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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JUNGHAN LEE and SUNGCHUL KIM

Appeal 2019-000682
Application 15/158,451
Technology Center 2600

Before JOSEPH L. DIXON, DAVID M. KOHUT, and JON M. JURGOVAN, *Administrative Patent Judges*.

KOHUT, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's final decision to reject claims 1–11, 13–17, and 20–28, which constitute all claims pending in this application.[2] Appeal Br. 36–42 (Claims App.). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM–IN–PART.

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[1] We use the term "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as LG Display Co., Ltd. Appeal Br. 3.

[2] Throughout this Decision we refer to the Final Rejection mailed March 12, 2018 ("Final Act."), the Appeal Brief filed June 11, 2018 ("Appeal Br."), the Examiner's Answer mailed September 5, 2018 ("Ans."), and the Reply Brief filed November 2, 2018 ("Reply Br.").

INVENTION

The present invention is directed to "a display device with an integrated touch screen" including "electrodes divided into a plurality of block type groups and a plurality of data lines" and "a display driver IC configured to . . . sequentially apply a touch scan signal to each block type group when the driving mode of the panel is a touch driving mode" and "apply a data signal to the data lines associated with a corresponding block type group when the touch scan signal is applied to the corresponding block type group," the data signal applied to the data lines having the same phase as that of the touch scan signal applied to the corresponding block type group. Spec. ¶¶ 3, 49; Abstract. Claim 1 is representative of the invention and is reproduced below.

> 1. A driver circuit for driving a display panel with an integrated touch screen, the driver circuit configured to:
>
> apply a common voltage to at least first and second touch electrodes of the display panel for driving the display panel during a display driving mode;
>
> apply a touch scan signal to the at least first and second touch electrodes to sense a touched position with the at least first and second touch electrodes during a touch driving mode; and
>
> apply a signal having a same phase as the touch scan signal to a first display driving electrode of the display panel overlapping with the first touch electrode concurrently with applying the touch scan signal to the first touch electrode, and to a second display driving electrode of the display panel overlapping with the second touch electrode concurrently with applying the touch scan signal to the second touch electrode.

Appeal Br. 36 (Claims App.).

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
van Lieshout et al. ("van Lieshout")	US 2012/0162088 A1	June 28, 2012
Shepelev et al. ("Shepelev")	US 2013/0057511 A1	Mar. 07, 2013

REJECTIONS[3]

Claims 1–11, 13–17, 20–25, 27, and 28 stand rejected under 35 U.S.C. § 112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. Final Act. 2–3.

Claims 3 and 13 stand rejected under 35 U.S.C. § 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement. Final Act. 4.

Claims 1–4, 6–11, 13, 14, 16, 17, 20–22, and 24–28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Shepelev and van Lieshout. Final Act. 5–13.

[3] The Examiner indicates "[c]laims 5, 15, and 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims (and amended to overcome the 112, first paragraph, scope of enablement rejection above)." Final Act. 13.

ANALYSIS

§ 112 Enablement Rejection of Claims 1–11, 13–17, 20–25, 27, and 28

In support of the § 112, first paragraph rejection of claims 1–11, 13–17, 20–25, 27, and 28 for failure to comply with the *enablement* requirement, the Examiner finds

> the specification, while being enabling for applying a signal having a same phase as the touch scan signal *to a data line*, does not reasonably provide enablement for applying a signal having a same phase as the touch scan signal *to a display driving electrode in general (e.g., a gate line, a storage capacitor line, etc.)*. . . .
> When discussing applying a data signal having a same phase as the touch scan signal to the display panel, Applicant's specification exclusively refers to "data lines." . . . However, Applicant's specification as filed provides no enabling disclosure related to "apply[ing] a signal having a same phase as the touch scan signal" *to gate lines, storage capacitor lines, or any other display driving electrodes other than data lines*.

Final Act. 2–3 (emphases added) (citing Spec. ¶¶ 44–50).

