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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ALAN JEFFREY SEEFELDT

Appeal 2015-007547
Application 12/668,789
Technology Center 2600

Before JOHN A. JEFFERY, BRADLEY W. BAUMEISTER, and DENISE M. POTHIER, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1, 3, 4, 6, 7, 9, 13, 15, 18–22, 24, and 26.[1] Claims 8 and 11 have been indicated as containing allowable subject matter. Ans. 3.

We reverse.

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[1] Although the Examiner indicates on the Action's PTOL-326 cover sheet that the Action is non-final, the Examiner clarifies that the Action is, in fact, made final. Final Act. 13.

REJECTIONS ON APPEAL

Claims 1, 3, 4, 6, 13, and 15 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Rajan (US 2002/0059065 A1; published May 16, 2002). Final Act. 2–4.[2]

Claims 7 and 9 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Rajan and Suppappola (US 2005/0278171 A1; published Dec. 15, 2005). Final Act. 4–6.

Claims 18–22, 24, and 26 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Rajan and Dishman (US 2007/0076783 A1; published Apr. 5, 2007). Final Act. 6–11.[3]

SUMMARY OF THE INVENTION

Appellant's invention computes a time-varying measure of the level of an audio signal. Spec. 1:5–9. Specifically, in audio-signal processing, automatic gain control (AGC) is used to vary an audio signal's gain to a desired level by smoothing. *Id.* at 1:25–28. In one application, AGC can be used on a television's audio to maintain a consistent average level across programming and channels. *Id.* at 2:28–30. When a viewer changes the channel, the associated average level may change abruptly, but it may take longer for the gain to converge to a new level. *Id.* at 3:2–5. During this change, the viewer may perceive the audio as too loud or soft. *Id.* On the

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[2] Throughout this opinion, we refer to (1) the Final Rejection mailed October 24, 2014 ("Final Act."); (2) the Appeal Brief filed January 5, 2015 ("App. Br."); (3) the Examiner's Answer mailed June 16, 2015 ("Ans."); and (4) the Reply Brief filed August 10, 2015 ("Reply Br.").

[3] During the appeal, the Examiner withdrew the rejection of claims 8 and 11. Ans. 2–3.

other hand, a fast change may be undesirable for someone listening to jazz or classical music because the listener may want to preserve the audio signal's large dynamics. *Id.* at 5:5–13. The choice of smoothing parameters controls how quickly the gain changes to a new level. *See generally id.* at 2. Appellant's invention determines the appropriate smoothing parameters using a probability density of the audio's time-varying level. *Id.* at 5:15–19.

CLAIMS 1, 3, 4, 6, AND 13

Independent claim 1 is reproduced below with our emphasis:

> 1. A method for smoothing a time-varying level of a signal, the method comprising:
>
> *estimating a time-varying probability density of the time-varying level of the signal;*
>
> computing a probability of a prior smoothed time-varying level using the time-varying probability density estimate;
>
> adapting a smoothing filter in response to the probability; and
>
> applying the adapted smoothing filter to the time-varying level to generate the smoothed time-varying level.

Contentions

The Examiner finds that Rajan discloses every limitation except for the recited time-varying level. Final Act. 2–3. The Examiner, however, concludes that it would have been obvious to use time-varying signals in Rajan because it was well-known that speech signals change over time. *Id.* at 3. Furthermore, the Examiner finds that Rajan estimates a time-varying probability density of a signal. *Id.* at 2 (citing Rajan ¶¶ 45–59,

Fig. 8). According to the Examiner, Rajan calculates the joint probability density for speech samples that vary over time. Ans. 4.

Appellant contends that Rajan does not estimate a time-varying probability density, as recited. App. Br. 9. According to Appellant, Rajan's joint probability density is calculated at a single point in time. *Id.*; Reply Br. 6. Appellant argues that Rajan assumes there is no time-based variation of noise. *Id.*

Issue

Has the Examiner established by a preponderance of the evidence that Rajan would have taught or suggested estimating a time-varying probability density of the time-varying level of the signal, as recited in claim 1?

Analysis

We are persuaded that the Examiner has erred in rejecting claim 1 over Rajan.

