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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LOUIS W. BOKMA

Appeal 2016-002532
Application 12/950,693
Technology Center 2600

Before JOHN A. JEFFERY, NATHAN A. ENGELS, and KAMRAN JIVANI, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's decision to reject claims 1–21. Claims 22–25 were withdrawn from consideration. App. Br. 18.[1] We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE

Appellant's invention configures and controls a touch sensing system to reduce measurement errors and avoid noise. To that end, an integration

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[1] Throughout this opinion, we refer to (1) the Final Rejection mailed November 20, 2014 ("Final Act."); (2) the Appeal Brief filed August 7, 2015 ("App. Br."); (3) the Examiner's Answer mailed October 30, 2015 ("Ans."); and (4) the Reply Brief filed December 28, 2015 ("Reply Br.").

capacitance is pre-charged before an electrode or pixel scan starts resulting in more consistent measurements and less scan noise. *See generally* Abstract; Spec. ¶¶ 2, 7, 29, 34. Claim 1 is illustrative:

> 1. An apparatus for synchronizing a capacitive touch sensing system to avoid capacitance measurement errors, comprising:
>
> a counter configured for generating a count value indicative of a capacitance during a capacitance measurement cycle; and
>
> a processor capable of triggering an interrupt from an end of a previous capacitance measurement cycle, and
>
> starting a new capacitance measurement cycle a predetermined delay after the interrupt is received;
>
> wherein the delay is selected such that the start of the new capacitance measurement cycle occurs within a charge portion of a capacitance charge/discharge cycle and the counter is disabled.

THE REJECTION

The Examiner rejected claims 1–21 under 35 U.S.C. § 103 as unpatentable over Philipp (US 2007/0062739 A1; Mar. 22, 2007) and Tasher (US 2010/030198 A1; Dec. 2, 2010). Final Act. 4–13.

CONTENTIONS

The Examiner finds that Philipp discloses a processor capable of (1) triggering an interrupt from an end of a previous capacitance measurement cycle, namely via a control signal closing reset switch 404 in Figure 6A, and (2) starting a new capacitance measurement cycle a predetermined delay after the interrupt is received, namely after the reset switch is open. Final Act. 4. According to the Examiner, this delay is selected such that the start of the new capacitance measurement cycle occurs within a charge portion of a capacitance charge/discharge cycle as shown in the annotated version of Philipp's Figure 6B. Final Act. 4–5. Although the Examiner acknowledges that Philipp lacks the recited counter-based limitations, the Examiner cites Tasher for teaching these features in concluding that the claim would have been obvious. Final Act. 5–6.

Appellant argues that Philipps does not start a new capacitance measurement cycle within a charge portion of a capacitance charge/discharge cycle as claimed. According to Appellant, the Examiner's interpretation of this portion covers a time period when no charging occurs, namely at the rising edge associated with the state of switch 401 in Philipp's Figure 6B. App. Br. 6–8; Reply Br. 2–5. Appellant also contends that Philipp does not start a new capacitance measurement cycle after a predetermined delay is selected such that starting the new capacitance measurement cycle occurs within the recited charge portion. App. Br. 8–10; Reply Br. 5.

According to Appellant, Philipp's drive signal 109 is synchronized with the control signal to sampling switch 401 and, therefore, the delay cannot be selected as claimed. App. Br. 9. Appellant further contends that Philipp does not trigger an interrupt from an end of a previous capacitance measurement cycle as claimed because the identified delay immediately follows the end of the measurement cycle with no intervening interrupt. App. Br. 10–12; Reply Br. 5. Appellant adds that the control signal identified by the Examiner as corresponding to this interrupt must occur before—not after—the end of the capacitance measurement cycle. App. Br. 11.

ISSUE

Under § 103, has the Examiner erred in rejecting claim 1 by finding that Philipp and Tasher collectively would have taught or suggested a processor capable of (1) triggering an interrupt from an end of a previous capacitance measurement cycle, and (2) starting a new capacitance measurement cycle a predetermined delay after the interrupt is received, where the delay is selected such that the start of the new capacitance measurement cycle occurs within a charge portion of a capacitance charge/discharge cycle and the counter is disabled?