Appellant argues the Specification explains the adverse effects of an initial capacitance formed between *overlapping* electrodes, and how to mitigate these adverse effects (i.e., a decrease in touch sensitivity) of such initial capacitance between electrodes—including touch electrodes and *data lines*. Appeal Br. 10–11 (citing Spec. ¶¶ 10–17, 29, 35–37); Reply Br. 3. Particularly, the Specification explains that applying the disclosed "signal having a same phase as the touch scan signal" to a *data line* reduces the initial capacitance formed between an *overlapping touch electrode* and the *data line*. Reply Br. 3. Regarding *display driving electrodes other than data lines (such as, e.g., gate lines)*, Appellant asserts:

> [b]ecause one skilled in the art would have had the above understandings in view of the present disclosure, he or she would have readily been able to apply the disclosed "signal having a same phase as the touch scan signal" (*e.g.*, as recited in claim[] 1 . . .) *to the gate electrode(s) or line(s) without undue experimentation*, even though the specific examples disclosed in the specification apply the signal *to a data line*. With (a) the form of the output signal already known, *i.e.*, a "signal having a same phase as the touch scan signal," as well as (b) the timing of the signal in relation to the touch scan signal, *see*, *e.g.*, paragraph [0059] of the specification ("[s]imultaneously" with a touch scan signal), one skilled in the art would have readily been able to implement the gate driving circuitry needed to apply the signal [having a same phase as the touch scan signal] *to a gate electrode or line without undue experimentation.*

Reply Br. 3–4 (emphases added); *see also* Appeal Br. 11–12 ("the skilled artisan would have been enabled by the present disclosure to apply the 'signal having the same phase as the touch scan signal' to lines or electrodes other than the data lines or electrodes, *e.g.*, the gate lines or electrodes, that overlap with a touch electrode").

We agree with Appellant. That is, "with the form and timing of the output signal already known, *i.e.*, a 'signal having a same phase as the touch scan signal,' one skilled in the art would have been able to apply such a signal to the gate lines or electrodes without undue experimentation." Appeal Br. 12. We further note, although the *written description* (in Appellant's Specification) does not provide detailed explanations pertaining to *other* display driving electrodes *besides data lines*, *written description* and *enablement* requirements are separate and distinct under 35 U.S.C. § 112, first paragraph. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc).

For example, to comply with the *enablement* requirement under 35 U.S.C. § 112, first paragraph, Appellant's Specification must adequately teach how to make and how to use a claimed invention throughout its scope, without undue experimentation. *Plant Genetic Sys. N.V. v. DeKalb Genetics Corp.*, 315 F.3d 1335, 1339 (Fed. Cir. 2003). In contrast to the *enablement* requirement, the *written description* requirement under 35 U.S.C. § 112, first paragraph, requires Appellant to "reasonably convey[] to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date." *Ariad*, 598 F.3d at 1351. "The enablement requirement is often more indulgent than the written description requirement" as "[t]he specification need not *explicitly* teach those in the art to make and use the invention; the requirement is satisfied if, *given what they already know, the specification teaches those in the art enough that they can make and use the invention without 'undue experimentation*.'" *Amgen, Inc., v. Hoechst Marion Roussel, Inc.,* 314 F.3d 1313, 1334 (Fed. Cir. 2003) (emphases added).

The Examiner has not shown that Appellant's Specification fails to teach those in the art to make and use the invention of independent claims 1, 11, and 22 throughout its scope and *without undue experimentation*, we decline to sustain the § 112, first paragraph rejection of claims 1, 11, and 22 and their dependent claims 2–10, 13–17, 20, 21, 23–25, 27, and 28 for failure to comply with the "enablement" requirement.