Claim 1 recites, in part, "estimating a time-varying probability density." The Specification states that the probability density estimate returns a probability between zero and one for a given level. Spec. 8:28–29. In one embodiment, this probability density can be estimated from past values of a level. *Id.* at 7:1–5. For example, an estimator may fit a parametric representation to these past values or compute a histogram. *Id.* This estimate can vary over time as the estimator receives new values. *Id.* at 8:29–31.

To be sure, although this embodiment informs our construction, claim 1 is not limited to this example. Nevertheless, claim 1 expressly requires estimating a time-varying function. Here, we are persuaded that the Examiner has not shown how Rajan estimates time-varying functions

In particular, Rajan's system performs speech processing. Rajan ¶ 1. Rajan uses auto-regressive (AR) filter coefficients to represent raw speech. *Id.* ¶¶ 28–29, equation (1); *see also id.*, Fig. 8, *cited in* Final Act. 2. Rajan's statistical-analysis unit 21 computes these AR coefficients. Rajan ¶ 25. Specifically, statistical-analysis unit 21 finds coefficients that maximize a joint probability density function. *Id.* ¶ 41. In other words, Rajan's joint probability density function defines the probability that a speech-signal representation has a particular set of coefficients. *See id.* In maximizing this function, Rajan determines the coefficients that best represent the speech. *Id.*

Like Appellant's probability density, Rajan's joint probability density function is used to obtain probabilities for some input parameters. Rajan ¶ 48. For example, Rajan's joint probability density function in equation (12) gives the probability of a given vector of process noise $e(n)$ occurring. *See id.* ¶¶ 48–49, 53, *cited in* Ans. 3; *see also* Rajan ¶¶ 45–59 (listing a series of other functions with other parameters given by equations (11)–(17)), *cited in* Final Act. 2. The Examiner concludes that it would have been obvious to process time-varying speech signals, just as Appellant's levels are time varying. Final Act. 3

But the values representing the speech signals are the parameters to the cited joint probability density function, $p(e(n))$, of Rajan's equation 12. *See, e.g.*, Rajan ¶¶ 48–49, *cited in* Ans. 3. Here, claim 1 requires "estimating a time-varying probability density of the time-varying level of the signal"—that is, estimating a probability density that varies in time. We agree with Appellant that varying the parameters to the function does not imply that the

probability density function, itself, changes or needs to be estimated. *See* App. Br. 9.

At best, the Examiner has shown that Rajan can use the observed, time-varying speech signal data in maximizing the cited probability density functions. Final Act. 2–3; *accord* Rajan ¶ 41. But regarding the cited function, Rajan assumes that measurement noise is independent of noise at another time point. Rajan ¶¶ 48–49, 53, *cited in* Ans. 3. This only further undermines the Examiner's finding that the probability density function itself varies in time. Ans. 3–4.

Moreover, the Examiner has not explained sufficiently how any of Rajan's cited equations (11)–(17) are estimated. *See* Final Act. 2–3 (citing Rajan ¶¶ 45–59)). Rather, the cited portions of Rajan (Final Act. 2) discuss the theory and overview of statistical analysis unit 21. *See* Rajan ¶ 26. Accordingly, we are persuaded that the Examiner has not shown where these probability density functions themselves are estimated, let alone, time-varying and estimated, as claimed.

Accordingly, we will not sustain the Examiner's rejection of claim 1. *See* Final Act. 2–3. Nor do we sustain the rejections of claims 3, 4, 6, 13, and 15, which are based on the Examiner's rationale for claim 1. *See id.* at 2–4.

CLAIMS 18–22, 24, AND 26

Independent claim 18 is reproduced below with our emphasis:

> 18. An apparatus for smoothing a time-varying level of an audio signal, wherein the apparatus comprises:
>
> an input terminal for receiving the audio signal;

> *a short-term-level computer coupled to the input terminal for computing a short-term level of the audio signal;*
>
> a level smoother coupled to an output of the short-term level computer for smoothing the short-term level of the audio signal using smoothing parameters;
>
> a probability-density estimator coupled to the output of the short-term-level computer for *estimating a probability density of the short-term-level;*
>
> a delay coupled to an output of the level smoother for delaying the smoothed short-term-level of the audio signal;
>
> a probability computer coupled to an output of the probability-density estimator and to an output of the delay for computing a probability of the delayed smoothed short-term level; and
>
> a smoothing-parameters calculator coupled to the output of the short-term level computer, coupled to an output of the probability computer, and coupled to the output of the delay for calculating the smoothing parameters, wherein the level smoother is also coupled to an output of the smoothing-parameters calculator.

