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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* PHILIP SCOTT LYREN and GLEN A. NORRIS

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Appeal 2019-002956  
Application 15/293,251  
Technology Center 2600

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Before JEREMY J. CURCURI, ADAM J. PYONIN, AND  
MICHAEL J. ENGLE, *Administrative Patent Judges*.

PYONIN, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>1</sup> appeals from the  
Examiner's rejection. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM IN PART.

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<sup>1</sup> We use the word "Appellant" to refer to "applicant" as defined in 37  
C.F.R. § 1.42(a). Appellant states the "inventors (Philip Lyren and Glen  
Norris) are the real party in interest." Appeal Br. 2.

## STATEMENT OF THE CASE

### *Introduction*

The Application relates to “provid[ing] binaural sound to a listener while the listener watches a movie so sounds from the movie localize to a location of a character in the movie.” Spec. 3:3–5. Claims 1–20 are pending. Appeal Br. 34–38. Independent claims 1, 8, and 16 are reproduced below for reference (emphases added):

1. A method to provide binaural sound to a listener in a movie theater, the method comprising:

*determining different head orientations of the listener with respect to an image of a character as the image of the character moves to different locations* from one side of a movie screen to an opposite side of the movie screen while being displayed to the listener on the movie screen during a movie in the movie theater;

selecting, based on the head orientations of the listener with respect to the image of the character, head related transfer functions (HRTFs) so *a voice of the character is heard to originate to the listener from the image of the character as the image of the character moves to the different locations* from the one side of the movie screen to the opposite side of the movie screen;

convolving, with a digital signal processor, the voice of the character with the HRTFs; and

providing, through a wearable electronic device and to the listener, the voice of the character convolved with the HRTFs so *the voice of the character localizes to the listener as originating from the image of the character as the image of the character moves to the different locations* from the one side of the movie screen to the opposite side of the movie screen.

8. A method to provide binaural sound to a listener from a point-of-view of a character in a feature length movie while the listener watches the feature length movie, the method comprising:

*determining an azimuth angle between the character and a source of sound in the feature length movie;*

selecting a head related transfer function (HRTF) that corresponds to the azimuth angle;

convolving, with a digital signal processor, sound from the source of the sound with the HRTF; and

providing, through a wearable electronic device and to the listener, the sound convolved with the HRTF so the listener hears the sound from the point-of-view of the character while the listener watches the feature length movie.

16. A method to provide binaural sound to a listener while the listener watches a movie so sounds from the movie localize behind the listener, the method comprising:

obtaining head related transfer functions (HRTFs) for the listener;

*selecting a character in the movie as an audial point-of-view of the listener;*

convolving, with a digital signal processor and with the HRTFs, a sound in the movie that originates from behind the character so the sound originates from behind the listener at a location that is in empty space not occupied by a tangible object; and

providing, through a wearable electronic device and to the listener, the sound convolved with the HRTFs so the listener localizes the sound to originate from behind the listener at the location that is in the empty space not occupied by a tangible object while the listener watches the movie.

*References and Rejections*

The Examiner relies on the following prior art:

<b>Name</b>	<b>Reference</b>	<b>Date</b>
Lin	US 2003/0053680 A1	Mar. 20, 2003
Shizuya	US 2006/0159274 A1	July 20, 2006
Antonellis	US 2012/0062700 A1	Mar. 15, 2012
Heinemann	US 2014/0328505 A1	Nov. 6, 2014
McRae	US 2015/0195425 A1	July 9, 2015
Norris	US 2015/0373477 A1	Dec. 24, 2015
Lester	US 2016/0119731 A1	Apr. 28, 2016
Karkkainen	US 2016/0183024 A1	June 23, 2016
Brown	US 2017/0094440 A1	Mar. 30, 2017
Nair	US 2017/0105083 A1	Apr. 13, 2017

Claim 1 is rejected under 35 U.S.C. § 103 as being unpatentable over Lin<sup>2</sup> and Karkkainen. Final Act. 9.

