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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte AIMO HEIKKINEN and TONI LESKELÄ

Appeal 2019-004659
Application 13/803,795
Technology Center 2800

Before BEVERLY A. FRANKLIN, JULIA HEANEY, and JANE E. INGLESE, *Administrative Patent Judges*.

INGLESE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] requests our review under 35 U.S.C. § 134(a) of the Examiner's decision to reject claims 1–5, 7–13, 15–18, 21, and 22.[2] We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] We use the word "Appellant" to refer to the "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Suunto Oy as the real party in interest. Appeal Brief filed February 12, 2019 ("Appeal Br.") at 2.

[2] Non-Final Office Action entered March 12, 2018 ("Office Act.") at 1.

CLAIMED SUBJECT MATTER

Appellant claims a method of monitoring or planning a dive of a diver (independent claims 1 and 21), and a diving computer for monitoring a dive of a diver (independent claim 13). Appeal Br. 3–8. Independent claims 1 and 13 illustrate the subject matter on appeal, and read as follows:

> 1. A method of monitoring or planning a dive of a diver, comprising:
> –*providing data on a composition of breathing gases containing helium using a gas composition observation unit*;
> –providing data on the diving depth or the ambient pressure of the diver, using a pressure measurement unit;
> –providing an original safe ascent profile for the diver based on the data on the composition of breathing gases and on the depth or ambient pressure;
> –*monitoring the composition of gases for an abrupt rise in nitrogen partial pressure of said breathing gases*, which may lead to a deep tissue isobaric counter diffusion (ICD) situation; and
> *in response to a detected abrupt rise in the nitrogen partial pressure of said breathing gases, providing a temporal ascent profile comprising an immediate temporal retardation of said original safe ascent profile*.
>
> 13. A diving computer for monitoring a dive of a diver, comprising:
> –a pressure sensing unit;
> –*a gas composition observation unit to sense gas composition and output data on the composition of gases breathed by the diver during the dive*;
> –a processor operably coupled to the pressure sensing unit and to the gas composition observation unit, the processor configured to receive the data on the composition of gases breathed by the diver during the dive from the gas composition unit, the processor configured to receive data on the depth or ambient pressure of the diver from the pressure sensing unit;

–an algorithm associated with the processor including a programmed model adapted to provide a safe ascent profile for the diver based on the data on the composition of gases and the depth or ambient pressure;
–a display configured to provide information on the safe ascent profile to the diver,
wherein the processor is adapted to detect a deep tissue isobaric counter diffusion (ICD) situation, based on the data on the composition of gases indicating an abrupt rise in nitrogen partial pressure of the breathing gas when the breathing gas initially contains helium, and
wherein the processor is configured to immediately form and present on the display a temporally retarded ascent profile in response to the detected ICD situation as indicated by the abrupt rise in nitrogen partial pressure of the breathing gas when the breathing gas initially contains helium.

Appeal Br. 25, 27–28 (Claims Appendix) (emphasis and spacing added).

REJECTIONS

The Examiner maintains the following rejections in the Examiner's Answer entered March 22, 2019 ("Ans."):[3]

I. Claims 13 and 15–18 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement;

II. Claims 13 and 15–18 under 35 U.S.C. § 112, second paragraph as indefinite for failing to particularly point out and distinctly claim the subject matter the applicant regards as the invention;

III. Claims 1, 2, 5, 8, 10–13, 17, 18, 21, and 22 under 35 U.S.C.

[3] The Examiner withdrew the rejection of claims 1–5, 7–13, 15–18, 21, and 22 under 35 U.S.C. § 101 as directed to non-statutory subject matter (Office Act. 7–8) in the Answer. Ans. 4.

§ 103(a) as unpatentable over Leskelä[4] in view of Johnson[5] and Wikipedia;[6]

IV. Claims 3, 4, 9, 15, and 16 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson, Wikipedia, and Survanshi[7]; and

V. Claim 7 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson, Wikipedia, and Leach.[8]

FACTUAL FINDINGS AND ANALYSIS

Upon consideration of the evidence relied upon in this appeal and each of Appellant's contentions, we reverse the Examiner's rejection of claims 13 and 15–18 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement and rejection of claims 13 and 15–18 under 35 U.S.C. § 112, second paragraph as indefinite, for reasons set forth in the Appeal Brief and below, and we affirm the Examiner's rejections of claims 1–5, 7–13, 15–18, 21, and 22 under 35 U.S.C. § 103(a), for reasons set forth in the Office Action, the Answer, and below.

