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| Curtis A. Vock LATHROP GAGE LLP 2440 Junction Place Suite 300 Boulder, CO 80301 | | | FLORES, ROBERTO W | |
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YI-WEI LIU, JAU-JAN DENG, and REGIS FAN

Appeal 2019-001446
Application 15/097,137
Technology Center 2600

Before JOHN A. EVANS, JOHN P. PINKERTON, and
MICHAEL M. BARRY, *Administrative Patent Judges*.

BARRY, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner’s decision to reject claims 1–11 and 23–26. Claims 12–22 are withdrawn from consideration. Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ We use “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as OmniVision Technologies, Inc. Appeal Br. 4.

Introduction

Appellant describes the invention as relating to “a near-eye display device for mounting in field of view of an eye of a user . . . with coaxial eye tracking functionality.” Spec. ¶ 3. In a disclosed embodiment, three non-coplanar beams of infrared light, visible display light, and ambient light may be propagated coaxially from the device to a user’s eye. *Id.* ¶ 56. Using light reflected back towards the device by the user’s eye, a camera may capture an image of the user’s eye and determine the eye’s gaze direction for biometrically identifying or assessing health related parameters of the user. *See id.* ¶¶ 51, 56, 124, 126, 128, 130.

Independent claim 1 is illustrative:

1. A near-eye display device, with coaxial eye tracking, for mounting in field of view of an eye of a user, comprising:

a display unit for displaying a display image;

a viewing unit for presenting the display image to the eye, based upon visible display light received from the display unit, and transmitting ambient light from an ambient scene toward the eye; and

an eye imaging unit including an illumination module for generating at least three infrared light beams propagating along at least three different, non-coplanar directions, respectively,

a beamsplitter interface, disposed between the display unit and the viewing unit, for merging at least a portion of each of the infrared light beams with the visible light to direct each portion toward the eye via the viewing unit, and

a camera for imaging, via the viewing unit and the beamsplitter interface, pupil of the eye and reflections of the infrared light beams incident on the eye, to form one or more images indicative of gaze direction of the eye.

Appeal Br. 24 (Claims App.).

References

| Name | Reference | Date |
|-------------------------------|--------------------|---------------|
| Border et al. (Border) | US 2015/0301593 A1 | Oct. 22, 2015 |
| Sugiyama et al. (Sugiyama) | US 2010/0060551 A1 | Mar. 11, 2010 |
| Robbins et al. (Robbins) | US 2016/0085300 A1 | Mar. 24, 2016 |
| Raffle et al. (Raffle) | US 8,971,570 B1 | Mar. 3, 2015 |
| Miao | US 9,116,337 B1 | Aug. 25, 2015 |
| Ferren | US 2012/0075452 A1 | Mar. 29, 2012 |
| Miao et al. (Miao2) | US 2013/0016292 A1 | Jan. 17, 2013 |

Rejections²

The Examiner rejected claims 1, 8, 10, and 24 under 35 U.S.C. § 102(a)(2) as anticipated by Border. Final Act. 3–6.

The Examiner rejected claims 2, 5, and 11 under 35 U.S.C. § 103 as unpatentable over Border and Sugiyama. *Id.* at 6–9.

The Examiner rejected claims 3 and 4 under 35 U.S.C. § 103 as unpatentable over Border, Sugiyama, and Robbins. *Id.* at 9–10.

The Examiner rejected claim 6 under 35 U.S.C. § 103 as unpatentable over Border, Sugiyama, and Raffle. *Id.* at 10–11.

The Examiner rejected claim 7 under 35 U.S.C. § 103 as unpatentable over Border and Miao. *Id.* at 11–12.

² In the Final Office Action prior to this Appeal, the Examiner rejected claim 24 under 35 U.S.C. § 112(a). Final Act. 2. After Appellant filed the Appeal Brief on September 21, 2019, the Examiner withdrew that rejection in the Examiner’s Answer mailed October 26, 2018 (Ans.). *See* Ans. 3.

The Examiner rejected claim 9 under 35 U.S.C. § 103 as unpatentable over Border and Ferren. *Id.* at 12–13.

The Examiner rejected claim 23 under 35 U.S.C. § 103 as unpatentable over Border. *Id.* at 13–14.

The Examiner rejected claims 25 and 26 under 35 U.S.C. § 103 as unpatentable over Border and Miao2. *Id.* at 14–15.

The Examiner’s Findings and Appellant’s Contentions

In rejecting claim 1, the Examiner finds Figure 53 of Border discloses “an illumination module for generating at least three infrared light beams propagating along at least three different, non-coplanar directions, respectively” with its infrared light 5357 emitted from illuminating lights 5355. Final Act. 4–5 (citing Border, Fig. 53). The Examiner explains that the four grey lines representing infrared light 5357 disclose “at least 3 infrared light beams along non-coplanar directions.” *Id.* at 4.

Appellant contends, to the contrary, that each illuminating light 5355 emits only a single light beam, with the corresponding lines of infrared light 5357 representing light rays spanning the width of each respective light beam. Appeal Br. 9, 12–13 (citing Border ¶ 199, Fig. 29). Appellant further argues that the Examiner’s interpretation contradicts conventional depictions of single-beam light sources such as a vehicle headlight symbol, which includes multiple lines representing a single light beam. *Id.* at 9.

