NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

SAMSUNG ELECTRONICS CO., LTD., SAMSUNG ELECTRONICS AMERICA, INC.,
Appellants

v.

POWER2B, INC.,
Cross-Appellant

2023-1629, 2023-1631, 2023-1753, 2023-1745

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2021-01239, IPR2021-01266.

OPINION ISSUED: March 31, 2025
OPINION REVISED: September 4, 2025

COKE MORGAN STEWART, O'Melveny & Myers LLP, Washington, DC, argued for appellants. Also represented by WILLIAM FINK; BENJAMIN HABER, ABIGAIL GRACE MCFEE, NICHOLAS WHILT, RYAN KEN YAGURA, Los Angeles, CA; THOMAS MCCLINTON HARRIS, Newport Beach, CA.

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argued for cross-appellant. Also represented by ADAM PETER DANIELS, Los Angeles, CA; JASON WIETJES, Dallas, TX.

Before HUGHES, MAYER, and STARK, *Circuit Judges*.

HUGHES, *Circuit Judge*.

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. appeal a final written decision of the Patent Trial and Appeal Board holding claims 15–18, 21, 22, 26 and 30 of U.S. Patent No. 8,624,850 and claims 26, 29, 36–38, 44–46, 48, 49, and 56–58 of U.S. Patent No. 9,569,093 were not shown to be unpatentable. Power2B, Inc. cross-appeals the Board's holding that claims 31 and 41 of the '850 patent and claims 1, 5, 8, and 12–13 of the '093 patent are unpatentable. For the following reasons, we affirm-in-part, reverse-in-part, vacate-in-part, and remand.

I

Power2B owns the '850 and '093 patents, which share a specification and claim priority to an application dated April 3, 2006. Both relate to interactive displays that can determine the relative position of objects in front of them and execute corresponding functions. *See, e.g.*, J.A. 360–61 (Fig. 23A–23E), 411–12 (50:7–51:25). The displays include a pixel array, a sensor configured to sense the position of an object using light reflected by the object, circuitry configured to provide an input representative of the position of the object, and a detector assembly arranged on at least one edge of the display. *See e.g.*, J.A. 419–20 (65:50–67:15).

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, Samsung) filed for *inter partes* review of the '850 and '093 patents, challenging as obvious the claims relating to a detector assembly and the claims relating to object position sensing. Although

Samsung contended that these claims did not need explicit construction, the Board construed a "detector assembly" as requiring "two or more detector elements that detect electromagnetic radiation" arranged along "one edge." J.A. 20, 29–30. Applying this construction, the Board found that Samsung's asserted prior art did not disclose the detector assembly claims. Samsung timely appealed, challenging the Board's construction and patentability determination.

The Board further construed the claims directed to object position sensing as including responsiveness to an object's touch and held that these claims were disclosed by Samsung's asserted prior art. Power2B cross-appealed, arguing that these claims should be construed to exclude touching and that the Board's findings of obviousness were not supported by substantial evidence. We address each argument in turn.

II

Claim construction is a question of law we review de novo. *Arendi S.A.R.L. v. Google LLC*, 882 F.3d 1132, 1133 (Fed. Cir. 2018); *Trustees of Columbia Univ. v. Symantec Corp.*, 811 F.3d 1359, 1362 (Fed. Cir. 2016).

Obviousness is a "mixed question of law and fact." *Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1361 (Fed. Cir. 2018). The Board's ultimate obviousness determination is reviewed de novo, *id.*, but what a prior art reference discloses is a question of fact, *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 910 (Fed. Cir. 2022), reviewed for substantial evidence, *Hologic,* 884 F.3d at 1361. Substantial evidence "means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *In re Gartside*, 203 F.3d 1305, 1312 (Fed. Cir. 2000) (citations omitted).

