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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BO VIGHOLM and JAN KARLSSON

Appeal 2018-004949
Application 14/111,569
Technology Center 3700

Before STEFAN STAICOVICI, EDWARD A. BROWN, and
ANNETTE R. REIMERS, *Administrative Patent Judges*.

STAICOVICI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's decision in the Final Office Action (dated July 6, 2017) rejecting claims 1–25. Appellant's representative presented oral argument on December 13, 2019. We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

SUMMARY OF DECISION

We REVERSE.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Volvo Construction Equipment AB is identified as the real party in interest in Appellant's Appeal Brief (filed Nov. 13, 2017). Appeal Br. 1.

INVENTION

Appellant's invention is directed "to a method for reducing vibrations in a working machine." Spec. 1, l. 3.²

Claims 1, 18, and 25 are independent. Claim 1 is illustrative of the claimed invention and reads as follows:

1. A method for reducing vibrations caused by a hydraulic system in a working machine, the working machine comprising the hydraulic system with a hydraulic machine for providing hydraulic fluid to at least one working function, the hydraulic machine being driven by a drive source having a variable speed of rotation, comprising
 - identifying a resonance frequency for the working machine, and
 - controlling the drive source so as to counteract waves having the resonance frequency.

REJECTIONS

- I. The Examiner rejects claims 1–25 under 35 U.S.C. § 112(a) as failing to comply with the written description.
- II. The Examiner rejects claims 1–25 under 35 U.S.C. § 112(b) as being indefinite.
- III. The Examiner rejects claims 1–4, 7–13, and 15–25 under 35 U.S.C. § 103(a) as being unpatentable over Yoshimatsu,³ Fox,⁴ and Völker.⁵

² Appellant's Specification, filed Oct. 14, 2013.

³ Yoshimatsu, US 2005/0001567 A1, published Jan. 6, 2005.

⁴ Fox et al., US 2005/0207907 A1, published Sept. 22, 2005.

⁵ Völker et al., US 2009/0202360 A1, published Aug. 13, 2009.

- IV. The Examiner rejects claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Yoshimatsu, Fox, Völker, and Deeken.⁶
- V. The Examiner rejects claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Yoshimatsu, Fox, Völker, and Nakayama.⁷
- VI. The Examiner rejects claim 14 under 35 U.S.C. § 103(a) as being unpatentable over Yoshimatsu, Fox, Völker, and Adnan.⁸

ANALYSIS

Rejection I

Each of independent claims 1, 18, and 25 requires, *inter alia*, “controlling the drive source . . . to *counteract* waves having the resonance frequency.” Appeal Br. 9, 11, 12 (Claims App.) (emphasis added).

The Examiner finds that “[i]f counteracting waves having the resonance frequency is *different* than avoiding waves having the resonance frequency,” such subject matter is not supported by Appellant’s original disclosure. Final Act. 5 (emphasis added). According to the Examiner, “[t]here is no discussion of another vibration/wave emitting device that causes destructive wave interference destruction and no discussion about waves being out of phase with whatever wave is being counteracted.” *Id.* The Examiner explains that the term “[c]ounteract can imply operating at a specific frequency that would cause destructive interference with waves caused by another component in the system which is more specific tha[n] avoiding the frequencies at which resonance occurs.” *Id.* at 7.

⁶ Deeken et al., US 2009/0145122 A1, published June 11, 2009.

⁷ Nakayama et al., US 6,119,967, issued Sept. 19, 2000.

⁸ Adnan et al., US 2008/0006089 A1, published Jan. 10, 2008.

In particular, the Examiner points to various sections of Appellant’s Specification to conclude that “[c]ounteract means to eliminate or avoid.” *Id.* at 6–9 (citing Spec. 2, ll. 19–25 (“to counteract waves with the resonance frequency, unwanted vibrations in the working machine can be reduced or avoided”), Spec. 4, ll. 3–4 (“control the electric motor so as to counteract waves with the resonance frequency”), 8–13, 28–35 (“the frequency to be avoided can be known in advance and/or by calculation”), Spec. 5, ll. 1–2, 14–15, 20–21, 31–35 (“controlling the electric motor so as to counteract waves with resonance frequency”), Spec. 6, ll. 10–14 (“the control unit 110 can change the rotation speed of the electric motor . . . to counteract the resonance frequency”), Spec. 7,⁹ ll. 2–7 (“limitation on the speed rotation of the electric motor . . . to counteract or avoid waves with an unwanted resonance frequency”). Thus, according to the Examiner, changing the rotation speed of the electric motor represents “stopping the further occurrence of waves at the resonance frequencies, but *not counteracting* them with destructive wave interference from another source.” *Id.* at 9 (emphasis added).