In response, the Examiner asserts that Border discloses the disputed limitation even if infrared light 5357 are rays because “the Merriam Webster dictionary” defines a “ray” as “a beam of radiant energy of small cross section,” which shows that “‘ray’ and ‘beam’ are equivalent and/or

interchangeable.” Ans. 4. The Examiner further asserts that “Border should have at least four light beams by using [a] diffraction element to modify the two light sources 5355 in figure 53 (at least two light beams for each light source).” *Id.* at 7–8 (citing Border ¶ 248; Appeal Br. 6).

Our Analysis

Anticipation requires a single prior art reference to disclose each and every claim element, in complete detail, and as arranged in the claim. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

Border discloses a head-worn computing system (e.g., glasses) that allow a user to look through the lenses and see the traditional environment as well as overlaid digital imagery, which together form an augmented reality. Border ¶ 85. Figure 53 of Border is reproduced below.

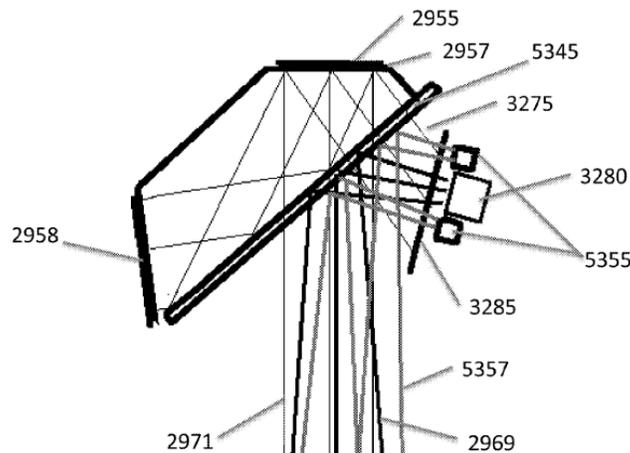


Figure 53

Figure 53 of Border shows a display system including an eye imaging system. *Id.* ¶ 246. Infrared light 5357 is emitted from illuminating lights 5355 and reflected by the hot mirror of beamsplitter plate 5345 such that the

light passes into the lower optic module of the head-worn computing system and illuminates the user's eye. *See id.*; Figs. 2, 53.

On the record before us, there is no persuasive evidence that infrared light 5357 in Figure 53 of Border discloses three infrared light beams that are non-coplanar. As an initial matter, Border does not specify the form of infrared light 5357—light *beams*, light *rays*, or otherwise. To assume that infrared light 5357 are light rays and adopt the Examiner's interpretation of the term "ray" as a "beam" would be speculative on our part. We decline to resort to such speculation. *See Ex parte Braeken*, 54 USPQ2d 1110, 1112 (BPAI 1999). Moreover, the Examiner's dictionary definition does not support the assertion that rays are interchangeable or equivalent to beams. To the contrary, defining a ray as "beam of radiant energy of small cross section" suggests that each ray is a small cross section of a beam—in other words, a beam includes a plurality of rays. This supports Appellant's position that Figure 53 of Border shows only two infrared light beams, with infrared light 5357 representing light rays spanning the width of each respective light beam. Nor does Border's use of a diffractive device to modify infrared light 5357 compel a different result. While this may modify the shape of infrared light 5357 emitted from illumination lights 5355, resulting in a particular light pattern, there is no evidence that the diffraction device itself generates infrared light beams. *See* Border ¶ 248. The alleged admissions by Appellant about the simultaneous generation of diffracted beams in the present application (Appeal Br. 6) do not fill the gaps of Border's disclosure.

In view of the foregoing, the Examiner has not adequately shown that Border discloses an illumination module for generating three infrared light

beams that are non-coplanar. Because these light beams, once generated, are used in a particular way by the recited “beamsplitter interface” and “camera for imaging,” the Examiner also has not adequately shown that Border discloses these claim elements. Accordingly, the Examiner has not adequately shown that Border discloses each and every claim element, in complete detail, and as arranged in the claim.

Therefore, we decline to sustain the 35 U.S.C. § 102(a)(2) rejection of claim 1. We likewise decline to sustain the rejection of dependent claims 8, 10, and 24, for which the Examiner makes no findings to cure the deficiency in the rejection of independent claim 1. For similar reasons, we also decline to sustain the Examiner’s § 103 rejections of claims 2–7, 9, 11, 23, 25, and 26, which recite a similar claim limitation for which the Examiner fails to provide any findings or reasoning that cures the above deficiency. *See* Final Act. 7–15.

CONCLUSION

We reverse the Examiner’s 35 U.S.C. § 102(a)(2) rejection of claims 1, 8, 10, and 24.

We reverse the Examiner’s 35 U.S.C. § 103 rejection of claims 2–7, 9, 11, 23, 25, and 26.

In summary:

| Claims Rejected | 35 U.S.C. § | Basis | Affirmed | Reversed |
|------------------------|--------------------|------------------|-----------------|-----------------|
| 1, 8, 10, 24 | 102(a)(2) | Border | | 1, 8, 10, 24 |
| 2, 5, 11 | 103 | Border, Sugiyama | | 2, 5, 11 |

| Claims Rejected | 35 U.S.C. § | Basis | Affirmed | Reversed |
|------------------------|--------------------|---------------------------|-----------------|-----------------|
| 3, 4 | 103 | Border, Sugiyama, Robbins | | 3, 4 |
| 6 | 103 | Border Sugiyama, Raffle | | 6 |
| 7 | 103 | Border, Miao | | 7 |
| 9 | 103 | Border, Ferren | | 9 |
| 23 | 103 | Border | | 23 |
| 25, 26 | 103 | Border, Miao2 | | 25, 26 |
| Overall Outcome | | | | 1–11, 23–26 |

REVERSED