§ 112 Written Description Rejection of Claims 3 and 13

In rejecting claims 3 and 13 as failing to comply with the written description requirement, the Examiner finds the recitations of "wherein the

first and second display driving electrodes are . . . gate electrodes" (in claim 3) and "wherein the display driving electrodes are . . . gate electrodes" (in claim 13) to which "a signal having a same phase as the touch scan signal" is applied (per claim 1 from which claim 3 depends, and per claim 11 from which claim 13 depends) do not have sufficient written description support in the Specification. Final Act. 4; Ans. 7–8. Particularly, the Examiner asserts the Specification only describes applying such a "same phase" signal *to a data line*, not *to a gate electrode*. Final Act. 4.

Original claim 3, however, recited "[t]he driver circuit of claim 1, wherein the display driving electrode is . . . a gate electrode," and original claim 1 recited "apply a signal having a same phase as the touch scan signal to a display driving electrode." Spec. 14. Also, original claim 13 recited "[t]he driver circuit of claim 11, wherein the display driving electrode is . . . a gate electrode," and original claim 11 recited "applying a signal having a same phase as the touch scan signal to a display driving electrode." Spec. 15. "[O]riginal claims are part of the original [S]pecification," and thus are relevant to the extent the "original claim language necessarily discloses the subject matter that it claims." *Ariad*, 598 F.3d at 1349 (citing *In re Gardner*, 480 F.2d 879, 879 (CCPA 1973)); *see also In re Wertheim*, 541 F.2d 257, 263 (CCPA 1976) ("[W]e are of the opinion that the PTO has the initial burden of presenting evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims."). Thus, we concur with Appellant that Appellant possessed display driving electrodes being "gate electrodes" (per claims 3 and 13) to which a signal having a same phase as the touch scan signal is applied.

Accordingly, we do not sustain the Examiner's § 112, first paragraph rejection of claims 3 and 13 as failing to comply with the "written description" requirement.[4,5]

§ 103(a) Rejection of Independent Claims 1, 11, and 22, and Dependent Claims 2, 4, 6, 8–10, 14, 16, 20, 21, 24, and 25

Appellant contends the Examiner's combination of Shepelev and van Lieshout does not teach or suggest "a first display driving electrode of the display panel overlapping with the first touch electrode" and "a second display driving electrode of the display panel overlapping with the second touch electrode," as recited in claim 1. Appeal Br. 14–15. Particularly, Appellant argues "*van Lieshout* discloses only a ***single*** common electrode

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[4] In the event of any further prosecution, we suggest the Examiner object to Appellant's Specification for failing to provide proper antecedent basis for the originally claimed subject matter in claims 3 and 13, and request Appellant to amend the Specification to include the subject matter of original claims 3 and 13 (i.e., a gate electrode to which a signal having a same phase as the touch scan signal is applied). *See In re Benno*, 768 F.2d 1340 (Fed. Cir. 1985); *see also* M.P.E.P. 2163.06.

[5] Appellant states this application (15/158,451) is "a continuation application under 35 U.S.C. § 120 of U.S. Patent Application No. 15/093,672." Spec. ¶ 1. However, Application No. 15/093,672 does not disclose the subject matter of original claims 3 and 13 of this application (15/158,451), i.e., the subject matter of a gate electrode to which a signal having a same phase as the touch scan signal is applied. Since a *continuation* application cannot include matter not disclosed in the prior-filed non-provisional application, the Examiner should require Appellant to delete the benefit claim (of this application) or change the relationship (continuation) of this application (15/158,451) to *continuation-in-part* (of 15/093,672), because this application (15/158,451) contains the subject matter of claims 3 and 13 (i.e., a gate electrode to which a signal having a same phase as the touch scan signal is applied) that is not disclosed in 15/093,672.

layer 115 (an alleged 'touch electrode'),'' failing to teach or suggest "both a 'first display driving electrode overlapping with the first touch electrode' ***and*** 'a second display driving electrode overlapping with the second touch electrode,' that are admittedly missing from *Shepelev*." *Id.*

Appellant further argues the combination of Shepelev and van Lieshout fails to teach or suggest:

