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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SAURAV PAUL, TROY T. TEGG,
and REED R. HEIMBECHER

Appeal 2014-008515
Application 12/979,475
Technology Center 3700

Before JAMES P. CALVE, GEORGE R. HOSKINS, and LEE L. STEPINA,
Administrative Patent Judges.

HOSKINS, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Saurav Paul et al. (“Appellants”)¹ appeal under 35 U.S.C. § 134 from the Examiner’s decision rejecting claims 1–17 and 19–21 in this application. The Board has jurisdiction over the appeal under 35 U.S.C. § 6(b).

We REVERSE.

¹ The Appeal Brief identifies St. Jude Medical, Atrial Fibrillation Division, Inc., as the real party in interest. Appeal Br. 2.

CLAIMED SUBJECT MATTER

Claims 1, 16, and 21 are independent. Claim 1 illustrates the subject matter on appeal, and it recites:

1. An acoustic assessment system for a catheter, the system comprising:

a flexible catheter shaft;

at least one acoustic transducer coupled to the flexible catheter shaft, the at least one acoustic transducer configured to emit a generated acoustic signal for reflection by an adjacent tissue, the at least one acoustic transducer configured to receive a reflected acoustic signal from the adjacent tissue responsive to the emitted acoustic signal;

an output device electrically connected to the at least one acoustic transducer, the output device including a processing device configured to interpret electrical signals generated in response to the reflected acoustic signal and corresponding to one or more property of the tissue, wherein the processing device is configured to *interpret an in-phase reflected acoustic signal as the flexible catheter shaft is in an endoluminal flow environment and an out-of-phase reflected acoustic signal as indicating the flexible catheter shaft is in contact with the adjacent tissue*;

a window positioned adjacent to the at least one acoustic transducer, the window configured to focus the generated acoustic signal; and

wherein the output device is configured to generate output for assessing one or more properties of the tissue.

Appeal Br. 15 (Claims App.) (emphasis added).

REJECTIONS ON APPEAL

Claims 1–5, 10, and 12 stand rejected under 35 U.S.C. § 103(a)² as unpatentable over Hendriks (US 2010/0280390 A1, pub. Nov. 4, 2010) and Zeleznik (US 2003/0055360 A1, pub. Mar. 20, 2003).

Claims 1, 7, and 14 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Sliwa (US 2010/0168570 A1, pub. July 1, 2010), Hendriks, and Zeleznik.

Claim 6 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Koger (US 6,475,151 B2, iss. Nov. 5, 2002).

Claim 8 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Suorsa (US 7,488,289 B2, iss. Feb. 10, 2009).

Claim 9 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Saguchi (US 2010/0217160 A1, pub. Aug. 26, 2010).

Claim 11 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Kubota (US 2006/0173321 A1, pub. Aug. 3, 2006).

Claims 13 and 21 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Salcudean (US 2005/0119568 A1, pub. June 2, 2005).

Claim 14 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Weng (US 2009/0036774 A1, pub. Feb. 5, 2009).

² The Examiner's reference to § 102(e) rather than § 103(a) is revealed to be a typographical error by the overall context of the rejection. Final Act. 2–3. The same is true of the rejection of claim 11. *Id.* at 6–7.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Hendriks, Zeleznik, and Maguire (US 6,599,288 B2, iss. July 29, 2003).

Claim 16 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Zanelli (US 6,546,276 B1, iss. Apr. 8, 2003), Suorsa, Zeleznik, and Salcudean.

Claim 17 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Zanelli, Suorsa, Zeleznik, Salcudean, and Maguire.

Claim 19 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Zanelli, Suorsa, Zeleznik, Salcudean, and Panescu (US 2003/0208123 A1, pub. Nov. 6, 2003).

Claim 20 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Zanelli, Suorsa, Zeleznik, Salcudean, and Weng.

