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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HUA XIEM, GRZEGORZ ANDRZEJ TOPOREK, GARY CHENG-HOW NG, and VIJAY THAKUR SHAMDASANI

Appeal 2024-004066
Application 17/262,390
Technology Center 3700

Before MURRIEL E. CRAWFORD, MICHAEL C. ASTORINO, and KENNETH G. SCHOPFER, *Administrative Patent Judges*.

ASTORINO, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), the Appellant[1] appeals from the Examiner's decision to reject claims 1–25, 27, and 30. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. The Appellant identifies the real party in interest as Koninklijke Philips N.V. Appeal Br. 3.

STATEMENT OF THE CASE

Claimed Subject Matter

Claims 1 and 21 are independent. Claim 1, reproduced below, is illustrative of the claimed subject matter.

> 1. An ultrasound imaging system for shear wave imaging comprising:
>
> a probe configured to acquire ultrasound echo signals for producing shear wave images of anisotropic tissue of a subject, wherein the probe is configured to be coupled to a position tracking system for tracking a position of the probe with respect to the subject;
>
> a processor in communication with the probe and configured to receive position tracking data from the position tracking system, wherein the processor further is configured to:
>
> define at least one target plane in the anisotropic tissue at an a [sic] first angle with respect to and using a reference plane of the anisotropic tissue;
>
> determine a second angle between a position of an imaging plane of the probe as indicated by the position tracking data and the reference plane;
>
> define a first transformation between a position of the at least one target plane and the reference plane based, at least in part, on the first angle;
>
> define a second transformation between the position of the image plane and the reference plane based, at least in part, on the second angle;
>
> determine a difference between the position of the image plane and the position of the target plane using the first and second transformations; and
>
> provide a visual indicator of the difference on a display of the ultrasound system, wherein the processor is configured to dynamically update the visual indicator responsive to a change in the position of the imaging plane with respect to the target plane.

Appeal Br. 20, Claims App.

References

The prior art relied upon by the Examiner is:

Name	Reference	Date
Pini	US 5,159,931	Nov. 3, 1992
Arai	US 2007/0010743 A1	Jan. 11, 2007
Deschinger	US 2007/0249935 A1	Oct. 25, 2007
Pelissier	US 2010/0298704 A1	Nov. 25, 2010
Anite	US 2011/0301460 A1	Dec. 8, 2011
Schneider	US 2013/0338505 A1	Dec. 19, 2013
Toma	US 2014/0081142 A1	Mar. 20, 2014
Kondoh	US 2014/0371593 A1	Dec. 18, 2014
Parthasarathy	US 2016/0143621 A1	May 26, 2016
Michael Wang ("Wang")	*Imaging Transverse Isotropic Properties of Muscle by Monitoring Acoustic Radiation Force Induced Shear Waves Using a 2-D Matrix Ultrasound Array*, 32 IEEE Transactions on Medical Imaging, pp. 1671–1684	2013

REJECTIONS

Claims 1–3, 5, 12, 14, 16, 17, 20–24, 27, and 30 are rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, and Kondoh.

Claim 4 is rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, and Schneider.

Claim 6 is rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, and Deschinger.

Claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, Deschinger, and Arai.

Claims 8–11 are rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, and Wang.

Claim 13 is rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, and Pini.

Claims 15 and 18 are rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, and Anite.

Claim 19 is rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, Pini, and Pelissier.

Claim 25 is rejected under 35 U.S.C. § 103 as unpatentable over Toma, Parthasarathy, Kondoh, and Anite.

ANALYSIS

Claim 1 calls for a processor configured to "define at least one target plane in the anisotropic tissue at an a [sic] first angle with respect to and using a reference plane of the anisotropic tissue." Appeal Br. 20, Claims App. Independent claim 21 includes a similar recitation, i.e., "defining at least one target plane using the reference plane and an a [sic] first angle between the at least one target plane and the reference plane." *Id.* at 23. These claim recitations require that the reference plane is used to define the at least one target plane.

The Examiner finds that Toma teaches a processor configured to "define at least one target plane in the anisotropic tissue . . . at a first angle with respect to a reference plane of the anisotropic tissue" (Final Act. 3–4), but "does not specifically teach using a reference plane to define at least one target plane" (*id.* at 5). The Examiner does not rely on the teachings of Parthasarathy to remedy this deficiency, rather the Examiner appears to rely on the teachings of Kondoh. *See id.* at 5–6. Specifically, the Examiner finds that "Kondoh . . . teaches using a reference plane to define at least one target

plane." Final Act. 6. The Examiner supports this finding by explaining that Kondoh teaches "a suitable angle at which the ultrasound probe should be positioned in relation a plane parallel to a carotid artery is displayed to the user. The position of the suitable angle is considered the target plane and the plane parallel to the carotid artery is considered the reference plane." *Id.* (emphasis omitted) (citing Kondoh ¶ 121); Ans. 4–5. Thereafter, the Examiner combines the teachings of Toth in view of Parthasarathy and Kondoh as a "simple substitution of one known element for another to obtain the predictable results of determining how much the ultrasound probe needs to move to be aligned with the target plane." *Id.* at 7.