> apply a signal having a same phase as the touch scan signal to a first display driving electrode of the display panel overlapping with the first touch electrode concurrently with applying the touch scan signal to the first touch electrode, and to a second display driving electrode of the display panel overlapping with the second touch electrode concurrently with applying the touch scan signal to the second touch electrode,

as recited in claim 1. Appeal Br. 13–14, 16–18. Particularly, Appellant argues the Examiner's rejection "does ***not*** support applying the Vshield signal of *van Lieshout* in *Shepelev* in the specific timing and manner in which the 'signal having the same phase as the touch scan signal' is applied in claim 1" because Shepelev does not disclose "a large overlap" between first/second touch electrodes and first/second display driving electrodes to justify applying van Lieshout's "same phase" Vshield signal to display driving electrodes. Appeal Br. 16–17 (citing van Lieshout ¶ 68). Appellant further asserts the Examiner's combination of Shepelev and van Lieshout lacks articulated reasoning because (i) contrary to the Examiner's rejection (*see* Final Act. 7, 19), Shepelev has no need to mitigate parasitic currents between electrodes, as Shepelev lacks overlapping electrodes that would cause such parasitic currents, and (ii) "*van Lieshout* does not specify what constitutes a 'large' overlap area" that would induce parasitic currents. Appeal Br. 16–18; Reply Br. 6–7. We do not agree.

We agree with the Examiner's findings. Ans. 9–15. Particularly, we agree with the Examiner that placing common electrodes (such as Shepelev's touch electrodes/transmitter electrodes 160) to *overlap* pixel circuitry (such as Shepelev's display lines) was well-known in the display arts. Ans. 9–11, 15. For example, a skilled artisan—viewing Shepelev's teaching of *touch electrodes 160* covering substantially the entire area of sensing elements 121 in Figure 2, and *also acting as common electrodes that update pixels* in display lines corresponding to the common electrodes—would have found it obvious that portions of the display lines are *overlapped by the common electrodes that update those display lines*. *See* Shepelev ¶¶ 21 ("driving common electrodes corresponding to pixels in the screen's display lines"), 42 ("sensing region 120 overlaps at least part of an active area of a display screen of the display device 101. . . . input device 100 may comprise substantially transparent sensor electrodes overlaying the display screen and provide a touch screen interface"), 52 ("transmitter electrodes 160 comprise one or more common electrodes. . . . In various embodiments, each transmitter electrode 160 comprises one or more common electrodes"), 55 (describing "a time period used to update the pixels 310 of the display line" and "driv[ing] a voltage onto the common electrode(s) corresponding to the display line"), 57 ("the input device may use the same common electrodes used to update the pixels of the display screen to drive transmitter signals" such that "the common electrodes may serve dual purposes. During a display update period, a common electrode updates the pixels in the display, but during a capacitive sensing period, the common electrodes are used as transmitter electrodes"), 58 ("after updating display lines during time periods A-D, the driver module may pause display

updating and use time period E to perform capacitive sensing"), 62 ("use one or more common electrodes to update the pixels in a display line and, before continuing to update the other display lines in the display frame, perform capacitive sensing using those same electrodes"), 68 ("During time periods A-D, the driver module activates one of the common electrodes and updates the pixels associated with the corresponding display line."), 90–91 ("display screen 930 includes a plurality of pixels arranged as one or more display lines," and "the hardware of the input device 100 [is operated] to detect input in the sensing region—*e.g.*, some portion of the display screen 930"), Figs. 1–3 and 9; Ans. 9–11, 15 (citing Shepelev ¶¶ 46–52, Figs. 1–2, 9); Final Act. 5–6 (citing Shepelev ¶¶ 55–59, 62, Figs. 3 and 5).

