 6 is rejected under 35 U.S.C. § 103 as being unpatentable over Miyake and Kitahara.[9]

Claims 8 and 19 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyake, lshida, IC International, and Xiao.[10]

Claim 12 is rejected under 35 U.S.C. § 103 as being unpatentable over Miyake and Kohno.[11]

Claim 13 is rejected under 35 U.S.C. § 103 as being unpatentable over Miyake and Van Nieuwstadt.[12]

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[2] "The rejections under 35 U.S.C. 101 and 112 are withdrawn for previously presented and amended claims, however new claims 21 and 22 would be rejected under 35 U.S.C. 101 and 112." Advisory Act. 2 (mailed Dec. 8, 2016). Although Appellants request our review as to claims 21 and 22 (Appeal Br. 9), we note that no new grounds of rejection were entered in the Examiner's Answer.

[3] US 7,281,368 B2, issued Oct. 16, 2007.

[4] US 8,603,310 B2, issued Dec. 10, 2013.

[5] US 2008/0276913 A1, published Nov. 13, 2008.

[6] Bruce Bugbee and Mark Blonquist, *Absolute and Relative Gas Concentration: Understanding Oxygen in Air*, ICT International

[7] US 5,402,665, issued Apr. 4, 1995.

[8] US 6,832,472 B2, issued Dec. 21, 2004.

[9] US 4,658,790, issued April 21,1987

[10] US 7,715,976 B1, issued May 11, 2010

[11] US 2013/0036806 A1, published Feb. 14, 2013

[12] US 8,459,243 B2, issued June 11, 2013

Claims 14–16 and 18 are rejected under 35 U.S.C. § 103 as being unpatentable over Miyake, Ishida, Xiao, ICT International, and Gibson.

ANALYSIS

We are persuaded by Appellants' argument that the Examiner erred in rejecting independent claim 1 as being unpatentable over Miyake, Ishida, Zubeck, IC International, Hart, and Huang. Appeal Br. 16–17.

Claim 1 is directed to a method for measurement of relative air humidity in a fresh air induction tube of an internal combustion engine. Appeal Br. 33 (Claims App.). According to claim 1, **"**the relative air humidity may be determined as a function of the concentration of oxygen sensed by the oxygen sensor and the temperature in the fresh air induction tube." *Id.* "Thus, advantageously, a humidity sensor for measuring the relative air humidity in the fresh air induction tube may be omitted." *Id.* The omission of a humidity sensor is expressly recited in claim 1 as "without a humidity sensor." *Id.* at 33 (Claims App.). Central to Appellants' invention is the omission of a humidity sensor because "the relative air humidity is relatively difficult to measure accurately and with a small delay over the great range of the fluctuation of temperatures that can occur in a fresh air induction tube." Spec. 2:1–3.

In support of the proposed combination of references to omit a humidity sensor, the rejection asserts that "the elimination of a step or element is obvious if not desired," citing *Ex parte Wu.*[13] Final Act. 6.

[13] 10 USPQ 2031 (BPAI 1989).

Appellants argue:

> However, in *Ex parte Wu,* the Board does not indicate that the elimination of a step or element is obvious if not desired; instead, the Board indicates that omission of an element and its function is obvious if the function of the element is not desired. *See* MPEP 2144.04(II)(a). In Appellant's claim 1, sensing humidity is desired, seeing as determination of relative humidity is desired. Accordingly, *Ex parte Wu* is not applicable, and does not support a finding of obviousness.

Appeal Br. 17. "Examiner respectfully disagrees wherein humidity is a natural occurrence, wherein water vapor exists in the air, and the water content of the air is a calculated function that incorporates air temperature and oxygen content of the air." Ans. 2. According to the Examiner:

> The removal of the humidity sensor of Miyake does not equate to the invention of Miyake no longer capable of calculating humidity, wherein the humidity in the air can be calculated with the temperature sensor and the oxygen sensor. The incorporation of the humidity sensor allows a second source of information, wherein with the speed of calculations happening in real time with engines, double checking and triple checking data to make sure sensors are working properly is known in the art. In the instant case the humidity sensor can be used to check the calculations derived from the other sensors that are being used to calculate humidity, wherein this feature if not desired is obvious. Merely having a plurality of sensors to use data that can be performed by a single sensor is not deemed to be inventive.

Id. at 2–3. We are persuaded of Examiner error.

Although we agree that humidity is a natural occurrence and a function of air temperature and oxygen, we disagree that this fact alone in

combination with the Examiner's reliance on *Wu* adequately supports a conclusion of obviousness, as proposed by the Examiner's rejection. In *Wu*, the issue was whether "it would have been obvious to omit Murdock's polybasic acid salts when the function attributed to these salts is not desired or required." *Wu*, 10 USPQ2d at 2032. "Murdock [taught] . . . that the[] salts are beneficial when the composition is employed in contact with fresh water." *Id*. Thus, in *Wu*, the panel found that the "[o]mission of the salt component in preparing compositions to be used to provide corrosion resistance to metals in environment which did not encounter fresh water would have been obvious." *Id*. In contrast to *Wu*, although a humidity sensor is explicitly omitted in claim 1, its function of determining relative humidity is required and retained in the claim. *See In re Larson*, 340 F.2d 965 (CCPA 1965) (Omission of additional framework and axle which served to increase the cargo carrying capacity of prior art mobile fluid carrying unit would have been obvious if this feature was not desired.); *see also In re Kuhle*, 526 F.2d 553 (CCPA 1975) (deleting a prior art switch member and thereby eliminating its function was an obvious expedient). In other words, we agree with Appellants that modifying the proposed combination of references to omit the humidity sensor, as advanced by the Examiner, is not obvious. Appeal Br. 17. To the contrary, "the omission of an element and retention of its function is an indicia of unobviousness." *Id.*; *see In re Edge*, 359 F.2d 896 (CCPA 1966). Therefore, the Examiner erroneously relied on Wu to support a conclusion of obviousness.

Accordingly, we do not sustain the rejection of independent claim 1, and independent claims 7, 8, and 14, which recite the same limitation and

are similarly rejected based on the misapplication of *Wu*. *See* Final Act. 7–13. We do not sustain the rejection of dependent claims 2, 3, 6, 12, 13, 15, 16, 18, 19, 21, and 22 for the same reasons because the additional cited references are not relied upon to remedy the above-noted error in the rejections.

DECISION

The rejections of claims 1–3, 6–8, 12–16, 18, 19 under 35 U.S.C. § 103(a) are reversed.

REVERSED