Claims 8 and 9 are rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, and Lester. Final Act. 11, 25.

Claims 16–18 are rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, and Nair. Final Act. 14, 34.

Claims 2, 4, 5, and 7 are rejected under 35 U.S.C. § 103 as being unpatentable over Lin, Karkkainen, and Heinemann. Final Act. 17, 20.

Claim 3 is rejected under 35 U.S.C. § 103 as being unpatentable over Lin, Karkkainen, and Lester. Final Act. 18.

Claim 6 is rejected under 35 U.S.C. § 103 as being unpatentable over Lin, Karkkainen, and Antonellis. Final Act. 23.

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<sup>2</sup> The Examiner refers to Heinemann instead of Lin in the first sentence of the rejection; however, the rejection heading, citations, and remaining analysis are with respect to Lin. *See* Final Act. 9–11. We consider the initial incorrect reference to Heinemann to constitute harmless error.

Claim 10 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Lester, and Antonellis. Final Act. 26.

Claim 11 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Lester, and McRae. Final Act. 27.

Claim 12 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Lester, and Shizuya. Final Act. 28.

Claim 13 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Lester, Shizuya, and Norris. Final Act. 29.

Claim 14 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Lester, and Nair. Final Act. 31.

Claim 15 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Lester, and Norris. Final Act. 32.

Claim 19 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Nair, and Norris. Final Act. 38.

Claim 20 is rejected under 35 U.S.C. § 103 as being unpatentable over Heinemann, Karkkainen, Nair, and Brown. Final Act. 39.

## ANALYSIS

We have reviewed the Examiner's rejections in light of Appellant's arguments. Arguments Appellant could have made but chose not to make are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(iv).

### *Independent Claim 1*

Appellant argues the Examiner's obviousness rejection of claim 1 is in error, because the "recitations in claim 1 are quite different than the teachings in Lin." Appeal Br. 8. Particularly, Appellant contends "Lin

never determines different head orientations of the listener,” and “Lin provides no teaching or suggestion whatsoever as to how HRTFs<sup>[3]</sup> can be used to generate sound to originate to the listener from images of characters that move from one side of the movie screen to the other” as claimed. *Id.* at 9, 11.

We are not persuaded the Examiner errs in determining the limitations of claim 1 are rendered obvious in view of the combined teachings of Lin and Karkkainen.<sup>4</sup> *See* Final Act. 11. Particularly, Appellant’s arguments disregard the Examiner’s citation to Karkkainen. *See, e.g.*, Appeal Br. 10 (“The Examiner does not rel[y] on Karkkainen for teaching or suggesting this claim recitation.”); Final Act. 9–11; *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“[O]ne cannot show non-obviousness by attacking references individually where, as here, the rejections are based on combinations of references.”). In the Final Action, the Examiner finds Karkkainen teaches

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<sup>3</sup> Appellant’s Specification explains that “[s]ound is convolved with head related transfer functions (HRTFs) of the listener.” Spec. 3:5–6.

<sup>4</sup> In the Answer, the Examiner newly relies on “Lin’s incorporate[d] reference 5,438,623 (Begault) in paragraph 0029,” for teaching a head orientation determination. Ans. 35. We note the Examiner does not attempt to show that Lin properly incorporates by reference any particular head orientation teachings of Begault (nor does the Examiner provide a reason to combine Begault with the cited references). *Cf. Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000) (“To incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents.”). Appellant, however, does not challenge the propriety of the Examiner’s new citation to Begault in the Answer. *See* Reply Br. 2. In any event, we do not reach the issue of whether Begault is properly part of the rejection because, as discussed herein, we do not find the Examiner’s rejection with respect to the teachings of Lin and Karkkainen is in error.

the “system processes the audio signals with the HTRF in order to represent the audio signal based on the head bearings (head tracking) of the user.”