Thus, "pixels with overlapping common electrodes are well-known," as recognized by the Examiner. Ans. 11. We, therefore, agree with the Examiner that the combination of Shepelev (whose common electrode layer includes multiple common electrodes corresponding to multiple display/data lines) with van Lieshout (whose display electrodes overlap a corresponding common electrode) teaches "a first display driving electrode[6] of the display panel overlapping with the first touch electrode" and "a second display driving electrode of the display panel overlapping with the second touch electrode" as recited in claim 1. Ans. 9–11.

We are also not persuaded by Appellant's argument that the Examiner "does ***not*** support applying the Vshield signal of *van Lieshout* in *Shepelev* in

[6] With respect to the claim term "display driving electrode," Appellant acknowledges that "a data line [as described in the Specification] is an example embodiment of a 'display driving electrode' (recited in claims 1, 11, and 22)." Reply Br. 2 (emphasis omitted).

the specific timing and manner in which the 'signal having the same phase as the touch scan signal' is applied in claim 1." Appeal Br. 16. Rather, we agree with the Examiner that the combination of Shepelev and van Lieshout teaches the "same phase" limitation of claim 1. Ans. 11–15. Particularly, as the Examiner finds (and as discussed *supra*), the combination of Shepelev and van Lieshout teaches the claimed overlapping touch electrodes and display driving electrodes; and van Lieshout also teaches that when *Vshield* (signal having a same phase as a touch scan signal Vprobe) "*is applied to another conductive structure* of the display panel **100**, *the parasitic currents* from the common electrode layer **115** *to said other conductive structure are mitigated*." *See* van Lieshout ¶ 68 (emphases added); Ans. 11–14. Thus, van Lieshout teaches the advantage of providing *Vshield* "to another conductive structure" that opposes a common electrode layer. *See* van Lieshout ¶ 68, Fig. 2A. Since "Van Lieshout teaches that, during touch sensing, it is beneficial to provide structures overlapping with the common electrode layer . . . with the shield signal Vshield," a skilled artisan would have recognized the benefit of applying Vshield to display lines' electrodes that overlap common touch electrodes 160 in Shepelev. Ans. 12–14. The benefit is that "*parasitic currents* from the common electrode layer . . . to said other conductive structure *are mitigated*" by applying a Vshield signal in phase with the common electrode's touch scan signal. *See* van Lieshout ¶ 68 (emphases added); Ans. 12–14.

Appellant argues Shepelev's disclosure does not warrant applying van Lieshout's Vshield to display driving electrodes, because Shepelev does not disclose a "large overlap" between display driving electrode and touch electrodes. Appeal Br. 16–17 (citing van Lieshout ¶ 68 (discussing "a large

overlap area")). Appellant's argument is not persuasive because van Lieshout teaches Vshield confers an *advantage* to display panel conductive structures that *oppose* a common electrode, but van Lieshout does not confine this advantage to only structures having "a large overlap area." Instead, van Lieshout discloses the Vshield advantage extends to "all structures in the display that have a large overlap area [with the common electrode]" as well as to "conductive structures" that induce "parasitic currents from the common electrode layer." *See* van Lieshout ¶ 68; *see also* van Lieshout ¶ 24; Ans. 12–14. Thus, we agree with the Examiner that the skilled artisan, viewing van Lieshout's teachings, would recognize that "providing a [same phase] shield signal to . . . an overlapping conductive structure [overlapping the common electrode layer to an extent that parasitic noise reduces the accuracy of touch position determination] would be beneficial for improving [touch detection] accuracy." Ans. 13–14. We also agree with the Examiner that an "overlapping area which measurably affects touch position accuracy [*e.g.*, by inducing parasitic currents] would be considered a 'large overlap area' by one of ordinary skill in the art." *Id.* (citing van Lieshout ¶¶ 24, 68).

