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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ITARU HIROMI

Appeal 2018-008424
Application 14/718,844
Technology Center 2800

Before BRADLEY W. BAUMEISTER, JASON V. MORGAN, and DAVID J. CUTITTA II, *Administrative Patent Judges.*

CUTITTA, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–3 and 5–10, all of the pending claims.[2] We have jurisdiction under 35 U.S.C. § 6(b). Oral arguments were heard on February 26, 2020. A transcript of that hearing will be added to the record in due time.

We REVERSE.

[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies Intersil Americas LLC as the real party in interest. Appeal Br. 2.
[2] Claim 4 is cancelled. Appeal Br. 2.

CLAIMED SUBJECT MATTER

Appellant's claimed invention relates to "a method for use by an optical proximity detector." Spec. ¶ 62.[3] According to Appellant, "a digital distance value, [is] indicative of a distance between the optical proximity detector and [an] object" to be detected. *Id.* ¶ 100. Also, "a digital precision value is produced which is indicative of a precision of the digital distance value." *Id.* ¶ 101. In the claimed invention, the digital precision value is determined in dependence on "an integration time of digital filters that are used to produce the digital distance value." Appeal Br. 10.

Independent claim 1 is reproduced below with limitations at issue emphasized and is illustrative of the claimed subject matter:

> 1. A method for use by an optical proximity detector that includes a light source and a light detector, the method comprising:
>
> selectively driving the light source with a drive signal having a carrier frequency to thereby cause the light source to selectively emit light having the carrier frequency;
>
> producing an analog light detection signal indicative of a magnitude and a phase of a portion of the light emitted by the light source that reflects off an object and is incident on the light detector;
>
> amplifying the analog light detection signal using amplification circuitry to thereby produce an amplitude adjusted analog light detection signal;

[3] Throughout this Decision we refer to: (1) Appellant's Specification filed May 21, 2015 ("Spec."); (2) the Final Office Action ("Final Act.") mailed November 30, 2017; (3) the Appeal Brief filed May 7, 2018 ("Appeal Br."); and (4) the Examiner's Answer ("Ans.") mailed June 14, 2018; and (5) the Reply Brief filed August 14, 2018 ("Reply Br.").

> producing, in dependence on the amplitude adjusted analog light detection signal, digital in-phase and quadrature-phase signals;
>
> producing, in dependence on the digital in-phase and quadrature-phase signals, a digital distance value indicative of a distance between the optical proximity detector and the object;
>
> producing a digital DC current value, using a DC photocurrent analog-to-digital converter (DCPC ADC) coupled to the light detector, the digital DC current value indicative of a DC current produced by the light detector when the light source is not emitting light;
>
> producing, in dependence on the digital DC current value indicative of the DC current produced by the light detector when the light source is not emitting light, a digital precision value indicative of a precision of the digital distance value, *wherein the producing the digital precision value includes determining the digital precision value also in dependence on:*
>
> > *an integration time of digital filters that are used to produce the digital distance value in dependence on the digital in-phase and quadrature-phase signals*; and
> >
> > a magnitude of the analog light detection signal produced using the light detector;
>
> outputting the digital distance value or saving the digital distance value in one or more addressable registers; and
>
> outputting the digital precision value or saving the digital precision value in one or more addressable registers.

Appeal Br. 10–11 (Claims Appendix).

REFERENCES

The references[4] relied upon by the Examiner are:

Name	Reference	Date
Yamashita	US 6,195,197 B1	Feb. 27, 2001
Seto	US 6,339,740 B1	Jan. 15, 2002
Banks	US 2010/0128109 A1	May 27, 2010
Ritter	US 2011/0181861 A1	July 28, 2011
Burns	*System design of a pulsed laser rangefinder*	Mar. 1991
Hebert	*3-D Measurements From Imaging Laser Radars: How Good Are They?*	Nov. 1991
Intersil	*HSP50110*	Mar. 2001

REJECTIONS

The Examiner rejects claims 1–3, 5, 8, and 9 under 35 U.S.C. § 103 as unpatentable over Yamashita, Seto, Ritter, HSP50110, and Burns. Final Act. 2–6.