Appellant responds that “[t]he present application includes both an embodiment involving *counteracting* waves that are identified AND another, separately described embodiment involving *avoiding* waves at undesired frequencies in the sense of preventing them from occurring in the first place.” Appeal Br. 4 (citing Spec. 4, ll. 1–21, Spec. 4, l. 23–5, l. 5) (emphasis added).

⁹ The Examiner cites to page 6 of the Specification for this disclosure. *See* Final Act. 7

In response, the Examiner notes that “the actual issue that raises the lack of written description rejection is that the [S]pecification does not disclose what ‘counteracting waves’ actually entails,” that is, “does not discuss how adjusting the motor speed counteracts the unwanted frequency waves in applicant’s system specifically.” Ans. 2–3.¹⁰

“The test for the sufficiency of the written description ‘is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.’” *Vasudevan Software, Inc. v. MicroStrategy, Inc.*, 782 F.3d 671, 682 (Fed. Cir. 2015) (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc)). Here, in a first embodiment, Appellant’s Specification describes reducing vibrations in a working machine by controlling an electric motor “counteract[s] waves with the resonance frequency.” Spec. 4, ll. 4–5. In particular, the Specification describes decreasing the rotation speed of a hydraulic pump from 2000 rpm to 1800 rpm in order to reduce the operating frequency from a detected resonant frequency of 233 Hz to a non-resonant frequency of 210 Hz. Spec. 6, ll. 6–14. Accordingly, Appellant is correct that the Specification describes a first embodiment in which “resonance frequency waves that are *detected* in a working machine are ‘*counteracted*’ by controlling a drive source of a hydraulic system of the working machine.” Reply Br. 1 (citing Spec. 4, ll. 1–21) (emphasis added).¹¹ We further agree with Appellant that in contrast to the first embodiment, the Specification also distinguishes a second embodiment, in which the drive source, i.e., electric motor, is

¹⁰ Examiner’s Answer, dated Mar. 5, 2018.

¹¹ Appellant’s Reply Brief, filed Apr. 10, 2018.

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operated at a frequency that is known to not be a resonance frequency, and, thus, *avoids* the resonance frequency altogether. *Id* (citing Spec. 4, l. 23–5, l. 5).

Furthermore, we appreciate the Examiner’s position that the term “counteract” implies an *opposing* action or force, such as, “destructive interference between two waves.” *See* Ans. 4.¹² However, in light of Appellant’s Specification, a skilled artisan would understand that “controlling the drive source,” i.e., electric motor, results in waves having non-resonance frequencies, and, thus, represents an *opposing action*, i.e., a counteraction, to generating waves having resonance frequencies. *See also* Reply Br. 3. Even though other methods exist to *counteract* a resonance frequency, such as employing destructive wave interference (*see* Final Act. 3, Ans. 4), such methods are not relevant to the instant case because Appellant’s claims are limited to “controlling the drive source,” i.e., electric motor, which is supported by Appellant’s original disclosure, for the reasons discussed *supra*.

Accordingly, for the foregoing reasons, we do not sustain the rejection under 35 U.S.C. § 112(a) of claims 1, 18, and 25, and dependent claims 2–17 and 19–24, as failing to comply with the written description.

¹² An ordinary and customary meaning of the term “counteract” is “to make ineffective or restrain or neutralize the usually ill effects of by means of an *opposite* force, action, or influence.” Appeal Br. 5 (citing <https://www.merriam-webster.com/dictionary/counteract>); Reply Br. 3 (emphasis added).

Rejection II

The Examiner finds that because “[A]pplicant’s [S]pecification never discusses what ‘counteract’ entails [and] if this term is different than avoid . . . [it] raises indefiniteness.” Final Act. 10. According to the Examiner, “there are various methods to ‘counteract’ resonance frequency, such as through destructive interference between two waves (generating an opposite force), utilizing dampers, adjusting stiffness of components, etc.” Ans. 4. Thus, the Examiner contends that because

Appellant does not provide adequate discussion with regards to how controlling the motor speed counteracts the resonance frequency waves, one of ordinary skill would not know which of these methods are being employed, if any, and therefore the metes and bounds of the claimed subject matter is not distinctly established.