ANALYSIS

A. Obviousness based on Hendriks and Zeleznik— Claims 1–5, 10, and 12

Appellants argue the Examiner errs in finding Zeleznik discloses, as recited in claim 1, interpreting an in-phase reflected acoustic signal as the catheter being in an endoluminal flow environment, and interpreting an out-of-phase reflected acoustic signal as the catheter being in contact with adjacent tissue. Appeal Br. 6–7; Reply Br. 3–5. As described in Appellants’ Specification, an in-phase signal indicates the catheter is “free-floating” within a blood flow through the heart and is “not in contact with” the heart tissue wall, because free-flowing blood exerts the same pressure on the catheter in all directions, so the acoustic signals are uniform or the same for each acoustic transducer. Spec. ¶¶ 58–60. Conversely, an out-of-phase signal indicates the catheter is in contact with the heart tissue wall because

one acoustic transducer receives a return signal much faster than another acoustic transducer. *Id.* ¶¶ 58, 61.

The Examiner cites Zeleznik’s disclosure at paragraphs 67–69 and 82, and Figures 13a–13b, in support of the challenged finding. Final Act. 3, 14–16; Ans. 14–16. In connection with Figures 13a–13b, Zeleznik indicates one challenge in using a hardness sensor is knowing when sense rod 101 of the hardness sensor is in contact with tissue 150 to be sensed. Zeleznik ¶ 65. Zeleznik places “a point contact sensor” 151 such as an “ultrasonic sensor” at the distal end of sense rod 101, to measure contact with the tissue surface. *Id.* ¶¶ 66–68, Fig. 14. According to Zeleznik,

An ultrasonic sensor, when used as contact sensor 151, can use *shifts in frequency or phase* of ultrasonic signals to identify the proximity of the probe tip to tissue 150. Alternatively or additionally, the *delay* between ultrasonic pulse-echo signals can be used to measure distance or proximity, similar in concept to sonar ranging. Further *shifts in frequency, phase, and/or delay* will occur as a force is applied between the sensor and the tissue. These *shifts* may be used to provide additional verification of contact and/or tissue rigidity to the operation of the hardness sensor.

Id. ¶ 67 (emphases added).

We agree with Appellants’ argument that such disclosure in Zeleznik does not correspond to interpreting an *in-phase* reflected acoustic signal as an endoluminal flow environment (i.e., a lack of contact with the tissue wall), and interpreting an *out-of-phase* reflected acoustic signal as contact with the tissue wall, as claimed. Zeleznik discloses only that change(s) in a reflected acoustic signal may be monitored to determine when contact with the tissue wall occurs, and such change(s) may include “shifts in” the frequency, phase, or delay of the reflected acoustic signal. Zeleznik ¶ 67.

Zeleznik does not disclose that such “shifts” correspond to an in-phase signal becoming an out-of-phase signal, or vice versa. Nor has the Examiner set forth technical reasoning or evidence that suggests Zeleznik’s described frequency, phase, or delay shifts necessarily correspond to an in-phase signal becoming an out-of-phase signal, or vice versa.

The Examiner additionally cites paragraph 82 of Zeleznik. That paragraph discloses an ultrasonic transducer that drives reciprocation of sense rod 101 against the tissue at a predetermined frequency, so that the resulting compression and retraction of bellows 103 may be monitored to determine the tissue hardness. Zeleznik ¶¶ 81–82, Figs. 10–12. For example, changes in the output phase of a pressure sensor coupled to bellows 103 may be monitored to determine the tissue hardness. *Id.* ¶ 82.

Thus, the ultrasonic transducer disclosed in paragraph 82 is performing a different function (tissue hardness determination) than the ultrasonic transducer disclosed in paragraphs 67–69 (tissue contact determination). Claim 1 is directed to using an acoustic transducer to perform the latter function. The Examiner does not explain how the use of an ultrasonic transducer to determine tissue hardness relates to the use of an ultrasonic transducer to determine tissue contact. Moreover, paragraph 82, like the other cited Zeleznik disclosures, discloses only that change(s) in a frequency or phase are monitored, and does not specify that such changes correspond to in-phase or out-of-phase signals.