III

Samsung's appeal concerns those claims directed to a detector assembly: claims 15–18, 21–22, 26 and 30 of the

'850 patent and claims 26, 29, 36–38, 44–46, 48–49, and 56–58 of the '093 patent. Opening Br. at 5. Claim 15 of the '850 patent is representative and reads:

> An integrated display and input device, comprising:
>
> > a pixel array configured to provide a visually sensible output;
> >
> > at least one sensor configured to sense at least a position of at least one object with respect to the pixel array when the at least one object has at least a predetermined degree of propinquity to the pixel array;
> >
> > circuitry configured to receive an output from the at least one sensor and to provide a non-imagewise input that is representative of the position of the at least one object relative to the pixel array;
> >
> > and wherein the at least one sensor includes *a detector assembly arranged at least one edge of a viewing plane defining plate*.

J.A. 419–20 (emphasis added).

Claim 16 of the '850 patent depends from claim 15 and requires that the detector assembly be arranged "along the at least one edge of the viewing plane defining plate." J.A. 420 (67:14–15). The remaining dependent claims, claims 17–18, 21–22, 26 and 30 of the '850 patent, either require or depend from claims that require "an arrangement of detector elements" or a "plurality of . . . detectors." J.A. 420 (67:16–67:25; 67:34–67:47; 68:47–68:50).

Claims 1 and 26 of the '093 patent combined are substantially similar to claim 15 of the '850 patent and recite:

> 1. An integrated display and input device, comprising:
>
> a pixel array operative to provide a visually sensible output;
>
> at least one sensor operative to sense a position of an object with respect to the pixel array when the object is within a predetermined degree of propinquity to the pixel array;
>
> at least one illuminator that provides backlighting and illuminates the object within the predetermined degree of propinquity;
>
> and circuitry that receives an output from the at least one sensor and provides a non-imagewise input representing the position of the object relative to the pixel array to utilization circuitry.

J.A. 514.

> 26. The integrated display and input device according to claim 1, wherein the at least one sensor comprises *a detector assembly arranged at an edge of a viewing plane defining plate*.

J.A. 515 (emphasis added).

Claims 29, 36, 37, and 38 of the '093 patent, which depend directly and indirectly from claim 26, require a detector assembly to include an "arrangement of detector elements," and in claims 36 and 38, a "plurality of . . . detectors." J.A. 515 (69:11–69:13, 69:32–69:40). Independent claim 44 requires a detector assembly to include "a support substrate" and "at least one sensor [that] detects electromagnetic radiation." J.A. 515 (69:67–70:20). The remaining detector assembly claims, claims 45–46, 48–49, and 56–58, depend directly or indirectly from claim 44. J.A. 515 (70:21–70:27; 70:32–70:40; 71:16–71:27).

Samsung petitioned for *inter partes* review of the '850 and '093 patents, challenging all detector assembly claims as obvious in view of U.S. Patent App. Pub. No. 2003/0034439 (Reime), which is directed to a method and system for "detecting the presence of an object at a touch pad." J.A. 1891 ([0007]). During the IPR proceedings, the parties contested the construction of the term "detector assembly." Samsung argued that it should be given its plain and ordinary meaning while Power2B argued that it required at least two detector elements. In both its Final Written Decisions, the Board agreed with Power2B that "detector assembly" should be construed to mean "two or more detector elements that detect electromagnetic radiation." J.A. 20, 73; *see* J.A. 19, 71 ("We find that this language is consistent with the plain and ordinary meaning for detector assembly in light of the ['850/'093] patent Specification.").

The detector assembly claims also all require the detector assembly to be "arranged [at an edge / at least one edge / along the at least one edge / about at least one edge] of a viewing plane defining plate." J.A. 419–20, 515–16. Although the parties did not present the Board with any proposed constructions of these "edge" terms, the Board's analysis of whether the prior art disclosed the "edge" claim elements appeared to construe them as requiring that a detector assembly be arranged at "one edge." J.A. 29–30, 100.