As to Appellant's argument that the Examiner's combination of Shepelev and van Lieshout lacks articulated reasoning (Appeal Br. 17–18; Reply Br. 6–7), we find the Examiner has articulated sufficient reasoning for applying a shield signal (as taught by van Lieshout) to display lines (taught by Shepelev), for mitigating parasitic currents between Shepelev's extensive common electrodes 160 and the display lines corresponding to those common electrodes. *See* Shepelev ¶¶ 55, 58 (describing the "display lines"), Fig. 2; van Lieshout ¶ 68; Ans. 13–15.

We, therefore, agree with the Examiner that the combination of Shepelev and van Lieshout teaches applying "a signal having a same phase as the touch scan signal to a first display driving electrode of the display panel overlapping with the first touch electrode concurrently with applying the touch scan signal to the first touch electrode" and to "a second display driving electrode of the display panel overlapping with the second touch electrode concurrently with applying the touch scan signal to the second touch electrode" as recited in claim 1. Ans. 12–15.

Thus, we agree with the Examiner's findings that Appellant has failed to clearly distinguish the claimed invention over the prior art relied on by the Examiner. We, therefore, sustain the Examiner's § 103(a) rejection of independent claim 1, independent claims 11 (reciting "overlapping" electrodes and applying "a signal having a same phase as the touch scan signal") and 22 (reciting "a signal having a same phase as the touch scan" being applied to "the first display driving electrode" and to "the second display driving electrode") argued for reasons similar to claim 1, and dependent claims 2, 4, 6, 8–10, 14, 16, 20, 21, 24, and 25, for which no separate arguments are provided. Appeal Br. 33.

§ 103(a) Rejection of Claims 3, 13, and 26

With respect to dependent claim 3 (reciting "[t]he driver circuit of claim 1, wherein the first and second display driving electrodes are data electrodes or gate electrodes"), claim 13 (reciting "[t]he driver circuit of claim 11, wherein the display driving electrodes are data electrodes or gate electrodes"), and claim 26 (reciting "[t]he driver circuit of claim 22, wherein the first display driving electrode and the second display driving electrode

are data electrodes"), Appellant submits arguments similar to those for claims 1, 11, and 22. *See* Appeal Br. 18–19 ("There is no clear teaching in *van Lieshout* of applying Vshield to 'data electrodes or gate electrodes.' . . . paragraph [0068] of *van Lieshout* does not mention data electrodes or gate electrodes at all" and "there is no explanation in *van Lieshout* as to what constitutes 'a large overlap area' such that *van Lieshout* fails to disclose that 'all structures that have a large overlap area with common electrode layer 115' include data electrodes or gate electrodes"), 27, 29–31; Reply Br. 6–7.

We are not persuaded by Appellant's arguments with respect to claims 3, 13, and 26, for reasons discussed *supra* with respect to claims 1, 11, and 22 and for additional reasons provided by the Examiner with respect to claims 3, 13, and 26. *See* Ans. 15–19, 28–32. Particularly, we agree with the Examiner that van Lieshout discloses *data electrodes* (powered by display signals Scl1, Scl2, . . . , Scln and corresponding to a touch electrode/common electrode layer 115) and *gate electrodes* (powered by display signals Srw1, Srw2, . . . , Srwm, *see*, *e.g.*, gate electrode 113a in Figure 2A), and Shepelev discloses *data electrodes* ("display lines") corresponding to touch electrodes (sensor electrodes 160 that function as common electrodes to update the display lines). Ans. 15–18 (citing van Lieshout ¶¶ 51, 55, 58–63, 70–71, Figs. 1–5; Shepelev ¶¶ 27–28, 52, 57, Abstract); *see also* van Lieshout ¶ 52 ("The display signals comprise at least a common display signal Sc and input control signals for the active matrix layer, *e.g.* Srw**1**, . . . and Scl**1**, . . . respectively."). More particularly, van Lieshout discloses gate electrodes (gate electrodes 113a receiving signals Srwi, *see* van Lieshout ¶ 59 and Fig. 2A) overlapped by common electrode layer 115. Ans. 16–19, 23, 29–31; *see* van Lieshout Fig. 2A. We further