Contentions

The Examiner finds that Rajan teaches all of the limitations of claim 18 except for the delay. Final Act. 7–8. The Examiner, however, turns to Dishman in concluding that it would have been obvious to add a delay to Rajan. *Id.* (citing Dishman ¶ 9). The Examiner finds that claim 18 contains limitations similar to those addressed in the rejection of claim 1. Final. Act. 7.

Appellant argues that claim 18 is unlike claim 1 and the Examiner, in rejecting claim 18, has failed to address the differences between these claims. App. Br. 20–21; Reply Br. 19–20. In Appellant's view, the

Examiner has not explained how Rajan discloses a short-term-level computer coupled to an input terminal for computing a short-term-level of the audio signal. App. Br. 21; Reply Br. 19–20.

Appellant further argues that the Examiner's rejection should be reversed for the reasons stated in connection with claim 1. App. Br. 21.

Issues

I. Did the Examiner satisfy the burden of production by providing an adequate explanation of the short-term-level computer, as recited in claim 18?

II. Has the Examiner established by a preponderance of the evidence that Rajan would have taught or suggested estimating a probability density, as recited in claim 18?

Analysis

Unlike claim 1, claim 18 further recites, in part, a "short-term-level computer" and "estimating a probability density of the short-term-level." The Specification states that "'[s]hort-term' means computed over a time interval significantly shorter than the interval over which the subsequent smoothing is effective." Spec. 2:2–4.

Because the Examiner relies on the discussion for claim 1, which does not contain a short-term-level computer or any method step corresponding to this component's function (*see* Final Act. 7–8; Ans. 7–8), the Examiner has not satisfied the burden of production. As such, Appellant has not been properly notified of the basis for claim 18's rejection.

> [T]he PTO carries its procedural burden of establishing a prima facie case when its rejection satisfies 35 U.S.C. § 132, in "notify[ing] the applicant . . . [by] stating the reasons for [its] rejection, or objection or requirement, together with such

> information and references as may be useful in judging of the propriety of continuing the prosecution of [the] application." That section "is violated when a rejection is so uninformative that it prevents the applicant from recognizing and seeking to counter the grounds for rejection."

In re Jung, 98 USPQ2d 1174, 1177 (Fed. Cir. 2011) (citations omitted) (alterations in original).

For at least this reason, we do not sustain the rejection of claim 18.

Additionally, the Examiner has not shown that Rajan estimates a probability density function. *See* Final Act. 7–8; Ans. 7–8. As discussed above, Rajan uses auto-regressive (AR) filter coefficients to represent raw speech. Rajan. ¶¶ 28–29. Rajan's statistical-analysis unit 21 computes these coefficients. *Id.* ¶ 25. In explaining this theory behind this unit, Rajan lists a series of probability density functions given by equations (11)–(17). Rajan ¶¶ 45–59, *cited in* Final Act. 2. But the Examiner has not explained how any of these equations are estimated. *See* Final Act. 7–8; Ans. 7–8. Rather, the cited portions of Rajan (Final Act. 2[4]) explain the theory behind unit 21 by discussing the probability distributions used in the statistical modelling. *See* Rajan ¶ 26.

For this additional reason, we do not sustain the Examiner's rejection of claim 18. Nor do we sustain the rejections of claims 19–22, 24, and 26,

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[4] The Examiner incorporates this citation by reference to claim 1. Final Act. 7–8. Although claim 1 recites "estimating a *time-varying* probability density of the *time-varying level* of the signal" instead of "estimating a probability density of the *short-term-level*," we understand the Examiner to find that these elements correspond to the same feature in Rajan because they both define an estimating function. *Id.*

which are based on the Examiner's rationale for the rejection of claim 1 *See* Final Act. 8–11.

THE OTHER OBVIOUSNESS REJECTION

We likewise do not sustain the Examiner's rejection of dependent claims 7 and 9 (*id.* at 4–8) for the same reasons discussed above in connection with claim 1. The additional references, Dishman and Suppappola, were not relied upon to teach the recited estimating that is missing from Rajan, and, thus, does not cure the deficiency explained previously.

DECISION

The Examiner's decision rejecting claims 1, 3, 4, 6, 7, 9, 13, 15, 18–22, 24, and 26 is reversed.

REVERSED