Applying this implied construction, the Board held that the detector assembly claims were not shown to be unpatentable. The Board found that al-though two of Reime's light receivers are detector elements that comprise a detector assembly, Samsung could not show that Reime discloses a detector assembly that satisfies the "edge" terms because Reime's receivers "are centered on opposite edges of the plate" and not arranged along "one edge." J.A. 29–31, 100–01.

IV

Samsung argues that the Board was incorrect to construe the term "detector assembly" to require "two or more detector elements" when "nothing in the language of claim 15 from the '850 patent or claim 26 from the '093 patent requires the "detector assembly" to include more than one detector element—or any other specific element(s)." Opening Br. at 14–15.[1] We agree with Samsung.

A

The claimed "detector assembly" is properly construed as requiring at least *one* detector element. The broad claim language in claim 15 of the '850 patent and claim 26 from the '093 patent requires only a "sensor" that "includes" or "comprises" a "detector assembly arranged" on "at least one edge" or "at an edge" of "a viewing plane defining plate." J.A. 420, 515. There is no requirement for two or more detector elements in the claim language. Samsung asks us to construe a "detector assembly" to include at least one detector element *and* at least one additional component, but there is no support in the claim language for an additional

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[1] Power2B argues that Samsung forfeited the argument that a "detector assembly" could be construed to include only a single detector element. Cross-Appellant Response Br. at 45–48. We disagree. In its petitions, Samsung argued that the term "detector assembly" should be afforded its plain and ordinary meaning, and in response to Power2B's proposal that the term should be narrowed to require "two or more detector elements," Samsung clarified its position that "the claims are indifferent to . . . whether the detector assembly includes a single detector element or multiple detector elements." J.A. 7562. Because this argument was made before the Board, it was sufficiently preserved for appeal.

component either. The claims only require an "assembly" that includes at least one "detector" element.

In reaching its conclusion to the contrary, the Board reasoned that the specification and dependent claims were consistent with a requirement that a detector assembly include "two or more detector elements." *See, e.g.*, J.A. 19 ("[D]ependent claims 17 and 18 recite having a plurality of detector elements."). However, as Samsung argues, dependent claims, such as claims 17 and 18 of the '850 patent, support our broader construction. Where Power2B wanted to specify that more than one detector element was required, it did so expressly using plural language. Dependent claims 17–18, 21–22, 26 and 30 of the '850 patent and dependent claims 29 and 36–38 of the '093 patent require or depend from claims that require an "arrangement of detector elements," plural, and/or a "plurality" of detector elements. The doctrine of claim differentiation teaches that a limitation in the dependent claims can give rise to a presumption that the limitation is not present in the independent claims. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004) (citing cases discussing "the presumption that an independent claim does not have a limitation that is introduced for the first time in a dependent claim"). Although Power2B argues that the "dependent claims are consistent with" a requirement of two or more detector elements, *see* Cross-Appellant Response Br. at 50, the intrinsic evidence provides no basis to read such a limitation into the independent claims.

The fact that the specification repeatedly refers to preferred embodiments in which a detector assembly includes multiple detector elements similarly does not justify importing such a limitation into the independent claims. *See, e.g.*, *Decisioning.com, Inc. v. Federated Dep't Stores, Inc.*, 527 F.3d 1300, 1314 (Fed. Cir. 2008) ("Th[e] description of a preferred embodiment, in the absence of a clear intention to limit claim scope, is an insufficient basis on which to narrow the claims."); *Johnson Worldwide Assocs., Inc. v. Zebco*

Corp., 175 F.3d 985, 992 (Fed. Cir. 1999) ("[J]ust as the preferred embodiment itself does not limit claim terms . . . inferences drawn from the description of an embodiment of the invention cannot serve to limit claim terms . . . as they are insufficient to require a narrower definition of a disputed term."). Though the Board and Power2B both note that the specification "consistently" describes the detector assembly as comprising two or more detector elements, *see* Cross-Appellant Response Br. at 51–52; J.A. 19, 71, the preferred embodiments cannot limit otherwise broad claims in the absence of an unmistakable disavowal of claim scope.

