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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* SAI MUN LEE, LYE PIN CHU, and KAI JEAN TEE

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Appeal 2018-000100<sup>1</sup>  
Application 13/009,669  
Technology Center 2600

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Before CAROLYN D. THOMAS, ERIC B. CHEN, and  
ADAM J. PYONIN, *Administrative Patent Judges*.

CHEN, *Administrative Patent Judge*.

DECISION ON APPEAL

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<sup>1</sup> Appellants identify Avago Technologies General IP (Singapore) Ptd. Ltd., as the real party in interest. (App. Br. 2.)

This is an appeal under 35 U.S.C. § 134(a) from the final rejection of claims 1–20, all the claims pending in the application. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

#### STATEMENT OF THE CASE

Appellants' invention relates to an optical sensor assembly that includes a folded optical system that utilizes one or more non-planar reflective surfaces and enables the manipulation or conditioning of the overall thickness of the sensor assembly, the field of view of the sensor assembly, and the image size. (Abstract.)

Claim 1 is exemplary, with disputed limitations in italics:

1. A folded optical imaging system, comprising:  
an object surface;  
an optical sensor;

a first optical element configured to receive light reflected from an object that is proximate to the object surface and transmit the received light; and

a second optical element configured to receive the light transmitted by the first optical element and transmit the light received from the first optical element to the optical sensor, wherein *at least one of the first and second optical elements comprise a non-planar reflective surface having at least some curvature along the non-planar reflective surface and light which is reflected from the non-planar reflective surface arrives at the optical sensor.*

Claims 1–20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Baharav et al. (US 2004/0208348 A1; pub. Oct. 21, 2004) and Hunter et al. (US 2003/0019934 A1; pub. Jan. 30, 2003).

## ANALYSIS

We are unpersuaded by Appellants' arguments (App. Br. 6–7; *see also* Reply Br. 4) that the combination of Baharav and Hunter would not have rendered obvious independent claim 1, which includes the limitation “at least one of the first and second optical elements comprise a non-planar reflective surface having at least some curvature along the non-planar reflective surface and light which is reflected from the non-planar reflective surface arrives at the optical sensor.”

The Examiner found that Figure 2 of Baharav, which illustrates prism 155 having surface 158 and prism 135 having surface 138, corresponds to the limitation “first and second optical elements,” respectively. (Ans. 3–4.)<sup>2</sup> The Examiner further found that Figure 8e of Hunter, which illustrates the primary light having reflective surface  $s_r$  of assembly 372 being divided into three sections  $sr_1$ ,  $sr_2$ , and  $sr_3$ , corresponds to the limitation “a non-planar reflective surface having at least some curvature along the non-planar reflective surface.” (Ans. 5.) The Examiner concluded that:

it seems obvious to one of ordinary skill in the art at the time of the invention to modify the prism surface 138, as taught by Baharav, by incorporating the curved surface  $s_r$ , as taught by Hunter figure 8e, for the purpose of aiming the transmitted light to optimize light transmission.

(*Id.* at 5–6 (emphasis omitted).) We agree with the Examiner's findings and ultimate conclusion of obviousness.

Baharav relates to an “imaging system for imaging a fingerprint operates in at least two different modes to provide both finger recognition and finger navigation applications.” (Abstract.) Figure 2 of Baharav,

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<sup>2</sup> Supplemental Examiner's Answer, mailed April 22, 2014.

reproduced below, illustrates swipe module 100 (¶ 16) having swipe interface 110, prism 155 (¶ 48), prism 135, and sensor 140 (¶ 49).

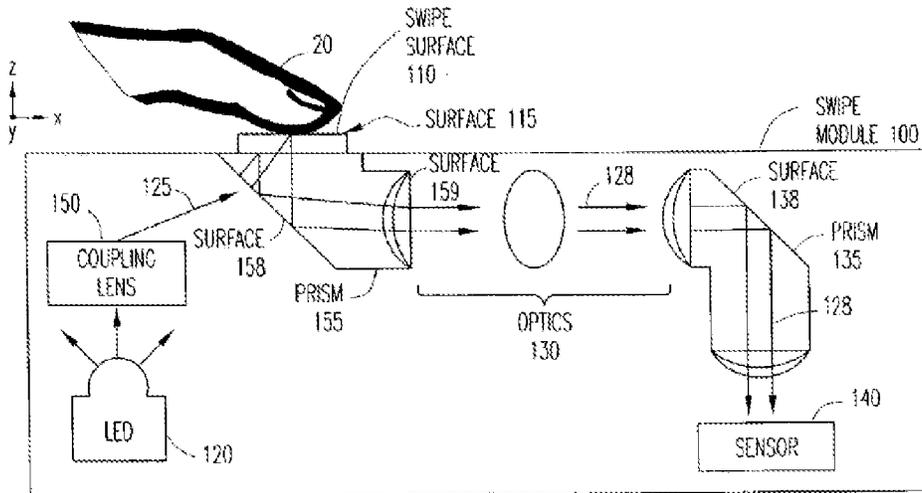
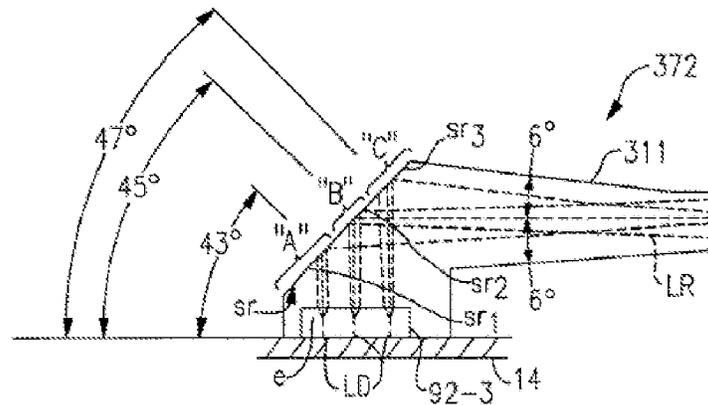