Final Act. 11 (emphasis omitted); Karkkainen ¶ 52 (“In order to more accurately determine the direction from the user to the object so as to permit the head-related transfer function filter to create a more representative audio cue, the apparatus . . . is configured to determine the head bearing of the user.”). Appellant does not argue the Examiner’s reliance on Karkkainen is in error.

Nor does Appellant show the Examiner’s rejection with respect to the combination of Lin and Karkkainen is in error. We agree with the Examiner that Lin teaches or suggests localizing the voice of a character, as claimed. *See* Final Act. 10. Lin discloses “extract[ing] different sound sources . . . [which] typically comprise voices,” and “match[ing] each sound source with a video object,” when using “head related transfer functions (HRTF’s) for . . . producing 3-dimensional audio signals that appear to come from separate and discrete positions from about the head of a listener.” Lin ¶¶ 15, 17, 29; *see also* Lin, Abstract, ¶ 24. Appellant does not challenge the Examiner’s finding that one of ordinary skill would combine Lin’s 3-D voice signal reproduction system with Karkkainen’s teachings, “in order to provide the sense of sound position based on the head orientation of the user.” Final Act. 11; Lin Fig. 2, ¶ 20; Karkkainen ¶¶ 51, 52. Accordingly, we are not persuaded the Examiner’s rejection is in error. *See* 37 C.F.R. § 41.37(c)(1)(iv) (“arguments or authorities not included in the appeal brief will be refused consideration by the Board for purposes of the present appeal”); *cf. In re Baxter Travenol Labs.*, 952 F.2d 388, 391 (Fed. Cir. 1991) (“It is not the function of this court to examine the claims in greater detail



than argued by an appellant, looking for [patentable] distinctions over the prior art.”).

We sustain the Examiner’s obviousness rejection of independent claim 1. Appellant does not present additional substantive arguments with respect to dependent claims 2 and 4. *See* Appeal Br. 19. Thus, we sustain the Examiner’s rejection of these claims for the reasons discussed above.

*Independent Claim 8*

Appellant argues the Examiner’s rejection of claim 8 is in error, because “the Examiner did not address the language actually recited in claim 8.” Appeal Br. 13. Particularly, Appellant contends that the claim “recites determining an azimuth angle between two specific objects: a character in a feature length movie and a source of sound in the feature length movie. By stark contrast, Karkkainen determines head bearing between two totally different things: a listener and an object in the feature length movie.” *Id.* at 14. Appellant similarly contends the “teaching[s] in Lester are fundamentally different than the recitations in claim 8.” *Id.* at 15.

We are persuaded the Examiner errs. Claim 8 recites a “method to provide binaural sound to a listener from a point-of-view of a character in a feature length movie,” including a step of “determining an azimuth angle between the character and a source of sound in the feature length movie.” Appeal Br. 36. The Examiner finds this limitation to be obvious in view of “Karkkainen[’s] teach[ing of] convolving, with a digital signal processor, the voice of the character” and Lester’s “system [which] tracks the user head position.” Final Act. 13; Karkkainen ¶ 51; Lester ¶¶ 41–44. Each of these

references, however, is cited for teachings with respect to an angle measured from the viewer of the movie. *See* Final Act. 11–14; Ans. 50–52.

The Examiner does not identify—and we do not see in the record before us—any teaching or suggestion of determining an angle between two objects *in* the movie. *See, e.g.*, Final Act. 13 (“Lester does not teach the object in a movie screen, however, Heinemann and Karkkainen teach the [angle] at which the user’s head position is tracked relative to the object on the screen.”). Nor does the Examiner provide a rationale to modify the references to determine such an angle. *See* Final Act. 14 (“The modification is to determine the [angle] of the user’s head orientation”); Ans. 51 (“Heinemann and Lester in combination would provide [the] feature and function of sound source position on the screen relative to the listener.”). Therefore, the Examiner has not shown the disputed claim limitation is rendered obvious by the cited art.