The prosecution history does not alter our conclusion. Power2B made no attempt during prosecution to limit the term "detector assembly" to require "two or more detector elements." *See* J.A. 1712–13.

B

We reverse the Board's decisions as to claims 15 and 16 of the '850 patent and claim 26 of the '093 patent. In its Final Written Decisions, the Board found that Reime teaches every limitation of claim 15 of the '850 patent and claim 26 of the '093 patent *except* for a detector assembly, comprising of at least two detector elements, arranged at one edge. J.A. 26–31, 96–101.

It is not disputed that Reime teaches one detector element on one edge. In Figure 6A, for example, Reime teaches that one group of optical sensor components can be placed on each side of a four-sided touch pad, resulting in one light receiver on each side. J.A. 1880 (Fig. 6A), 1895 ([0082]); *see also* J.A. 1876–84 (Figs. 2A–2D,4A–4B, 5A–5H, 6A–6B, and 9C–9F, all depicting one receiver, either receiver 30 or 32, on one edge of the touch pad). The Board also acknowledged that Reime teaches receivers "centered on opposite edges of the plate." J.A. 30–31, 101. Because the Board found Reime discloses at least one detector element on one edge of a touch screen, we conclude that claim

15 of the '850 patent and claim 26 of the '093 patent are unpatentable as obvious in view of Reime. Because claim 16 has the same claim limitations as claim 15, we find that claim 16 of the '850 patent is also obvious.

C

Our construction of "detector assembly" does not resolve the patentability of the dependent claims that explicitly require multiple detectors arranged at an edge of a touch screen—specifically, claims 17–18, 21–22, 26 and 30 of the '850 patent and claims 29 and 36–38 of the '093 patent—or claims that explicitly require a detector assembly to comprise of at least one detector and a support substrate—specifically, claims 44–46, 48–49, and 56–58 of the '093 patent. Because these claims all either incorporated the limitations of claim 15 of the '850 patent or claim 26 of the '093 patent, or otherwise relied on a showing that claim 26 of the '093 patent was disclosed by the prior art, the Board did not analyze whether Reime taught the additional limitations in these claims. It instead relied on its analysis of claim 15 of the '850 patent and claim 26 of the '093 patent to find that Samsung had not shown these claims to be unpatentable. J.A. 31, 101–02.

We vacate the Board's decisions as to these remaining claims and remand for the Board to evaluate Samsung's obviousness contentions under the correct construction of "detector assembly." The Board will need to evaluate, in the first instance, whether the additional limitations in these challenged claims are disclosed by Reime.

D

To guide the Board's analysis on remand, Samsung asks us to clarify the proper reading of the "edge" terms in

the detector assembly claims. Oral Arg. at 25:15–28:05.[2] To the degree the Board imposed an additional limitation by construing the terms "at an edge" and "at least one edge" to require that an entire detector assembly be located on "one edge," we agree with Samsung that this construction was incorrect.[3]

Properly construed, the terms "at an edge" and "at least one edge" require a detector assembly to be arranged along one or more edges of a viewing plane defining plate. As a general rule, we construe terms such as "an" and "at least one" to mean one or more. *See Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008) ("That 'a' or 'an' can mean 'one or more' is best described as a rule . . . . The exceptions to this rule are extremely limited: a patentee must 'evince a clear intent' to limit 'a' or 'an' to 'one.' The subsequent use of definite articles 'the' or 'said' in a claim to refer back to the same claim term does not change the general plural rule, but simply reinvokes that non-singular meaning.") (internal citations omitted); *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999) ("Use of the phrase 'at least one' means that there could be only one

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[2] *Available at* https://oralarguments.cafc.uscourts.gov/default.aspx?fl=23-1629_11042024.mp3.

[3] Power2B argues that Samsung forfeited the argument that the "edge" terms need not be arranged on only "one edge." Cross-Appellant Response Br. at 48–50. We disagree. To the degree the Board implied a new construction of the "edge" terms for the first time in its Final Written Decisions, Samsung properly responded on appeal. See *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1383 (Fed. Cir. 2023) ("[P]arties in an IPR must be permitted to respond to a new claim construction adopted by the Board sua sponte after the institution decision.") (citing *Qualcomm Inc. v. Intel Corp.*, 6 F.4th 1256, 1263 (Fed. Cir. 2021)).

or more than one."). There is nothing in the claim language, specification, or prosecution history that compels a departure from this convention, as the record does not demonstrate that Power2B ever intended to limit the detector assembly claims to a "one edge" requirement. Power2B does not contend that such limiting language exists. And without such limiting language, "one edge" cannot be the proper reading of "at an edge" or "at least one edge" in accordance with our caselaw.

In summary, we (1) construe the term "detector assembly" to require at least one detector element; (2) reverse the Board's holding that claims 15 and 16 of the '850 patent and claim 26 of the '093 patent are nonobvious in view of Reime; (3) vacate the Board's findings that claims 17–18, 21–22, 26 and 30 of the '850 patent and claims 29, 36–38, 44–46, 48, 49, and 56–58 of the '093 patent are not unpatentable and remand for the Board to evaluate whether Reime renders these claims obvious; and (4) clarify that arranging a detector assembly "at," "along," or "about" "at least one edge" or "an edge" does not limit the detector assembly to being arranged entirely on "one edge" as the Board apparently determined.

V

Power2B's cross-appeal concerns those claims directed to position sensing, which we will call the "propinquity" claims: claims 31 and 41 of the '850 patent and claims 1, 5, 8, and 11–13 of the '093 patent. Cross-Appellant Response Br. at 11, 29–31. These claims all require a sensor or pixel array which can sense the relative position of an object when it "[has at least / is within] a predetermined degree of propinquity." J.A. 420–21, 514. Claim 31 of the propinquity claims at issue in the'850 patent is representative and recites:

A position sensing assembly comprising:

a plate defining a surface;

> at least one pixel array including a plurality of detector elements configured to detect electromagnetic radiation at a baseline level, the at least one pixel array being configured to sense a position of an object with respect to the surface according to locations of ones of the plurality of detector elements at which at least one of the amount of radiation detected and the change in the amount of radiation detected exceed a predetermined threshold, the at least one pixel array being configured to sense at least a position of at least one object with respect to the at least one pixel array *when the at least one object has at least a predetermined degree of propinquity to the at least one pixel array*;
>
> circuitry configured to receive an output from the at least one pixel array and to provide a non-imagewise input that is representative of the position of the at least one object relative to the at least one pixel array; and
>
> wherein the change in the amount of radiation detected results from ones of the plurality of detector elements detecting reflected light from the object in addition to detecting the radiation at the baseline level.

J.A. 420–21 (68:51–69:6) (emphasis added).

Claim 1 of the '093 patent, recited in Section III, is representative of the propinquity claims at issue in the '093 patent. *See* J.A. 514 (67:45–67:58). Also on cross-appeal is claim 11 of the '093 patent. Claim 11 depends indirectly from claim 1 and requires utilization circuitry to

"distinguish at least between directions of motion of the object towards and away from the device." J.A. 514 (68:17–68:20).

Samsung challenged claims 31 and 41 of the '850 patent as obvious in view of U.S. Patent Application Publication No. 2005/0219229 (Yamaguchi), and claims 1, 5, 8, and 11–13 of the '093 patent as obvious in view of Reime, alone or in combination with U.S. Patent Application Publication No. 2002/0021278 (Hinckley). During the proceedings, Power2B advocated for "a predetermined degree of propinquity" to be construed as "a specified proximity distance established in advance and does not include touching." *E.g.* J.A. 6912. The Board rejected this position and instead agreed with Samsung that the plain and ordinary meaning of "at least" or "within" "a predetermined degree of propinquity" encompasses "touching" or zero distance. J.A. 11, 63–64 ("[W]hether propinquity and touching are mutually exclusive . . . is inapposite. The claims do not recite having a particular propinquity. Rather, they recite '[having *at least* /] is *within* a predetermined degree of propinquity,' without reciting a lower bound. The plain meaning thus includes a degree of propinquity, and being closer.") (internal citations omitted) (emphasis in original). The Board further determined that "propinquity" means "proximity," and that "a predetermined degree of propinquity" is not a specified distance established in advance. J.A. 16, 69. Turning to obviousness, the Board held that Samsung had shown all propinquity claims to be unpatentable.

VI

Power2B argues that the Board incorrectly construed the phrase "predetermined degree of propinquity" to include touching. Cross-Appellant Response Br. at 64. Even if we disagree, Power2B asserts that "the Board's ultimate obviousness findings were not supported by substantial evidence." *Id.* Accordingly, Power2B asks us to reverse the Board's determination that the propinquity claims were

disclosed by the prior art. We decline to do so, as we disagree with Power2B's proposed claim construction and assessment of the Board's obviousness analysis.

A

As an initial matter, Samsung contends that Power2B's cross-appeal concerning the "propinquity" claims is collaterally estopped by a related IPR. Samsung's Reply Br. at 43–50. In a prior IPR of Power2B's U.S. Patent No. 8,610,675, the Board issued a Final Written Decision rejecting Power2B's argument that the phrase at least "a predetermined degree of propinquity" should be construed to exclude touching. J.A. 14905. Claim 1 of the '675 patent had a "propinquity" term nearly identical to that in claim 31 of the '850 patent and claim 1 of the '093 patent, and the Board agreed with Samsung that, properly construed to include touching, the term was disclosed by Reime and Yamaguchi. J.A. 14986–87, 14934–35. Power2B did not appeal that decision. Because we agree on the merits with Samsung that the Board had substantial evidence for its finding that the "propinquity" claims of the '850 and '093 patents are obvious, we need not determine if collateral estoppel also precludes Power 2B from prevailing in its cross-appeal.

B

The propinquity claims require a pixel array or sensor configured to sense the "position" of an object "with respect to" the pixel array when the object "is within" or "has at least" "a predetermined degree of propinquity" to the pixel array. J.A. 420, 514. We agree with the Board that the plain and ordinary meaning of "at least" or "within" "a predetermined degree of propinquity" includes touching the display, or zero distance.

The Board and the parties agree that "propinquity" means "proximity." Power2B urges that this proximity-based limitation means "determining an object is at a

specific distance away from the surface," which only covers objects that are near, but not touching, the device. Cross-Appellant Response Br. at 64–65. However, there is a difference between a claim that is indifferent to touch and one that excludes touch. The language of the "propinquity" claims falls into the former category. Power2B's proposed construction replaces a "predetermined degree" of proximity with a "specific distance" and requires "proximity" to exclude touching. The claims do not recite a specific propinquity or proximity, and Power2B's cross-appeal does not point to any authority which defines proximity to exclude touch.

Neither the specification nor the dependent claims provide a basis for reading in Power2B's proposed construction. Even if Power2B's position were correct, and the specification's exemplary figures and dependent claims always used "propinquity" to refer to a set distance away from the pixel array, *see* Cross-Appellant Response Br. at 67–70, this does not provide a basis to import such a distinction into the broad claim language. *See, e.g.*, *Decisioning.com, Inc.*, 527 F.3d at 1314; *Johnson Worldwide Assocs., Inc.*, 175 F.3d at 992.