We review appealed rejections for reversible error based on the arguments and evidence the Appellant provides for each issue the Appellant identifies. 37 C.F.R. § 41.37(c)(1)(iv); *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637

[4] Leskelä et al., US 2010/0250208 A1, published September 30, 2010.
[5] Johnson, US 2011/0102177 A1, published May 5, 2011.
[6] *Isobaric counterdiffusion*, August 16, 2012, https://web.archive.org/web/20120816174411/http://en.wikipedia.org/wiki/Isobaric_counterdiffusion ("Wikipedia").
[7] Survanshi et al., US 5,363,298, issued November 8, 1994.
[8] Leach et al., US 4,658,358, issued April 14, 1987.

F.3d 1356, 1365 (Fed. Cir. 2011) (explaining that even if the Examiner had failed to make a prima facie case, "it has long been the Board's practice to require an applicant to identify the alleged error in the examiner's rejections")).

Rejections I and II

We first address the Examiner's rejection of claims 13 and 15–18 under 35 U.S.C. § 112, first paragraph for failing to comply with the written description requirement (Rejection I), and rejection of claims 13 and 15–18 under 35 U.S.C. § 112, second paragraph as indefinite (Rejection II). We limit our discussion to claim 13, the sole independent claim subject to these grounds of rejection.

The Examiner interprets the recitation in claim 13 of "a gas composition observation unit to sense gas composition and output data on the composition of gases breathed by the diver during the dive" under 35 U.S.C. § 112, sixth paragraph because, according to the Examiner, a "gas composition observation unit" is a generic placeholder that is not preceded by a structural modifier, and is coupled with functional language that does not recite sufficient structure to achieve the recited function. Office Act. 3.

Because the Examiner thus determines that the phrase "a gas composition observation unit to sense gas composition and output data on the composition of gases breathed by the diver during the dive" invokes 35 U.S.C. § 112, sixth paragraph, the Examiner interprets the phrase "to cover the corresponding structure described in the specification that achieves the claimed function, and equivalents thereof." Office Act. 4. The Examiner finds, however, that the Specification does not disclose any "corresponding structure." *Id.* Consequently, the Examiner rejects claim 13 for failing to

comply with the written description requirement because, the Examiner determines, the lack of corresponding structure in the Specification "leaves it unclear as to whether the inventors had possession of the claimed invention at the time the application was filed." *Id.* at 5–6. The Examiner also rejects claim 13 as indefinite because, the Examiner further determines, the lack of corresponding structure in the Specification "leaves the scope of the terms unclear." *Id.* at 6.

We determine, however, that "a gas composition observation unit to sense gas composition and output data on the composition of gases breathed by the diver during the dive" as recited in claim 13 does not invoke § 112, sixth paragraph, for reasons expressed by Appellant (Appeal Br. 10–12) and discussed below.

When evaluating whether a claim limitation invokes § 112, sixth paragraph, the essential inquiry is "whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc). This determination must be made under traditional claim construction principles, on an element-by-element basis, and in light of intrinsic evidence, including the Specification, and extrinsic evidence, such as prior art references. *Zeroclick, LLC v. Apple Inc.*, 891 F.3d 1003, 1007 (Fed. Cir. 2018) (citation omitted); *Williamson*, 792 F.3d at 1348; *Personalized Media Commc'ns, LLC v. Int'l Trade Comm'n*, 161 F.3d 696, 702–04 (Fed. Cir. 1998) ("Whether certain claim language invokes 35 U.S.C. § 112, ¶ 6 is an exercise in claim construction"); *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 531 (Fed. Cir. 1996) (noting that whether § 112 ¶ 6 is invoked involves an analysis of the

"patent and its prosecution history," and consulting a dictionary definition to understand if one of skill in the art would understand a recited term to connote structure); *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996).

Applying these principles, we first look to Appellant's Specification to determine whether "a gas composition observation unit" as recited in claim 13 would be understood by persons of ordinary skill in the art "to have a sufficiently definite meaning as the name for structure." *Williamson*, 792 F.3d at 1348.