ANALYSIS

We begin by noting the key temporal aspects of the processor's functionality recited in claim 1. As noted above, the processor must be capable of triggering an interrupt from an *end* of a *previous* capacitance measurement cycle, and (2) starting a *new* capacitance measurement cycle a predetermined delay *after* the interrupt is received. Moreover, the delay is selected such that the *start* of the new capacitance measurement cycle occurs within a charge portion of a capacitance charge/discharge cycle.

The Examiner relies principally on Philipp's Figure 6B for teaching this sequence. *See* Final Act. 4–5; Ans. 2–5. As shown in the Examiner's annotated version of Philipp's Figure 6B on page 5 of the Final Rejection reproduced below, the Examiner identifies one capacitance measurement cycle from the first rising edge of the signal associated with numeral 109 to the rising edge of the signal associated with reset switch 404.

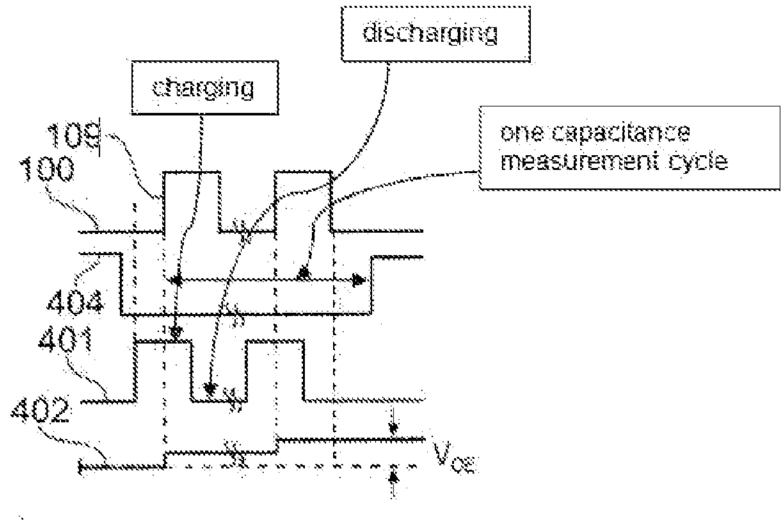

Fig. 6B

Examiner's annotated version of Philipp's Figure 6B

Appellant, however, contends that Philipp's Figure 6B shows a single capacitance measurement cycle that begins when reset switch 404 goes low and ends when reset switch goes high. Reply Br. 3–4. Therefore, both the Examiner and Appellant agree that Philipp's capacitance measurement cycle ends when reset switch 404 goes high, but differ as to when this cycle begins. According to the Examiner, this cycle begins at the first rising edge of the signal associated with numeral 109, but Appellant contends that the cycle begins earlier, namely when reset switch 404 goes low. *Compare* Final Act. 5 *with* Reply Br. 3–4.

Although a capacitance measurement cycle can be defined between the respective transitions of Philipp's reset switch 404 as Appellant indicates, we nevertheless see no reason why a capacitance measurement cycle could not *also* be defined between the first rising edge of the signal associated with numeral 109 and the rising edge of the signal associated with reset switch 404 in Philipp's Figure 6B as the Examiner indicates. Nothing in the claim precludes the Examiner's interpretation in this regard, nor does the Specification define the term "capacitance measurement cycle" to so limit its interpretation, unlike other terms that leave no doubt as to their meaning.[2] Under its plain meaning, a "cycle" is "a course or series of events or operations that recur regularly and usu[ally] lead back to the starting point." MERRIAM WEBSTER'S COLLEGIATE DICTIONARY 288 (10th ed. 1993). Because events associated with Philipp's signals 109 and 404 recur regularly and are associated with capacitance-based measurements as noted in paragraphs 64 and 65, the time period from the first rising edge of the signal associated with numeral 109 to the rising edge of the signal associated with reset switch 404 in Philipp's Figure 6B is a "capacitance measurement cycle" under the term's broadest reasonable interpretation. Appellant's arguments to the contrary (Reply Br. 3–4) are unavailing and not commensurate with the scope of the claim.