The Examiner rejects claims 6 and 7 under 35 U.S.C. § 103 as unpatentable over Yamashita, Seto, Ritter, HSP50110, Burns, and Banks. *Id.* at 9–10.

The Examiner rejects claim 10 under 35 U.S.C. § 103 as unpatentable over Yamashita, Seto, Ritter, HSP50110, Burns, and Hebert. *Id.* at 9–10.

[4] All citations to the references use the first-named inventor or author only.

OPINION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of Appellant's arguments and evidence. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential). Arguments not made are waived. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Independent claim 1 recites, in part, "producing a digital precision value . . . wherein the producing the digital precision value includes determining the digital precision value also in dependence on: an integration time of digital filters that are used to produce the digital distance value in dependence on the digital in-phase and quadrature-phase signals." The Examiner relies on the combined teachings of HSP50110 and Burns to teach the limitation at issue. Final Act. 5–6 (citing HSP50110, 4, 8, 10 and Burns 324–25).

Appellant argues "[n]owhere does Burns mention anything about integration times of digital filters, much less filters used to produce digital distance values as explicitly set forth in the claims. . . . [A]t best, Burns describes a method for determining range error (the alleged digital precision value) based on a noise equivalent bandwidth BW_N." Appeal Br. 7. Appellant continues "[n]owhere does HSP50110 mention anything about how noise bandwidth can be set by integration times of digital filters, much less filters used to produce digital distance values as explicitly set forth in the claims." *Id.* "HSP50110 teaches that BW_N is not dependent on an Integrate and Dump filter (much less integration times thereof), but is instead dependent on a type of third order CIC filter used to produce a desired decimation factor" and, therefore, "it is clearly erroneous to take the position that HSP50110 teaches anything about how 'noise bandwidth [is] set by integration time' as set forth in the claims." *Id.* at 8 (emphasis omitted).

Appellant's arguments are persuasive. Claim 1 requires that the digital precision value is determined "in dependence on: an integration time of digital filters that are used to produce the digital distance value." *Id.* at 10. As discussed above, the Examiner finds, and Appellant agrees (Appeal Br. 7), that "'Burns describes a method for determining range error (the alleged digital precision value) based on a noise equivalent bandwidth BW_N. But Burns does not teach or suggest anything about how this term BW_N is obtained or computed.'" Ans. 4. The Examiner finds "one of ordinary skill would know that the BW_N will be provided in data sheets. For example, Intersil Corporation's HSP50110 data sheet is evidence that noise equivalent bandwidth is a function of the integration time for a digital filter of an I/Q demodulator IC." *Id.*

In response to Appellant's argument that HSP50110 does not teach "how noise bandwidth can be set by integration times of digital filters, much less filters used to produce digital distance values as explicitly set forth in the claims" (Appeal Br. 7), the Examiner notes that even though "the references fail to show certain features of appellant's invention, . . . the features upon which appellant relies (i.e., a specific digital filter) are not recited in the rejected claim(s)" (Ans. 5).

We disagree with the Examiner because claim 1 *does* require determining the digital precision value in dependence on an integration time of specific digital filters, i.e., "digital filters that are used to produce the digital distance value in dependence on the digital in-phase and quadrature-phase signals." Accordingly, the features upon which Appellant's argument relies are recited in claim 1. Furthermore, the Examiner does not show how HSP50110 teaches determining the digital precision value in dependence on an integration time of digital filters, as recited in claim 1, because the Examiner does not sufficiently explain how noise equivalent bandwidth is a function of the integration time for the digital filters discussed in HSP50110.