The Specification explains that in deep water scuba diving, nitrogen, helium, and other inert gases collect in a diver's blood and tissues through a process driven by pressure gradients between gas inhaled by the diver and the diver's tissues. Spec. ¶ 4. The Specification indicates that when the diver rises towards the surface, the ambient pressure decreases, causing nitrogen and other gases accumulated in a diver's tissues to be released, which leads to an increased risk of decompression sickness (DSC). *Id.* The Specification explains that "[t]he partial pressure of precisely nitrogen and helium is therefore monitored carefully when diving." *Id.*

The Specification describes carrying out such a monitoring process by real time measurement of "the composition, i.e., partial pressures of components" of gas breathed by a diver during diving using a "gas composition observation unit." Spec. ¶¶ 19, 27, 28; claims 6, 13, and 19. The Specification explains that a "gas composition observation unit" detects changes in breathing gas composition by detecting changes in partial pressures of components of the breathing gas, such as a change in nitrogen partial pressure. *Id.* The Specification further describes a diving computer

for use by a diver during diving that includes such a gas composition observation unit, and includes a display for communicating information to the diver. Spec. ¶¶ 40, 41; Fig. 4.

In view of this description in Appellant's Specification, one of ordinary skill in the art reasonably would understand a "gas composition observation unit" as recited in claim 13 to refer to a component of a diving computer that detects changes in partial pressures of components of gas breathed by a diver to sense changes in the composition of the gas. Consequently, one of ordinary skill in the art would understand a "gas composition observation unit" as recited in claim 13 to denote a particular structure described in the Specification—a component of a diving computer that determines the composition of breathing gas by sensing the partial pressures of components of the breathing gas.

Supporting this determination that a "gas composition observation unit" would be understood by persons of ordinary skill in the art to denote or name structure, we point out the Examiner's statement in the Answer that "[t]he recited 'gas composition observation unit' *would appear to be a sensor* because it performs the recited function of 'sens[ing] gas composition and output[ting] data on the composition of gases breathed by the diver during the dive.'" Ans. 6 (emphasis added). This statement indicates that the Examiner understands a "gas composition observation unit" to denote structure—a sensor.

Furthermore, although not subject to the present grounds of rejection, independent claims 1 and 21 both recite "providing data on a composition of breathing gases containing helium using a gas composition observation unit." In rejecting these claims under § 103(a) (discussed below), the

Examiner finds that sensors disclosed in Johnson for obtaining data relating to the composition of a diver's breathing gas, including the helium and nitrogen concentration of the gas, constitute "a gas composition observation unit" as recited in claims 1 and 21. This finding again supports the position that a "gas composition observation unit" would be understood by persons of ordinary skill in the art to denote or name structure—a sensor. Office Act. 10 ("Johnson discloses the use of a gas composition observation unit for detecting nitrogen and helium concentration in the gas breathed by SCUBA divers"); *see also* Johnson ¶¶ 57–60, 65, 66, 103, 108.

Accordingly, contrary to the Examiner's determination, "a gas composition observation unit to sense gas composition and output data on the composition of gases breathed by the diver during the dive" does not invoke 35 U.S.C. § 112, sixth paragraph because it would be understood by persons of ordinary skill in the art "to have a sufficiently definite meaning as the name for structure" in view of the description provided in the Specification of corresponding structure, and the knowledge and understanding of such structure in the art, as evidenced by Johnson. *Williamson*, 792 F.3d at 1352 ("Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence clearly links or associates that structure to the function recited in the claim."); *Greenberg*, 91 F.3d at 1583 ("It is true that the term 'detent' does not call to mind a single well-defined structure, but the same could be said of other commonplace structural terms such as 'clamp' or 'container.' What is important is not simply that a 'detent' or 'detent mechanism' is defined in terms of what it does, but that the term, as the name for structure, has a reasonably well understood meaning in the art.").

Because the Examiner's rejection of claim 13 for failing to comply with the written description requirement, and rejection of claim 13 for indefiniteness, are both premised on the Examiner's assertion of lack of corresponding structure in the Specification for "a gas composition observation unit to sense gas composition and output data on the composition of gases breathed by the diver during the dive," we do not sustain these rejections of claim 13, and claims 15–18, which each depend from claim 13.

Rejection III

We turn now to the Examiner's rejection of claims 1, 2, 5, 8, 10–13, 17, 18, 21, and 22 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson and Wikipedia. To address this rejection, Appellant presents arguments directed to each of independent claims 1, 13, and 21. Appellant's arguments for claims 13 and 21 are the same as arguments Appellant presents for claim 1, however. Appeal Br. 18–22. We, therefore, select claim 1 as representative, and decide the appeal as to claims 1, 2, 5, 8, 10–13, 17, 18, 21, and 22 based on claim 1 alone. 37 C.F.R. § 41.37(c)(1)(iv).