For the foregoing reasons, we determine a preponderance of evidence does not support the Examiner’s finding that Zeleznik discloses interpreting an in-phase reflected acoustic signal to indicate a catheter being in an endoluminal flow environment, and an out-of-phase reflected acoustic signal

indicating contact with adjacent tissue. The Examiner's findings concerning the Hendriks disclosure, and corresponding obvious analysis, do not cure that deficiency in the Zeleznik disclosure in relation to claim 1. Final Act. 2–3. The Examiner's additional consideration of dependent claims 2–5, 10, and 12 likewise does not cure the deficiency. *Id.* Therefore, we do not sustain the rejection of claims 1–5, 10, and 12 as unpatentable over Hendriks and Zeleznik.

*B. Obviousness based on Hendriks, Zeleznik, and one of Koger, Suorsa, Saguchi, Kubota, Salcudean, Weng, and Maguire—
Claims 6, 8, 9, 11, 13–15, and 21*

The Examiner's additional consideration of claims 6, 8, 9, 11, and 13–15, each of which depends from claim 1, in light of the combination of Hendriks and Zeleznik with one of Koger, Suorsa, Saguchi, Kubota, Salcudean, Weng, and Maguire, does not cure the deficiency of Zeleznik in connection with claim 1, discussed above. Final Act. 5–10. We, therefore, do not sustain the various obviousness rejections of these claims for the reasons provided above.

Independent claim 21 recites a similar “in-phase” / “out-of-phase” limitation as the limitation discussed above in connection with claim 1. Appeal Br. 18 (Claims App.). In rejecting claim 21 as unpatentable over Hendriks, Zeleznik, and Salcudean, the Examiner relies on the same findings concerning the Zeleznik disclosure discussed above in connection with claim 1. Final Act. 7–8. The Examiner's findings concerning the Hendriks and Salcudean disclosures, and corresponding obvious analysis, do not cure the deficiency in the Zeleznik disclosure. *Id.* We, therefore, do not sustain the rejection of claim 21.

*C. Obviousness based on Sliwa, Hendriks, and Zeleznik—
Claims 1, 7, and 14*

In rejecting claim 1 and its dependent claims 7 and 14 as unpatentable over Sliwa, Hendriks, and Zeleznik, the Examiner relies on the same findings concerning the Zeleznik disclosure as discussed above in connection with the other rejection of claim 1. Final Act. 3–5. The Examiner’s findings concerning the Sliwa and Hendriks disclosures, and corresponding obvious analysis, do not cure the deficiency in the Zeleznik disclosure. *Id.* We, therefore, do not sustain the rejection of claims 1, 7, and 14 as unpatentable over Sliwa, Hendriks, and Zeleznik.

*D. Obviousness based on Zanelli, Suorsa, Zeleznik, and Salcudean—
Claim 16*

Independent claim 16 recites a similar “in-phase” / “out-of-phase” limitation as the limitation discussed above in connection with claim 1. Appeal Br. 17 (Claims App.). In rejecting claim 16 as unpatentable over Zanelli, Suorsa, Zeleznik, and Salcudean, the Examiner relies on the same findings concerning the Zeleznik disclosure discussed above in connection with claim 1. Final Act. 10–12. The Examiner’s findings concerning the Zanelli, Suorsa, and Salcudean disclosures, and corresponding obvious analysis, do not cure the deficiency in the Zeleznik disclosure. *Id.* We, therefore, do not sustain the rejection of claim 16.

*E. Obviousness based on Zanelli, Suorsa, Zeleznik, Salcudean, and one
of Maguire, Panescu, and Weng—
Claim 17, 19, and 20*

The Examiner’s additional consideration of claims 17, 19, and 20, each of which depends from claim 16, in light of the combination of Zanelli, Suorsa, Zeleznik, and Salcudean with one of Maguire, Panescu, and Weng,

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does not cure the deficiency of Zeleznik in connection with claim 16, discussed above. Final Act. 12–14. We, therefore, do not sustain the various obviousness rejections of these claims for the reasons provided above.

DECISION

The Examiner’s decision to reject claims 1–17 and 19–21 is reversed.

REVERSED