The rejection relies, in part, on HSP50110's Table 3, which shows noise equivalent bandwidth for different filters. HSP50110's Table 3 is reproduced below:

TABLE 3. DOUBLE SIDED NOISE EQUIVALENT BANDWIDTH FOR DIFFERENT FILTER CONFIGURATIONS AND OUTPUT SAMPLE RATES

DEC	INTEGRATE/ DUMP	INTEGRATE/ DUMP W/ x/sin(x)	3RD ORDER CIC	3RD ORDER CIC W/ $[x/sin(x)]^3$
2	1.0000	1.3775	0.6250	1.3937
10	1.0000	1.3775	0.5525	1.0785
18	1.0000	1.3775	0.5508	1.0714
26	1.0000	1.3775	0.5504	1.0698
34	1.0000	1.3775	0.5502	1.0691
42	1.0000	1.3775	0.5501	1.0688
50	1.0000	1.3775	0.5501	1.0687
58	1.0000	1.3775	0.5501	1.0686
66	1.0000	1.3775	0.5501	1.0685
74	1.0000	1.3775	0.5500	1.0684
82	1.0000	1.3775	0.5500	1.0684
90	1.0000	1.3775	0.5500	1.0684
98	1.0000	1.3775	0.5500	1.0684
106	1.0000	1.3775	0.5500	1.0684
114	1.0000	1.3775	0.5500	1.0683
122-4096	1.0000	1.3775	0.5500	1.0683

HSP50110 describes Table 3, in part, as including "[a] summary of equivalent IF BN's for different filter configurations and decimation rates." HSP50110, p. 10.

The Examiner relies on Table 3's illustration of various decimation rates ("DEC") to teach an integration time of the claimed digital filter. Specifically, the Examiner finds,

> In this case, the scope of the "digital filters" includes any digital filter that can be used to produce the digital distance value in dependence on the digital in-phase and quadrature-phase signals. As discussed above, one of ordinary skill would program the I/Q demodulator IC (*e.g.*, with an integration time of 10 DEC for 0.5525 noise equivalent bandwidth using a 3rd order CIC) so as to achieve a desired bandwidth for detection of in-phase (I) and quadrature-phase (Q) data in order to extract range (i.e., distance) information by a demodulate calculation. Therefore the scope of the "digital filters" includes 3rd order CIC digital filter within a commercially available I/Q demodulator IC that can be used to produce the digital distance value in dependence on the digital in-phase and quadrature-phase signals.

Ans. 5–6.

The Examiner, however, has not sufficiently shown how HSP50110's decimation rate, i.e., the cited decimation rate of 10 in row 2 of Table 3—teach an integration time, as claimed. As argued by Appellant, the Examiner's finding that the '"decimation rate is equivalent to the number of samples in the integration period'" is insufficient to establish that HSP50110 teaches or suggests "that the number of samples in an integration period is the same as an integration time of digital filters as is expressly set forth by the claims." Reply Br. 2 (emphasis omitted).

Because the Examiner has not sufficiently shown that HSP50110 teaches "an integration time of digital filters that are used to produce the digital distance value in dependence on the digital in-phase and quadrature-phase signals," we find persuasive Appellant's argument that the Examiner has not shown the cited combination teaches "determining the digital precision value also in dependence on: an integration time of digital filters," as recited in claim 1.

Because we agree with at least one of the dispositive arguments advanced by Appellant for claim 1, we need not reach the merits of Appellant's other arguments. Accordingly, based on the record before us, we do not sustain the Examiner's 35 U.S.C. § 103 rejection of independent claim 1, and, for the same reasons, of dependent claims 2, 3, and 5, 8 and 9.

With respect to the remaining obviousness rejections of claims 6, 7, and 10, the Examiner does not rely on either of the additionally cited references, Banks and Hebert, to cure the deficiency noted in relation to claim 1. Final Act. 9–11. Accordingly, we do not sustain these obviousness rejections for the reasons set forth above in relation to claim 1.

CONCLUSION

We reverse the Examiner's rejections of claims 1–3 and 5–10 under 35 U.S.C. § 103.

DECISION SUMMARY

In summary:

Claims Rejected	**35 U.S.C. §**	**References**	**Affirmed**	**Reversed**
1–3, 5, 8, 9	103	Yamashita, Seto, Ritter, HSP50110, Burns		1–3, 5, 8, 9
6, 7	103	Yamashita, Seto, Ritter, HSP50110, Burns, Banks		6, 7
10	103	Yamashita, Seto, Ritter, HSP50110, Burns, Hebert		10
Overall Outcome				1–3, 5–10

REVERSED