Claim 1 requires the recited method of monitoring or planning a dive of a diver to comprise, in part, providing data on a composition of breathing gases containing helium using a gas composition observation unit, monitoring the composition of gases for an abrupt rise in nitrogen partial pressure of the breathing gases, and in response to a detected abrupt rise in the nitrogen partial pressure of the breathing gases that may lead to a deep tissue isobaric counter diffusion (ICD) situation, providing a temporal ascent profile comprising an immediate temporal retardation of an original safe

ascent profile.

Leskelä discloses a method for determining the ascent time for a dive (planning a dive) using a diving computer. Leskelä ¶ 9. Leskelä discloses that the method involves entering data on the composition of primary breathing gas A and secondary breathing gas B into the diving computer before the dive (providing data on a composition of breathing gases). Leskelä ¶¶ 20, 21. Leskelä discloses that during the dive, the computer receives information indicating the prevailing pressure (ambient pressure) from pressure sensors on the diver's gas tanks, and calculates an ascent time based on this information, the diving time, and the stored data for primary gas A. Leskelä ¶¶ 11, 19. Leskelä discloses that if something goes wrong during the dive, such as a device failure in the primary gas tank, the diver selects from the diving computer secondary gas B as the gas to be used, and the diving computer calculates a revised ascent time "assuming that the primary gases are not available, but that the ascent will take place using solely the selected secondary gas" (monitoring the composition of gases for a gas composition change). Leskelä ¶¶ 23, 31. Leskelä refers to the revised ascent time as "a securing dive plan," and discloses that "[t]he surfacing time of the securing dive plan will usually be quite long, because the preferred primary surfacing gases are not available, but instead reserve gases are used" (providing a temporal ascent profile comprising an immediate temporal retardation of said original safe ascent profile). Leskelä ¶ 23.

The Examiner finds that Leskelä does not disclose that data on the composition of gases breathed by the diver during the dive is provided using a gas composition observation unit. Office Act. 10. Johnson, however, discloses a system for monitoring a diver that includes one or more sensors

disposed on the diver's equipment for obtaining data relating to the composition of the diver's breathing gas, including the nitrogen concentration and helium concentration (gas composition observation unit). Johnson ¶¶ 57–60, 66, 73.

In view of this disclosure in Johnson, the Examiner concludes that "[i]t would have been obvious to include a gas composition observation unit with the dive computer [disclosed in Leskelä], so that a change in gas composition could be automatically detected and used to update the ascent profile." Office Act. 10.

The Examiner finds that Leskelä also does not disclose that detecting a change in the breathing gas composition is carried out by detecting an abrupt rise in nitrogen partial pressure of the breathing gas, which may lead to a deep tissue isobaric counter diffusion (ICD) situation. Office Act. 13. The Examiner determines, however, that it would have been obvious to modify Leskelä's method to identify an abrupt rise in nitrogen partial pressure in breathing gases using sensors as disclosed in Johnson because Wikipedia "teaches that changing breathing gases from one that is helium-rich to a breathing gas that is nitrogen-rich can lead to an ICD situation." *Id.* at 13–14.

Appellant argues that Leskelä does not disclose measuring gas partial pressures during a dive as a reason for recalculating an ascent time for the dive. Appeal Br. 19–20. Appellant argues that Leskelä relies on a diver's selection of alternate pre-entered data to calculate a securing dive plan, rather than an abrupt rise in nitrogen partial pressure, to trigger a temporal retardation of the original ascent profile. *Id.* Appellant argues that the Examiner's "motivation" for utilizing Johnson's sensors in Leskelä's system

"so that a change in gas composition could be automatically detected and used to update the ascent profile," therefore, relies on impermissible hindsight because "[a]utomated monitoring for a gas composition change, let alone an '**abrupt change in partial pressure**,' does not appear to be supported by either the disclosures of the cited art or by the knowledge of one of ordinary skill in the art at the time of the invention." Appeal Br. 20–21 (citing Office Action 10).

Appellant's arguments do not identify reversible error in the Examiner's rejection, however, for reasons that follow.

As discussed above, Leskelä discloses using a diving computer to determine the ascent time for a dive, and Leskelä discloses that if something goes wrong during the dive, such as a device failure in the primary gas tank, the diver must indicate (or select) to the diving computer that a secondary gas is being used, and the diving computer then calculates a revised ascent time based on use of the selected secondary gas. In view of Johnson's disclosure of disposing sensors on a diver's equipment for obtaining data relating to the composition of the diver's breathing gas, one of ordinary skill in the art reasonably would have been led to incorporate such a breathing gas composition sensor into Leskelä's dive computer, to allow the computer to monitor the composition of the diver's breathing gas, and automatically recalculate the ascent profile in response to a change in the composition of the gas. As the Examiner explains, modifying Leskelä's dive computer in this manner would advantageously "eliminate[] the need for the diver to manually make a selection that the breathing gas composition has been changed," and would also "eliminate[] the possibility that a diver makes an error when doing so." Ans. 11.