FIG. 2

Baharav explains that “[l]ight 128 reflected back from the finger 20 pressed against the surface 115 of the swipe interface 110 is internally reflected off the first surface 158 of the prism 155” (¶ 48) and “[t]he prism 135 internally reflects the light 128 off of surface 138 to redirect the light 128 in the z-direction to the sensor 140” (¶ 49). Because Baharav explains that surface 158 and surface 138 reflect light 128, Baharav teaches the limitation “first and second optical elements.”

Hunter relates to “an aimer system for an image sensor based optical reader.” (¶ 2.) Figure 8e of Hunter, reproduced below, illustrates light source assembly 372, including “primary light reflective surface  $s_r$  of assembly 372 . . . divided into three sections  $sr_1$ ,  $sr_2$ , and  $sr_3$ .” (¶ 178.)



Hunter explains that “[e]ach section  $sr_1$ ,  $sr_2$ , and  $sr_3$  of light reflective curved surface  $s_r$  forms a different angle with PCB 14 so as to optimize the efficiency of light transmission through light pipe 86-2 for each of the LED dies LD.” (*Id.*) Because Hunter explains that sections  $sr_1$ ,  $sr_2$ , and  $sr_3$  of light reflective curved surface  $s_r$  forms a different angle, Hunter teaches the limitation “a non-planar reflective surface having at least some curvature along the non-planar reflective surface.”

A person of ordinary skill in the art would have recognized that incorporating light reflective curved surface  $s_r$  of Hunter into prisms 155 and 135 of Baharav would improve Baharav by providing the advantage of optimizing the efficiency of light transmission. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”). Alternatively, the combination of Baharav and Hunter is nothing more than incorporating the known light reflective curved surface  $s_r$  of Hunter with the known prisms 155 and 135 of Baharav, to yield predictable results. *See KSR*

550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”). Thus, we agree with the Examiner that the combination of Baharav and Hunter teaches the claim limitation “at least one of the first and second optical elements comprise a non-planar reflective surface having at least some curvature along the non-planar reflective surface and light which is reflected from the non-planar reflective surface arrives at the optical sensor.” (*See* Ans. 4–7.)

Appellants argue that “the Examiner is citing a structure from Hunter that is not reflective as is required by independent claim 1.” (App. Br. 6.) In particular, Appellants argue that “[t]he passages of Hunter specifically discussing Fig. 6x continue to discuss negative lenses as being light-transmissive elements as opposed to reflective elements” and “Hunter is teaching that the negative lenses correspond to light-transmitting elements having a concave lens and the negative lenses are provided on a light entry and/or light exiting side of the plate (26).” (*Id.* at 7.) Similarly, Appellants argue that “none of the structures from Hunter cited by the Examiner against the claimed non-planar reflective surface can be fairly interpreted in such a manner” and “[e]ach and every structure from Hunter cited by the Examiner as a non-planar reflective surface belongs to a lens, which is explicitly taught to be a light-transmissive surface.” (Reply Br. 4.) However, the Examiner also cited to Figure 8e of Hunter for teaching the limitation “a non-planar reflective surface having at least some curvature along the non-planar reflective surface.” (Ans. 6.) Appellants have not presented any arguments or evidence as to why the Examiner’s findings with respect to Figure 8e of Hunter are improper.

Thus, we agree with the Examiner that the combination of Baharav and Hunter would have rendered obvious independent claim 1, which includes the limitation “at least one of the first and second optical elements comprise a nonplanar reflective surface having at least some curvature along the non-planar reflective surface and light which is reflected from the non-planar reflective surface arrives at the optical sensor.”

Accordingly, we sustain the rejection of independent claim 1 under 35 U.S.C. § 103(a). Claims 2–9 depend from claim 1, and Appellants have not presented any additional substantive arguments with respect to these claims. Therefore, we sustain the rejection of claims 2–9 under 35 U.S.C. § 103(a), for the same reasons discussed with respect to independent claim 1.

Independent claims 10 and 17 recite limitations similar to those discussed with respect to independent claim 1, and Appellants have not presented any additional substantive arguments with respect to these claims. *See In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011) (“[T]he Board reasonably interpreted Rule 41.37 to require more substantive arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art.”). We sustain the rejection of claims 10 and 17, as well as dependent claims 11–16 and 18–20, for the same reasons discussed with respect to claim 1.

#### DECISION

The Examiner’s decision rejecting claims 1–20 is affirmed.

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).

Appeal 2018-000100  
Application 13/009,669

AFFIRMED