agree with the Examiner that the skilled artisan, viewing van Lieshout's teachings, would recognize that "providing a [same phase] shield signal to . . . an overlapping conductive structure [overlapping the common electrode layer to an extent that parasitic noise would reduce accuracy of touch position determination] would be beneficial for improving [touch detection] accuracy." Ans. 17 (citing van Lieshout ¶ 24, 68). Thus, van Lieshout teaches and suggests that it is beneficial to apply a same phase shield signal to data electrodes and gate electrodes in a display panel when a common electrode overlaps the data and gate electrodes. Ans. 16–18, 29–31; *see* van Lieshout Fig. 2A.

Accordingly, Appellant's arguments have not persuaded us of error in the Examiner's rejection of claims 3, 13, and 26. Thus, we sustain the Examiner's § 103(a) rejection of claims 3, 13, and 26.

§ 103(a) Rejection of Claims 7, 17, and 27

Claim 7 depends from claim 1, and further recites "wherein the driver circuit is further configured to apply the touch scan signal to the at least first and second touch electrodes through a respective connection line and to sense a change in the capacitance of the at least first and second touch electrodes through the respective connection line." Appeal Br. 37 (Claims App.). Appellant contends the Examiner fails to provide a basis for incorporating the alleged "connection line" of van Lieshout into Shepelev for sensing capacitance. Appeal Br. 20–21. Appellant further asserts "[i]ncorporating the alleged 'connection line' of *van Lieshout* for both driving and sensing would result in electrically shorting the transmitter electrodes 160 and [capacitance sensing] receiver electrodes 170 [of

Shepelev], thus improperly changing the principle of operation of *Shepelev* and improperly rendering *Shepelev* unsatisfactory for its intended purpose." *Id.* at 21–22.

We do not agree. Rather, we agree with the Examiner that van Lieshout discloses a "connection line" (as claimed) between a multiplexer and common electrode 115 for providing Vprobe and sensing a produced current Isense, whereby a finger causes a capacitive load in common electrode layer 115, which changes the AC currents of the common electrode's four corners. Final Act. 8 (citing van Lieshout ¶¶ 6, 67, Figs. 1–4). Particularly, paragraph 67 in van Lieshout describes how to "determine whether the display panel is touched . . . [and] determine the location where the display panel is touched" by using an alternating voltage applied at the common electrode's corners such that when "a finger **350** or other pointing device touches the display panel, different currents Isense-a, Isense-b, Isense-c, Isense-d will *capacitively leak away* from said corners a–d depending on the distance from the point (x,y) where the panel is touched to said corners." *See* van Lieshout ¶ 67 (emphasis added). Thus, Van Lieshout teaches that a touch scan signal (Vprobe) can be applied through a connection line, and a change in capacitance can be sensed through the connection line. Final Act. 8.

Incorporating van Lieshout's connection line into Shepelev does not require electrically shorting Shepelev's sensor electrodes 160 and 170 to each other (as Appellant argues, *see* Appeal Br. 21). Shepelev itself contemplates sensing touch via a change in capacitance reflected by "changes in voltage, current, or the like." *See* Shepelev ¶ 32 ("In some capacitive implementations of the input device **100**, voltage or current is

applied to create an electric field. Nearby input objects cause changes in the electric field, and produce detectable changes in capacitive coupling that may be detected as changes in voltage, current, or the like"); *see also* Shepelev ¶ 34 ("Some capacitive implementations utilize 'self capacitance' (or 'absolute capacitance') sensing methods based on changes in the capacitive coupling between sensor electrodes and an input object," whereby "an input object near the sensor electrodes alters the electric field near the sensor electrodes, thus changing the measured capacitive coupling"); Ans. 20–21 (citing Shepelev ¶¶ 32–35). Thus, we are unpersuaded by Appellant's arguments regarding changing Shepelev's principle of operation and rendering Shepelev unsatisfactory.