We also see no error in the Examiner's finding that Philipp at least suggests triggering an interrupt from an end of a previous capacitance measurement cycle, namely via a control signal closing reset switch 404 in Figure 6A. Final Act. 4. Because this control signal is applied to the reset switch's gate terminal at the rising edge of the corresponding signal 404 in Figure 6B at the end of the capacitance measurement cycle, Philipp at least suggests triggering an interrupt from the end of this cycle. *See* Ans. 5 (noting this point); *see also* Philipp ¶ 65. Appellant's contention that this interrupt occurs before—not *after*—the cycle ends (App. Br. 11) is unavailing and not commensurate with the scope of the limitation that does

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[2] *See, e.g.*, Spec. ¶¶ 44–45 (defining "computer-readable storage medium" and "transport medium").

not preclude the Examiner's interpretation, namely that Philipp at least suggests triggering an interrupt *from* an end of the previous cycle.

Philipp also at least suggests starting a new capacitance measurement cycle a predetermined delay after the interrupt is received. Not only is there a delay between the rising edge of the signal 404 associated with reset switch 404 in the *previous* cycle and the rising edge of the signal associated with numeral 109 in the *next* cycle as the Examiner illustrates in the annotated version of Philipp's Figure 6B on page 4 of the Answer, but Philipp also at least suggests that this delay can be predetermined. *See* Philipp ¶ 65 (noting that after the measurement is taken, reset switch 404 is closed again, and the cycle restarted when *next desired*, e.g., after a *delay* appropriate to the device being controlled).

Notably, this predetermined delay is effectively selected under these circumstances such that the start of the new capacitance measurement cycle, namely at the first rising edge of signal 109 in Philipp's Figure 6B, occurs within a "charge portion" of a capacitance charge/discharge cycle. We reach this conclusion even assuming, without deciding, that a "charge portion" is limited to only that part of a cycle when charging occurs as Appellant contends. *See* App. Br. 7. As Appellant acknowledges, Philipp's charge integrator (capacitor) 402 charges when its voltage level becomes non-zero as shown in the lowermost state diagram of Figure 6B. *See* App. Br. 8. Because this charging begins simultaneously with the first rising edge of signal 109—the start of the new capacitance measurement cycle—as shown in Philipp's Figure 6B, the start of this new cycle occurs within a "charge portion" of a capacitance charge/discharge cycle, namely at the beginning of that charge portion. Appellant's contention that because Philipp's new capacitance measurement cycle starts *when reset switch 404 goes low* and, therefore, is not within the charge portion (*see* App. Br. 7–8; Reply Br. 4–5) is unavailing, for this argument is not germane to the Examiner's finding that the first rising edge of signal 109 commences the new capacitance measurement cycle as noted above.

Philipp also at least suggests a discharge portion of this cycle at least when the capacitor 402's voltage is zero. This discharge portion is at least before the first rising edge of signal 109 in Philipp's Figure 6B, and presumably after the last rising edge of reset switch 404 despite the figure apparently erroneously not showing this latter discharged state as Appellant contends. *See* Reply Br. 3–4 (arguing that Philipp's Figure 6B erroneously does not show capacitor 402 discharging when switch 404 goes high).

Although the Examiner refers to the state of sampling switch 401 in connection with the recited charge/discharge cycle (*see* Final Act. 5; Ans. 2–3), we nonetheless see no harmful error in these findings at least to the extent that the identified charge portion corresponds at least partly to the charged state of capacitor 402—a charge portion in which the new capacitance measurement cycle starts as noted above.

Lastly, despite Appellant's arguments to the contrary (App. Br. 12), we see no error in the Examiner's reliance on Tasher for the limited purpose for which it was cited, namely for at least suggesting the recited counter-based limitations, including disabling the counter when a new charge/discharge cycle starts in Figure 6. *See* Final Act. 6. Appellant's arguments regarding Tasher's individual shortcomings, including not starting a new capacitance measurement cycle within the recited charge portion (App. Br. 12), do not persuasively rebut the Examiner's obviousness rejection where, as here, the rejection is based on the cited references' collective teachings. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

Therefore, we are not persuaded that the Examiner erred in rejecting claim 1, and claims 2–21 not argued separately with particularity.

CONCLUSION

The Examiner did not err in rejecting claims 1–21 under § 103.

DECISION

We affirm the Examiner's decision to reject claims 1–21.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED