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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JEAN-MARIE BUSSAT, BENJAMIN B. LYON, SCOTT A. MYERS, and TERRY L. GILTON

Appeal 2019-000532
Application 14/335,553
Technology Center 2600

Before CARL W. WHITEHEAD JR., JEFFREY S. SMITH, and JAMES B. ARPIN, *Administrative Patent Judges*.

ARPIN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. § 134(a), the final rejection of claims 1, 3–7, 9, 10, 21, 23, 24, 26–29, and 31. Final Act. 2.[2] Claims 2, 8, 22, and 30 are canceled. *Id.* We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] "Appellant" here refers to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party-in-interest as Apple Inc. Appeal Br. 3.

[2] In this Decision, we refer to Appellant's Appeal Brief ("Appeal Br.," filed April 16, 2018)); the Final Office Action ("Final Act.," mailed October 16, 2017) and the Examiner's Answer ("Ans.," mailed August 9, 2018); and the originally-filed Specification ("Spec.," filed July 18, 2014). Rather than repeat the Examiner's findings and determinations and Appellant's contentions in their entirety, we refer to these documents.

STATEMENT OF THE CASE

Appellant's claimed subject matter "relates generally to electronic devices, and more specifically, to sensors for electronic devices." Spec. ¶ 2. In particular, a method of manufacturing a sensor chip may include "connecting two or more sensors together, thereby forming a sensor stack. This may allow two or more sensors to detect data or parameters through the same stack (e.g., vertical location)." *Id.* ¶ 25.

The Specification's Figures 7A and 7B are reproduced below.

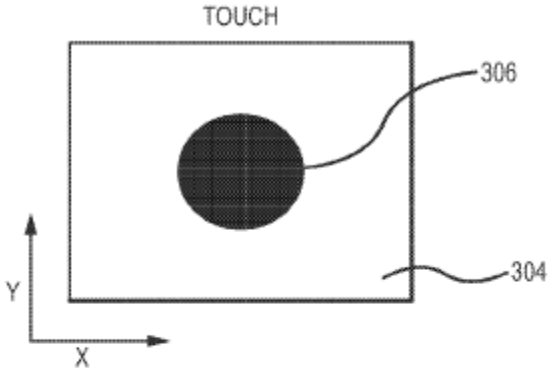

FIG.7A

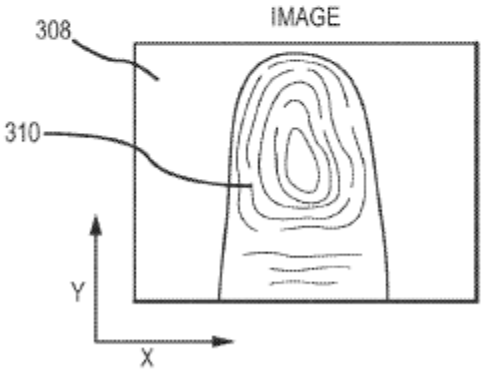

FIG.7B

Figure 7A "is a diagram of data captured by a first sensor in the sensing element during the user input shown in [Figure 6, and Figure 7B] is an

image of data captured by a second sensor in the sensing element during the user input shown in [Figure 6]." *Id.* ¶¶ 20–21. Figure 6 depicts finger 300 pressed against substrate 156 above vertically stacked sensors 122 and 124. *Id.*, Fig. 6. Figure 7A depicts touch location 306 in image 304, produced by capacitive data corresponding to finger 300, as captured by first sensor 122 (*id.* ¶ 73); and Figure 7B depicts a fingerprint 310 of finger 300 in image 308 produced by data as captured by second sensor 124 (*id.* ¶ 74). *See id.* ¶ 72 (describing Fig. 6).

As noted above, claims 1, 3–7, 9, 10, 21, 23, 24, 26–29, and 31 stand rejected. Claims 1, 21, and 27 are independent. Appeal Br. i (claim 1), ii (claim 21), iii (claim 27) (Claims App.). Claims 3–7, 9, and 10 depend directly or indirectly from claim 1, claims 23, 24, and 26 depend directly from claim 21, and claim 28, 29, and 31 depend directly or indirectly from claim 27. *Id.* at i–iii (Claims App.).

Claim 1, reproduced below with disputed elements emphasized, is representative.

> 1. An electronic device, comprising:
>
> a processor;
>
> a sensing element in communication with the processor, the sensing element comprising:
>
> *a first sensor configured to detect a touch input*; and
>
> *a second sensor* vertically aligned and bonded with a major surface of the first sensor *and configured to detect a parameter associated with the touch input*; and
>
> a substrate bonded to one of the first or second sensors and forming an external surface of the electronic device,
>
> wherein the substrate is a functional component of the electronic device.

Id. at i (Claims App.) (emphases added). Independent claims 21 and 27 recite limitations corresponding to the disputed limitations of claim 1 (*id.* at ii, iii), but independent claim 27 recites the additional disputed step of "enhancing at least one of the first image or the second image using the first and second parameters" (*id.* at 8; Ans. 7–8).

REFERENCES AND REJECTIONS

The Examiner relies upon the following references in rejecting the claims:

Name[3]	**Number**	**Published**	**Filed**
Greschitz	US 2003/0103873 A1	June 5, 2003	Oct. 15, 2002
Chatterjee	US 2010/0027854 A1	Feb. 4, 2010	July 31, 2008
Ferren	US 2010/0315337 A1	Dec. 16, 2010	Dec. 31, 2009
Kerness	US 2012/0187515 A1	July 26, 2012	Dec. 27, 2011
Kim	US 2012/0206406 A1	Aug. 16, 2012	Feb. 15, 2012

Specifically, the Examiner rejects claims 1, 3–6, 9, 27–29, and 31 under 35 U.S.C. § 103 as obvious over the combined teachings of Kim and Chatterjee (Final Act. 3–10); claim 7 under 35 U.S.C. § 103 as obvious over the combined teachings of Kim, Chatterjee, and Ferren (*id.* at 10–11); claims 10, 21, 23, and 24 under 35 U.S.C. § 103 as obvious over the combined teachings of Kim, Chatterjee, and Kerness (*id.* at 11–14); and claim 26 under

[3] All reference citations are to the first named inventor only.

35 U.S.C. § 103 as obvious over the combined teachings of Kim, Chatterjee, Kerness, and Greschitz (*id.* at 15).

Appellant contests the obviousness rejections of independent claims 1, 21, and 27 (Appeal Br. 6–10) and relies on similar deficiencies in the rejections of each independent claim to overcome the rejections of the dependent claims (*id.* at 10–11). Because we determine that reversal or affirmance of the rejections of the independent claims is dispositive, except for our ultimate decision, we do not discuss the merits of the rejections of claims 3–7, 9, 10, 23, 24, 26, 28, 29, and 31 further herein. We review the appealed rejections of the independent claims for error based upon the issues identified by Appellant, and in light of the arguments and evidence produced thereon. *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). Unless otherwise indicated, we adopt the Examiner's findings in the Final Action and the Answer as our own and add any additional findings of fact for emphasis. We address the rejections of claims 1, 21, and 27 below.

ANALYSIS

1. Obviousness of Claims 1, 21, and 27 Over Kim and Chatterjee, Alone or in Combination with Kerness

The Examiner finds that Kim teaches or suggests the majority of the limitations of independent claim 1, including that a sensing element comprises "a first sensor configured to detect a touch input; and a second sensor vertically aligned and bonded with a major surface of the first sensor." Final Act. 3–4. The Examiner acknowledges, however, that "Kim does not explicitly teach: the second sensor is *configured to detect a parameter associated with the touch input*." *Id.* at 4 (emphasis added).

Nevertheless, the Examiner finds that Chatterjee teaches this limitation. *Id.* (citing Chatterjee ¶¶ 73, 74, Figs. 4–7). In particular, Chatterjee discloses:

> *In one implementation, the contact surface 410 may comprise of an optical detector that can measure the biometric features of the user's fingers (e.g. fingerprint).* Use of such an integrated component enables any of the embodiments described with FIG. 4 through FIG. 7 to serve as a biometric sensor feature. *In still other embodiment, the biometric sensor feature may be provided through an independently positioned optical sensor that detects the biometric information apart from the capacitive or resistive layer that detects the finger position or movement.*

Chatterjee ¶ 74 (emphases added). Further, the Examiner concludes

> it would have been obvious to one of ordinary skill in the art at the time the invention was filed to have modified the invention of Kim to incorporate the teaching of Chatterjee to configure the first sensor to detect a touch input and the second sensor to detect a parameter associated with the touch input. The motivation of combining these analogous arts is to utilize the teaching of Chatterjee to provide a multi-purpose detector-based input feature for a computing device.

Final Act. 4; *see* Chatterjee, Abstract ("The input feature is multi-dimensional in ability to detect position information, applied pressure and/biometric characteristics about the user or finger. The input feature may also include a haptic feedback mechanism."), ¶¶ 32–33 (describing benefits of Chatterjee's input features); *see also* Chatterjee, Fig. 16A (depicting stacked sensors 1610 and 1630), ¶ 102 (describing Fig. 16A).

Appellant contends the Examiner fails to show that a person of ordinary skill in the relevant art would have had reason to combine the teachings of Kim and Chatterjee to achieve the devices, as recited in claim 1. Appeal Br. 8. For the reasons given below, we disagree.

First, Appellant contends, "Kim does not disclose any sort of second sensor that can be modified by Chatterjee's teachings." *Id.* Nevertheless, as the Examiner finds,

> Kim teaches a sensing element (**the touch screen 100 in Fig. 1 includes a first sensor and a second sensor**), the sensing element comprising: a first sensor configured to detect a touch input (**second sensor layer 20 in Fig. 1**); and a second sensor vertically aligned and bonded with a major surface of the first sensor and configured to detect a parameter associated with the touch input (**first sensor layer 10 in Fig. 1**). As such the sensor is composed of two separate sensor layers (**first sensor layer and second sensor layer**) which are vertically aligned.

Ans. 3–4; *see* Final Act. 3. Thus, the Examiner finds that Kim teaches a multi-layer sensor having the structure recited in claim 1, and Kim teaches a sensor that detects a touch input. As Appellant acknowledges,

> Many devices use sensors to detect one or more characteristics or parameters. For example, many touch-screen electronic devices may include capacitive sensors (and/or alternative sensors) that may detect a user's touching the screen of the device, and register this as an input. Often, some sensors may require one or more components to be mounted on a substrate, such as silicon.

Spec. ¶ 3 ("Background"); *see id.* ¶ 88. As with the devices recited in claim 1, Kim teaches that multiple sensors may be used. *See* Kim ¶ 55 ("For example, suitable results may be achieved if the described techniques are performed in a different order and/or if components in a described system, architecture, device, or circuit are combined in a different manner and/or replaced *or supplemented by other components or their equivalents*." (emphasis added)). Therefore, we are not persuaded Kim does not teach multiple sensors and, in particular, a second sensor that may be modified by Chatterjee's teachings.

Second, Appellant contends, "modifying one of Kim's conductive/sensor layers would seem to render Kim's singular sensor inoperable (e.g., because Kim's singular sensor relies on both conductive/sensor layers to sense a single parameter - capacitance)." Appeal Br. 8; *see* MPEP § 2143.01(V), (VI).[4] Appellant, however, appears to misunderstand the Examiner's combination of the teachings of Kim and Chatterjee. *See Univ. of Maryland Biotechnology Institute v. Presens Precision Sensing GmbH*, 711 Fed. Appx. 1007, 1011 (Fed. Cir. 2017) (finding that the location of sensors in the proposed combination would not require "substantial reconstruction and redesign of the element shown" in one reference, as prohibited by *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959)).

With regard to claim 1, the Examiner relies on Kim to teach multiple sensor layers, the relationship between the sensor layers and the substrate, and the substrate as a functional component of the electronic device. Final Act. 3–4 (citing Kim ¶¶ 44, 54, Fig. 1); Ans. 3–4. Chatterjee teaches that multiple sensors measuring different touch-related parameters may be stacked in devices, such as those described by Kim. Chatterjee ¶¶ 73, 74, 102, Figs. 4–7, 16A; *see* Final Act. 4; Ans. 4–5. We are persuaded that a person of ordinary skill in the art would have understood the benefits of combining the teachings of Chatterjee with those of Kim to achieve devices, as recited in claim 1. *See* Kim ¶ 55 (quoted above); Chatterjee ¶¶ 2, 3, 32, 33.

As in *Presens*, we are persuaded here that the Examiner's

[4] All Manual of Patent Examining Procedure ("MPEP") citations herein are to MPEP, Rev. 08.2017, January 2018.

combination of the teachings of Kim and Chatterjee is "[t]he combination of familiar elements according to known methods [and] is likely to be obvious when it does no more than yield predictable results." *Presens*, 711 Fed. Appx. at 1011 (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007)). Thus, we are not persuaded that the proposed combination would improperly change a fundamental principle of operation of Kim.

Third, Appellant contends,

> Chatterjee only discloses an "integrated component" comprising a first sensor and a second sensor (e.g., a touch sensor and a biometric sensor). Chatterjee does not disclose 'a second sensor ***vertically aligned and bonded with a major surface of*** the first sensor and configured to detect a parameter associated with the touch input," as recited in claim 1.

Appeal Br. 8. Although, as noted above, Chatterjee discloses stacked sensors (*see, e.g.*, Chatterjee ¶ 102, Fig. 16A), the Examiner relies on Kim, rather than Chatterjee, to teach the stacked sensors bonded to a substrate. Final Act. 3 (citing Kim ¶¶ 44, 54, Fig. 1); Ans. 3 (citing Kim ¶ 36, Fig. 1); *see* Kim ¶ 55. Further, making an integral component separable generally is not sufficient to render a proposed device non-obvious. *See* MPEP § 2144.04(V)(C). Thus, we are not persuaded by the contention that the Examiner erred.

Each of independent claims 1, 21, and 27 recites limitations corresponding to the limitations discussed above. Appeal Br. i–iii (Claims App.). Appellant raises substantially the same contentions regarding these limitations with respect to each of the independent claims. *See* Appeal Br. 6–10. We are equally unpersuaded by these contentions with respect to

claims 21[5] and 27, as we are with respect to claim 1.

Nevertheless, with respect to claim 27, Appellant also contends that Chatterjee does not teach or suggest "enhancing at least one of the first image or the second image using the first and second parameters." Appeal Br. 9 (quoting *id.* at iii (Claims App.)). In particular, Appellant contends, "Chatterjee does not disclose 'enhancing *at least one of the first image or the second image*,' because Chatterjee does not disclose the existence of two images, and does not disclose any sort of enhancement that might be made to an image." *Id.* (emphasis added). We disagree.

As noted above, the Specification's Figure 7A depicts "a touch location 306 may be detected in an image 304 or plane corresponding to the location on the substrate 126 where the user pressed his or her finger 300"; and its Figure 7B depicts "an image of the finger 300 as the finger 300 applies an input to the substrate 156[, and t]he image 308 may include a fingerprint 310 of the finger 300." Spec. ¶¶ 73, 74; *see id.*, Fig. 6. Referring to Figure 6, the Specification explains that "the sensor chip 120 may be used to detect a fingerprint input, as well as one or more characteristics of the input, such as pulse rate, vein mapping, blood flow, etc., *that may be used to enhance the initial sensed input*." *Id.* ¶ 77 (emphasis added); *see* Appeal Br. 9 (citing Spec. ¶¶ 77, 82). With respect to each of Figures 7A and 7B, the Specification explains that each figure is merely a simplified diagram of data captured by the respective sensors. Spec. ¶¶ 73, 74.

[5] With respect to claim 21, the Examiner relies on Kerness to teach or suggest a lens may be included in the combined teachings of Kim and Chatterjee. Final Act. 13–14. Appellant does not contest the combination of the teachings of Kerness with those of Kim and Chatterjee, for this purpose. Appeal Br. 9–10.

The Examiner finds Chatterjee discloses "an optical detector that can measure the biometric features of the user's fingers (e.g. fingerprint)" and a "capacitive or resistive layer that detects the finger position or movement." Chatterjee ¶ 74. Further, Chatterjee discloses:

> If an optical, RF or capacitive sensor is used (such as in the case of an integrated biometric position/movement sensor), an image or other data may be detected that correlates to finger velocity or motion. The finger detecting operation may detect the position/movement of the finger at the start and/or end of the swipe (e.g. range measurement), as well as record instances between, and the time for the finger to complete the swipe (e.g. velocity) or move to points between (e.g. acceleration or velocity).

Id. ¶ 56. Moreover, Chatterjee discloses "[t]he input feature is multi-dimensional in ability to detect position information, applied pressure and/*biometric characteristics about the user or finger*." *Id.*, Abstract (emphasis added).

Based on Chatterjee's disclosures and the Specification's explanations of the data, i.e., the recited "images," captured by the sensors; additional data that may be captured, and at least one of those images may be *enhanced* based on that additional data. Thus, the Examiner finds that Chatterjee teaches or suggests the recited "enhancing" step. Final Act. 8 (citing Chatterjee ¶ 56, Fig. 1); Ans. 8; *see* Chatterjee, Abstract (detecting "biometric characteristics about the user or finger"), ¶ 43–44 (detecting and employing "finger-print features"). We agree.

We are not persuaded that the Examiner erred in rejecting claim 1, 21, or 27 as obvious over the combined teachings of Kim and Chatterjee alone or in combination with the teachings of Kerness. Consequently, we sustain the rejections of independent claims 1, 21, and 27.

2. Dependent Claims 3–7, 9, 10, 23, 24, 26, 28, 29, and 31

Each of claims 3–7, 9, 10, 23, 24, 26, 28, 29, and 31 depends directly or indirectly from independent claim 1, 21, or 27. Appeal Br. i–iii (Claims App.). As noted above, Appellant challenges the rejections of the dependent claims for the same reasons as their base claims. *See* id. at 10–11. Because we are not persuaded the Examiner erred with respect to the rejections of claims 1, 21, and 27; we also are not persuaded the Examiner erred with respect to the rejections of claims 3–7, 9, 10, 23, 24, 26, 28, 29, and 31. For this reason, we sustain the rejections of those claims.

DECISIONS

1. The Examiner did not err in rejecting claims 1, 3–7, 9, 10, 21, 23, 24, 26–29, and 31 as obvious over the combined teachings of Kim and Chatterjee, alone or in combination with the teachings of one or more of Ferren, Kerness, and Greschitz.
2. Thus, on this record, claims 1, 3–7, 9, 10, 21, 23, 24, 26–29, and 31 are not patentable.

CONCLUSION

For the above reasons, we affirm the Examiner's decision rejecting claims 1, 3–7, 9, 10, 21, 23, 24, 26–29, and 31.

In summary:

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1, 3–6, 9, 27–29, 31	103	Kim, Chatterjee	1, 3–6, 9, 27–29, 31	
7	103	Kim, Chatterjee, Ferren	7	
10, 21, 23, 24	103	Kim, Chatterjee, Kerness	10, 21, 23, 24	
26	103	Kim, Chatterjee, Kerness, Greschitz	26	
Overall Outcome			1, 3–7, 9, 10, 21, 23, 24, 26–29, 31	

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