Accordingly, Appellant's arguments have not persuaded us of error in the Examiner's rejection of claim 7. Thus, we sustain the Examiner's § 103(a) rejection of claim 7.

Claims 17 and 27, also argued by Appellant, include limitations similar to those of claim 7, and the Examiner's rejection of claims 17 and 27 relies upon findings similar to those made for claim 7. Final Act. 11, 13; Ans. 28, 33. Accordingly, we also sustain the Examiner's § 103(a) rejection of claims 17 and 27.

§ 103(a) Rejection of Claim 28

Claim 28 depends from claim 27, and further recites "wherein the connection line overlaps at least one of the first and second display driving electrodes." Appeal Br. 42 (Claims App.). That is, claim 28 requires the connection line—through which the touch scan signal is applied to the touch electrode(s) and a change in capacitance of the touch electrode(s) is

sensed—to overlap at least one of the first and second display driving electrodes.

The Examiner asserts "Fig. 3 of Van Lieshout explicitly shows connection line Scc overlapping lines Scl and Sstc" and "figs. 4 and 6 of Van Lieshout clearly show 'connection line' Scc-a overlapping lines Srw1–m (the gate lines) connected to gate driver 230." Ans. 33–34 (citing van Lieshout ¶¶ 66, 72, Figs. 3, 4, and 6); Final Act. 13 (citing van Lieshout ¶¶ 52–57, Figs. 1–4).

We are not persuaded the Examiner's findings are accurate because, as Appellant explains, van Lieshout's Figures 3, 4, and 6 are schematic circuit diagrams that do not disclose the electrical connections' physical layout and arrangement. Appeal Br. 32–33; Reply Br. 7–12. For example, van Lieshout's Figure 3 (and similarly, Figures 4 and 6) "merely shows how ***output signal Scc*** is supplied, not how a signal line or lines carrying signal Scc are physically disposed." Appeal Br. 32–33. On the other hand, van Lieshout's Figure 2A (showing a cross-sectional view of a physical layout of a display panel portion) illustrates "the line carrying Scc (the alleged 'connection line') connecting to an edge of the common electrode layer 115 outside the display area," therefore *not overlapping* lines carrying signals Scl(i) and Srw(i). Reply Br. 8–12; *see* van Lieshout Figure 2A.

As the Examiner has not identified sufficient evidence to support the rejection of claim 28, we do not sustain the Examiner's § 103(a) rejection of claim 28.

CONCLUSION

On the record before us, we conclude Appellant has demonstrated the Examiner erred in rejecting: (1) claims 1–11, 13–17, 20–25, 27, and 28 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement; (2) claims 3 and 13 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; and (3) claim 28 under 35 U.S.C. § 103(a). However, we conclude Appellant has not demonstrated the Examiner erred in rejecting claims 1–4, 6–11, 13, 14, 16, 17, 20–22, and 24–27 under 35 U.S.C. § 103(a) as being unpatentable over Shepelev and van Lieshout.

DECISION SUMMARY

As such, we AFFIRM the Examiner's final rejection of claims 1–4, 6–11, 13, 14, 16, 17, 20–22, and 24–27 under 35 U.S.C. § 103(a).

However, we REVERSE, (1) the Examiner's final rejection of claims 1–11, 13–17, 20–25, 27, and 28 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement; (2) claims 3 and 13 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; and (3) claim 28 under 35 U.S.C. § 103(a).

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–11, 13–17, 20–25, 27, 28	112, first paragraph	enablement		1–11, 13–17, 20–25, 27, 28

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
3, 13	112, first paragraph	written description		3, 13
1–4, 6–11, 13, 14, 16, 17, 20–22, 24–28	103(a)	Shepelev, van Lieshout	1–4, 6–11, 13, 14, 16, 17, 20–22, 24–27	28
Overall Outcome			1–4, 6–11, 13, 14, 16, 17, 20–22, 24–27	5, 15, 23, 28

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–IN–PART