Moreover, the specification and the dependent claims support our construction. In Figures 20A and B of the '850 patent, for example, the specification discloses detecting an object's position regardless of whether it is touching or near, but not touching, the surface. J.A. 410 (48:26–29) ("When the user's fingers' touch, as in FIG. 20B, or is located in propinquity to, as in FIG. 20A, plate 1508, the light reflected from the fingers is detected by one or more of detector elements 1504[.]"). Claims that depend on claim 31 of the '850 patent, such as claim 34, add a separate requirement for a "utilization circuitry . . . configured to distinguish at least between positions of the at least one object when touching and not touching the device." J.A. 421 (69:16–19). As Samsung argues, "in order for claim 34's circuitry to be able to distinguish between positions of

touching and not touching, independent claim 31 must encompass touching . . . in the range of proximity the system can sense, otherwise the utilization circuitry would not be able to make its determination." Samsung Reply Br. at 52. The Board found this argument convincing, reasoning that if the propinquity claims excluded touching, there would be no touching position for claim 34's circuitry to distinguish. J.A. 13. We agree.

We have considered Power2B's remaining claim construction arguments regarding the propinquity claims and find them unconvincing. The fact that the "specification repeatedly uses the term 'propinquity' to describe and depict an object positioned at a pre-established distance," Cross-Appellant Response Br. at 67, for instance, says nothing of the full scope of "propinquity"—only that objects hovering nearby are included. Because the specification and dependent claims distinguish between touch-based operations and propinquity-based operations, Power2B also asks us to infer that these two kinds of operations cannot both respond to touching. *Id.* at 68–69. Power2B misunderstands that the question here is the scope of propinquity-based functionality (*i.e.*, whether such functionality can be triggered by the touching of a display in addition to hovering adjacent to the display), not the difference between touch-based and propinquity-based operations. While it is true that the '850 patent and the '093 patent incorporate hardware that can respond to touch input "akin to the click of a conventional mouse," *e.g.*, J.A. 412 (51:9–14), this does not clarify which object interactions fall within the claimed propinquity-based operations.

In summary, Power2B's proposed construction is overly narrow and unsupported by the intrinsic record. The Board properly concluded that the plain meaning of "at least" or "within" "a predetermined degree of propinquity" includes "a degree of propinquity, and being closer," which includes touching. J.A. 11, 64.

C

Substantial evidence supports the Board's factual findings that Samsung's asserted prior art references taught the "predetermined degree of propinquity" claim limitations. Accordingly, we affirm the Board's holding that claims 31 and 41 of the '850 patent and claims 1, 5, 8, 11–13 of the '093 patent are unpatentable as obvious in view of the prior art.

Regarding the '850 patent claims, the Board determined that Yamaguchi teaches detecting an object's position when it has at least a predetermined degree of propinquity. J.A. 41–42. This determination is supported by substantial evidence. Yamaguchi is directed to "an image display device including the capability of detecting an object position." J.A. 32 (citing J.A. 1836 ([0003])). The image display incorporates a matrix of light-emitting and photo-detection cells. Light-emitting cells in the display emit light in accordance with image data, while photo-detection cells detect light reflected by an object. J.A. 33–34; *see also* J.A. 1836–37 ([0016]–[0019]). The Board recognized that Yamaguchi Figure 5 explicitly teaches sensing an object's position when it is "brought into contact or close proximity with the display" by comparing the photo-detection signal produced by the object against a predetermined threshold. J.A. 41 (citing J.A. 1842 ([0118])), J.A. 42 (citing J.A. 1848 ([0169])). The Board also afforded "significant weight" to testimony from Samsung's expert that Yamaguchi's threshold to respond and sense an object in close proximity is established "at some predetermined degree of propinquity, *i.e.*, a level of nearness to the device [that] has been set." J.A. 42. We give deference to "the Board's findings concerning the credibility of expert witnesses." *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010).

The Board's finding that Reime teaches detecting the position of an object when it is "within a predetermined degree of propinquity" as claimed by the '093 patent is also

supported by substantial evidence. J.A. 83–86. Reime detects an object's location using one or more groups of "optical sensor components" including two light emitters and one light receiver "at different locations" around a touch pad. J.A. 1891 ([0008]). Reime depicts objects interacting with the touchpad and explains:

> When a user uses an object such as a pencil **100** or a finger **100' (FIG. 2A)** to touch the touch pad **5,** some light **110** emitted from the emitter **10** encounters the surface of the object **100**. Part of the light **110** reflects off the object **100** and is received by the receiver **30**. . . . The amount of light received by the receiver **30** can be measured from the output signal **130**. . . . [T]he presence of the object **100** near the emitters **10, 20** and the receiver **30** would cause a change in the output signal **130**. . . . With a series of such measurements, it is possible to track the positions of the object **100** and thus its movement.