Furthermore, in view of Wikipedia's disclosure that changing from a helium-rich to a nitrogen-rich breathing gas can lead to an isobaric counter diffusion (ICD) situation, one of ordinary skill in the art would have been led to utilize Johnson's sensors—incorporated into Leskelä's dive computer—to monitor the diver's breathing gas for an abrupt rise in nitrogen partial pressure, to prevent occurrence of an isobaric counter diffusion (ICD) situation.

Thus, contrary to Appellant's arguments, the Examiner's rationale for modifying Leskelä's method in view of Johnson and Wikipedia is not based on impermissible hindsight. Rather, the Examiner's rationale is based on explicit disclosures of Leskelä, Johnson, and Wikipedia, and what those disclosures reasonably would have suggested to one of ordinary skill in the art at the time of Appellant's invention.

Appellant argues that Johnson is silent as to automated recalculation of an ascent profile based on gas composition changes. Appeal Br. 20. Appellant argues that based on "the teachings [of] Johnson it would appear that a person of ordinary skill in the art would, at most, modify Leskelä such that the diver would no longer need to preenter the gas groups, but would still rely on a diver's selection to recalculate an ascent profile." *Id.* (emphasis omitted)

Appellant's arguments, however, do not address the basis of the Examiner's reliance on Johnson, or the Examiner's proposed modification of Leskelä in view of the relied-upon disclosures in Johnson. Appellant's arguments, therefore, do not identify reversible error in the Examiner's rejection.

Specifically, as discussed above, the Examiner acknowledges that

Leskelä does not disclose providing data on the composition of gases breathed by a diver during a dive using a gas composition observation unit, and the Examiner relies on Johnson's disclosure of sensors disposed on a diver's equipment that provide data relating to the composition of the diver's breathing gas. Office Act. 10. As the Examiner determines, in view of this disclosure in Johnson, one of ordinary skill in the art would have been led to include a gas composition observation unit (or sensor) in Leskelä's dive computer to allow the dive computer to monitor the composition of the diver's breathing gas, and automatically recalculate the ascent profile in response to a change in the composition, thereby eliminating the need for the diver to manually indicate a change in the selected breathing gas to the computer. *Id.*; Ans. 11.

We, accordingly, sustain the Examiner's rejection of claims 1, 2, 5, 8, 10–13, 17, 18, 21, and 22 under 35 U.S.C. § 103(a).

Rejections IV and V

Finally, we turn to the Examiner's rejection of claims 3, 4, 9, 15, and 16 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson, Wikipedia, and Survanshi (Rejection IV), and rejection of claim 7 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson, Wikipedia, and Leach (Rejection V).

To address these rejections, Appellant relies on the arguments Appellant presents for claim 1 (discussed above), and argues that the additional references applied in these rejections do not cure the deficiencies of Leskelä, Johnson, and Wikipedia. Appeal Br. 22–23. Because Appellant's arguments do not identify reversible error in the Examiner's rejection of claim 1 for the reasons discussed above, Appellant's arguments

also do not identify reversible error in the Examiner's rejection of claims 3, 4, 9, 15, and 16 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson, Wikipedia, and Survanshi (Rejection IV), and rejection of claim 7 under 35 U.S.C. § 103(a) as unpatentable over Leskelä in view of Johnson, Wikipedia, and Leach (Rejection V), which we accordingly sustain.

CONCLUSION

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
13, 15–18	112, first paragraph	Written Description		13, 15–18
13, 15–18	112, second paragraph	Indefiniteness		13, 15–18
1, 2, 5, 8, 10–13, 17, 18, 21, 22	103	Leskelä, Johnson, Wikipedia	1, 2, 5, 8, 10–13, 17, 18, 21, 22	
3, 4, 9, 15, 16	103	Leskelä, Johnson, Wikipedia, Survanshi	3, 4, 9, 15, 16	
7	103	Leskelä, Johnson, Wikipedia, Leach	7	
Overall Outcome			1–5, 7–13, 15–18, 21, 22	

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)(iv).

AFFIRMED