Ans. 4. In particular, the Examiner notes that independent “claim 25 seems to imply that some type of destructive wave interference occurs when the drive source generates pressure pulses such that they counteract waves having the resonance frequency.” Final Act. 10.

The essence of the requirement under 35 U.S.C. § 112, second paragraph, that the claims must be definite, is that the language of the claims must make it clear what subject matter the claims encompass. *In re Hammack*, 427 F.2d 1378 (CCPA 1970). In this case, as discussed *supra* in Rejection I, Appellant’s Specification describes controlling an electric motor, i.e., drive source, to *counteract* waves having a resonance frequency. *See* Spec. 4, ll. 1–21, Spec. 6, ll. 6–14. As such, in light of the Specification, a skilled artisan would understand that controlling Appellant’s drive source, i.e., electric motor, results in waves having non-resonance frequencies, and,

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thus, such an action counteracts generating waves having resonance frequencies.

Accordingly, the limitation “controlling the drive source . . . to counteract waves having the resonance frequency,” as recited in independent claims 1, 18, and 25, when construed in light of Appellant’s Specification by a person of ordinary skill in the art, does not lack sufficient precision so that one endeavoring to practice the invention could not determine the metes and bounds thereof. In other words, “those skilled in the art would understand what is claimed when the claim is read in light of the [S]pecification.”

Orthokinetics, Inc. v. Safety Travel Chairs, Inc., 806 F.2d 1565, 1576 (Fed. Cir. 1986) (citations omitted). By not specifying more about how “controlling the drive source” takes place, the claims are merely broad, not indefinite. *See In re Johnson*, 558 F.2d 1008, 1016 n.17 (CCPA 1977) (breadth is not indefiniteness).

Lastly, we do not agree with the Examiner that independent claim 25 implies “destructive wave interference.” *See* Final Act. 5. Rather, when reading claim 25 in light of Appellant’s Specification, a person of ordinary skill in the art would understand that by “controlling the drive source,” i.e., electric motor, the resulting “pressure pulses” have non-resonance frequencies, and, thus, such an action counteracts generating waves having resonance frequencies.

Accordingly, for the foregoing reasons, we do not sustain the rejection under 35 U.S.C. § 112(b) of claims 1, 18, and 25, and dependent claims 2–17 and 19–24, as being indefinite.

Rejection III

The Examiner finds that the combined teachings of Yoshimatsu and Fox disclose most of the limitations of independent claims 1, 18, and 25, but do not disclose the limitation of “controlling the drive source . . . to counteract waves . . . having the resonance frequency.” *See* Final Act. 11–12. Nonetheless, the Examiner finds that Völker discloses a method to operate a pump in which a resonance frequency is identified and the drive source is controlled by increasing or decreasing the rotational speed of the drive motor to counteract waves having the resonance frequency. *Id.* at 12 (citing Völker, paras. 12–15, 26). Thus, the Examiner concludes that it would have been obvious for a skilled artisan to control the rotational speed of the drive motor of Yoshimatsu’s hydraulic pump so as to counteract waves having resonance frequency, as taught by Völker, in order “to prevent [having] resonance vibrations which are known to be detrimental [to hydraulic pumps] as taught by Fox.” *Id.* at 11–12.

Appellant argues that Völker does not disclose “counteracting waves having the resonance frequency” because Völker discloses changing the rotational frequency (speed) of the compressor “when natural oscillations . . . exceed a predetermined limit value.” Appeal Br. 6 (emphasis added). According to Appellant, Völker “is concerned with avoiding waves having a resonance frequency so that such waves never occur in the first place.” *Id.* at 6–7.

The Examiner responds that because “[A]ppellant defines the resonant frequency to include frequencies near the undamped frequency, V[ö]lker actually does let the resonance frequency waves occur and then counteracts them in the same way [as A]ppellant.” Ans. 5 (citing Appeal Br. 7, n.1; Völker, paras. 12–14). The Examiner explains that Völker’s “device

operates at a speed causing resonance frequency waves which causes the natural oscillations of the compressor to exceed a predetermined limit value, and then [the] system adjusts the speed of the drive motor only when the excessive oscillations actually occur to stop further excessive oscillations.”