J.A. 1894 ([0073]). The Board cited to this portion of Reime's specification to find that Reime teaches detecting of an object's position via a change in output signal. J.A. 83–84. In view of Power2B's arguments that a "predetermined degree of propinquity" should exclude touching, the Board also clarified that Reime discloses that "it is not necessary for the object [] to physically touch" the display in order for the object to be interpreted as "touching the surface" because the touch pad will determine an object's position whenever there is a sufficient change in output signal. J.A. 84 (citing J.A. 1894 ([0074])). Thus, Reime discloses a touch pad that is responsive to objects that are near, but not necessarily touching, the touch pad. *Id.*

On cross-appeal, Power2B repeats its argument before the Board that Reime and Yamaguchi are not responsive to an object's "predetermined degree" of proximity because they only teach operations to determine an object's position in two-dimensional space, i.e., its x-y coordinate, and

neither teaches how to measure an object's position in three dimensions, i.e., by also determining the object's position along the z-axis. Cross-Appellant Response Br. at 70–71, 73. The Board correctly responded that nothing in the plain language of the propinquity claims requires calculating an object's distance on a z-axis. J.A. 43, 84. The limitation only requires sensing an object's "position" when it is "within" or "has at least" "a predetermined degree of propinquity" to the pixel array. Therefore, the Board reasoned that "the plain and ordinary meaning of 'position' is broad enough to cover both two-dimensional and three-dimensional positions." J.A. 85. We agree and affirm that both Yamaguchi's and Reime's teachings cover the "propinquity" limitation.

Finally, Power2B challenges the Board's determination that claim 11 of the '093 patent was obvious in view of a combination of Reime and Hinckley. Cross-Appellant Response Br. at 31. The Board properly credited testimony from Samsung's expert that "one of ordinary skill in the art would have been motivated to modify Reime to include Hinckley's features and benefits." J.A. 107. Hinckley relates to "devices with displays" which can be activated "based on whether [they are] being handled, [their] orientation, and/or whether [they are] being gestured toward." J.A. 1908 ([0002], [0009]). Hinckley teaches touch sensors, tilt sensors, and proximity sensors which can be used separately or in combination to control activation of a device. *E.g.*, J.A. 1909 ([0029]), 1911–12 ([0062]–[0066]). As the Board recognized, Hinckley's disclosure of a "proximity sensor" which can determine when the user is "close" to the device, when "the user takes the device *away* from their mouth," and in other embodiments, when the user is "gesturing toward the device," is sufficient to demonstrate that Hinckley "teaches distinguishing between an object moving towards or away from a device" as required by the additional limitation in claim 11. J.A. 106–07.

VII

We hold that the Board's construction of the "detector assembly" limitation was erroneous. We therefore reverse the Board's construction, reverse the Board's conclusion that claims 15 and 16 of the '850 patent and claim 26 of the '093 patent are not unpatentable as nonobvious in view of the prior art, and vacate and remand the Board's conclusion that claims 17–18, 21–22, 26, and 30 of the '850 patent and claims 29, 36–38, 44–46, 48–49, and 56–58 of the '093 patent are not unpatentable for further proceedings in view of our claim construction.

We hold that the Board's factual findings regarding claims 31 and 41 of the '850 patent and claims 1, 5, 8, 11–13 of the '093 patent are supported by substantial evidence, and we affirm the Board's conclusion that these claims are unpatentable as obvious in view of the prior art.

AFFIRMED-IN-PART, REVERSED-IN-PART, VACATED AND REMANDED

COSTS

Costs awarded to Appellant Samsung.