The Appellant argues that the Examiner's reliance on both Toma's and Kondoh's teachings to result in the processor configured to "define at least one target plane in the anisotropic tissue at an a [sic] first angle with respect to and using a reference plane of the anisotropic tissue," as recited in claim 1, is inadequate and confusing. *See* Appeal Br. 16; *see also id.* at 13.

The Examiner responds to the Appellant's argument by focusing on the teachings of Toma. *See* Ans. 6–7. Specifically, the Examiner responds as follows:

> *Examiner notes that as previously set forth Toma does not use the reference plane to define at least one target plane* but does teach defining at least one a target plane at a first angle with respect to a reference plane. Specifically, fig. 2c of Toma shows the "measurement target region" (solid line box) which corresponds to a target plane is defined on the longitudinal axis of the carotid artery (reference plane). By defining a target plane, Toma is also defining the target plane at a first angle with respect to a reference plane because the claims do not require that a first angle actually be defined, they only require the target plane to be at an angle with respect to a reference plane. Therefore, by defining the measurement target region of

> Toma in relation to the longitudinal axis of the carotid artery (reference plane), Toma is defining a target plane at a first angle with respect to a reference plane.

Ans. 6–7 (emphasis added). Accordingly, it is clear that the Examiner does not rely on Toma to disclose the claim requirement that the reference plane is used to define the at least one target plane.

Nonetheless, we, like the Appellant, are confused by the Examiner's rejection as it relates to claim 1's processor, which is configured to "define at least one target plane in the anisotropic tissue at an a [sic] first angle with respect to and using a reference plane of the anisotropic tissue." We note that the Examiner's rejection is based on a *simple substitution* of one known article for another. *See* Final Act. 7. Therefore, the Examiner's response to the Appellant's argument should, at the very least, include a discussion of how Kondoh teaches the entirety of the claimed processor's operation to "define at least one target plane in the anisotropic tissue at an a [sic] first angle with respect to and using a reference plane of the anisotropic tissue."

In this regard, and as best understood, the Examiner finds that Kondoh's suitable angle (i.e., the first angle) is used to determine a plane parallel to a carotid artery (i.e., the reference plane) and the position at which the ultrasound probe should be positioned (i.e., the at least one target plane). *See* Final Act. 6 (citing Kondoh ¶ 121); Ans. 4–5. However, the Examiner fails to adequately explain on the record how Kondoh teaches that the plane parallel to a carotid artery (i.e., the reference plane) is used to define the position at which the ultrasound probe should be positioned (i.e., the at least one target plane). *See* Appeal Br. 13. Therefore, we fail to understand how the Examiner adequately supports the finding that Kondoh teaches the claimed processor's operation to "define at least one target plane

in the anisotropic tissue at an a [sic] first angle with respect to and using a reference plane of the anisotropic tissue."

Thus, we reverse the Examiner's rejection of independent claim 1 and its dependent claims under as unpatentable over Toma, Parthasarathy, and Kondoh. The Examiner's rejection of independent claim 21 and its dependent claims under as unpatentable over Toma, Parthasarathy, and Kondoh is reversed for a similar reason. We likewise reverse the Examiner's rejections of dependent claims 4, 6–11, 13, 15, 18, 19, and 25 because, as best understood, these rejections do not include an adequate basis to cure the deficiency in the rejection of the independent claims.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–3, 5, 12, 14, 16, 17, 20–24, 27, 30	103	Toma, Parthasarathy, Kondoh		1–3, 5, 12, 14, 16, 17, 20–24, 27, 30
4	103	Toma, Parthasarathy, Kondoh, Schneider		4
6	103	Toma, Parthasarathy, Kondoh, Deschinger		6
7	103	Toma, Parthasarathy, Kondoh, Deschinger, Arai		7
8–11	103	Toma, Parthasarathy, Kondoh, Wang		8–11
13	103	Toma, Parthasarathy, Kondoh, Pini		13
15, 18	103	Toma, Parthasarathy, Kondoh, Anite		15, 18

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
19	103	Toma, Parthasarathy, Kondoh, Pini, Pelissier		19
25	103	Toma, Parthasarathy, Kondoh, Anite		25
Overall Outcome				1–25, 27, 30

REVERSED