Id. at 6. The Examiner further points to Völker’s claim 11 and states that

[A]n oscillation sensor which senses oscillations indicative of operation *approaching* a resonant frequency” corresponds to [A]ppellant’s defined resonance frequency which includes a range of frequencies near an undamped frequency of the system. The oscillations approaching a resonance frequency in V[ö]lker must actually occur in order for the oscillation sensor to sense them. It is only after the sensor detects these actual oscillations that the drive motor speed is adjusted to stop further operation at a speed that causes resonance frequency waves.

Id. (emphasis added).

Völker discloses a method for operating a high rotational speed vacuum pump having a compressor, a drive motor for operating the compressor, and a motor control unit, at a constant nominal rotational frequency. Völker, para. 11. The method includes determining the natural oscillations of the compressor, changing the rotational frequency of the motor when the natural oscillations of the compressor exceed a *predetermined* limit, and operating the motor at the changed rotational frequency. *Id.*, paras. 12–14.

Although we appreciate that Völker determines when the natural oscillations of the compressor exceed a *predetermined* limit, nonetheless, we agree with Appellant that Völker “does not disclose what this ‘predetermined limit’ is or how close it is to a resonance frequency.” Reply Br. 4. The Examiner’s position that “it would be reasonable [in Völker] to construe that the structure with the excessive amplitude . . . is at a resonating

frequency” is speculative as the Examiner does not make any specific findings from which a skilled artisan would understand that Völker’s “predetermined limit” refers to natural oscillations of the compressor at a resonance frequency. *See* Advisory Act. 2.¹³

Furthermore, in contrast to the Examiner’s position, we note that Völker specifically discloses that “[t]he nominal rotational frequency [of the motor] is determined such that the resonant frequency or the resonant frequencies of the vacuum pump *are not excited*.” Völker, para. 2 (emphasis added). Völker further discloses adjusting *preemptively* the rotational frequency of the drive motor to “eliminat[e] resonance behavior of the vacuum pump at the nominal rotational frequency.” *Id.*, para. 4. As such, in light of Völker’s teachings, we agree with Appellant that a skilled artisan would not reasonably understand Völker’s reference to “oscillations indicative of operation *approaching* a resonant frequency,” in claim 11, to mean “oscillations ‘at’ a resonance frequency, even where resonance frequency is defined as a ‘frequency . . . equal or very close to the natural undamped frequency of the system.” Reply Br. 5 (emphasis added). In our view, Appellant is correct that Völker’s purpose “is to *prevent* the occurrence of resonance,” and, thus, Völker does “not disclose counteracting . . . waves with resonance frequency waves,” as called for by each of independent claims 1, 18, and 25. *Id.* (emphasis added).

Accordingly, for the foregoing reasons, we find that the Examiner’s legal conclusion of obviousness is not supported by sufficient factual evidence, and thus, cannot stand. *See In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967) (holding that “[t]he legal conclusion of obviousness must be

¹³ Advisory Action, dated Sept. 19, 2017.

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supported by facts.[□] Where the legal conclusion is not supported by facts it cannot stand.”). Therefore, we do not sustain the rejection under 35 U.S.C. § 103(a) of independent claims 1, 18, and 25, and dependent claims 2–4, 7–13, 15–17, and 19–24, as unpatentable over Yoshimatsu, Fox, and Völker.

Rejections IV–VI

The Examiner’s use of the Deeken, Nakayama, and Adnan disclosures does not remedy the deficiency of the Examiner’s combination of Yoshimatsu, Fox, and Völker. *See* Final Act. 19–24.

Accordingly, for the foregoing reasons, we also do not sustain the rejections under 35 U.S.C. § 103(a) of claim 5 as unpatentable over Yoshimatsu, Fox, Völker, and Deeken; of claim 6 as unpatentable over Yoshimatsu, Fox, Völker, and Nakayama; and of claim 14 as unpatentable over Yoshimatsu, Fox, Völker, and Adnan.

CONCLUSION

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–25	112(a)	Written Description		1–25
1–25	112(b)	Indefiniteness		1–25
1–4, 7–13, 15–25	103(a)	Yoshimatsu, Fox, Völker		1–4, 7–13, 15–25
5	103(a)	Yoshimatsu, Fox, Völker, Deeken		5
6	103(a)	Yoshimatsu, Fox, Völker, Nakayama		6
14	103(a)	Yoshimatsu, Fox, Völker, Adnan		14

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Overall Outcome				1-25
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REVERSED