We agree with Appellant that the Examiner’s obviousness rejection of claim 8 is in error. We do not sustain this rejection, or the rejections of the claims dependent thereon.

### *Independent Claim 16*

Claim 16 recites “selecting a character in the movie as an aural point-of view of the listener.” Appeal Br. 37. Appellant argues the Examiner’s rejection of this claim is in error, because “Heinemann provides no teaching or suggestion about such an aural point-of-view,” and “Heinemann does not even teach or suggest selecting a character in the movie.” Appeal Br. 18.

We are persuaded the Examiner errs. The Examiner finds Heinemann teaches the disputed limitations, because Heinemann’s “system determines

which object the user is viewing by tracking the user's head position/orientation and then would provide the audio using the HRTF to provide the sound source in association with the head position." Final Act. 14, 15; Heinemann ¶¶ 28, 29, 39. The cited portions of Heinemann, however, provide no teaching or suggestion regarding an aural point of view. Rather, the Examiner states Heinemann's teaching of the "sound *from* the object (character) would be from the aural point of view of the character," and the "object on the screen can be viewed in which the sound provided *from* the object at that location and direction would be provided to the user." Ans. 59 (emphases added). We disagree—such sound *from* an object would not reasonably represent the object's point of view, as claimed. *See* Appeal Br. 18. We find the Examiner's rejection is in error, because Heinemann does not teach or suggest an aural point of view, and the Examiner does not rely on additional reasoning or the other cited references for teaching this limitation. *See* Ans. 59.

Accordingly, we do not sustain the Examiner's obviousness rejection of claim 16, or the rejections of the claims dependent thereon.

### *Dependent Claims*

Dependent claim 3 recites, *inter alia*, the "method of claim 1 further comprising: determining azimuth angles and elevation angles between a forward facing head orientation of the listener and the image of the character." Appeal Br. 34. Appellant argues the Examiner's rejection is in error, because "Lester teaches tracking head orientations of a user with respect to an apparatus, speaker," but "Lester provides no teaching or

suggestion whatsoever to substitute the speaker, apparatus 52 with an image of a character being shown on a movie screen.” Appeal Br. 20.

We are not persuaded of error in the rejection of claim 3, because Appellant’s argument only focuses on teachings within Lester, and ignores the Examiner’s analysis with respect to the combination. *Id.*; Final Act. 19 (“[I]t would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Lin and Karkkainen to incorporate the azimuth and elevation angles” of Lester.); *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”). Thus, Appellant does not persuade us the Examiner errs in finding that one of ordinary skill would combine the particular angle teachings of Lester in the method of Lin and Karkkainen. *See* Ans. 63, 64; Lester ¶¶ 28, 41–43, 44 (“referencing target data 44 indicating a pre-defined target azimuth angle, target elevation angle and target distance for the head region in relation to the current position and orientation of the sound generating device”). We sustain the Examiner’s rejection of dependent claim 3.

Dependent claims 5 and 7 each recite providing “point-of-view” sound that relates to a character in the movie. Appeal Br. 35, 36. Appellant argues the Examiner has not shown the cited references teach or suggest these limitations. *See* Appeal Br. 22, 23. We agree. The Examiner has not shown Heinemann and Karkkainen teach or suggest these limitations, for the same reasons discussed above with respect to independent claim 16. The Examiner does not rely on Lin for these limitations. *See* Final Act. 21, 22.

Therefore, we do not sustain the Examiner's rejection of dependent claims 5 and 7.

Claim 6 depends from claim 1, and recites "switching, in response to the position of the character no longer being located on the movie screen, the voice of the character from being provided in binaural sound to being provided to the listener in stereo sound." Appellant argues the Examiner's rejection is in error, because "Lin provides no teaching whatsoever to switch binaural sound to stereo sound in response to the position of the character no longer being located on the movie screen," and "Antonellis . . . provide[s] no teaching or suggestion to switch binaural sound to stereo sound in response to the position of the character no longer being located on the movie screen." Appeal Br. 24.

Appellant's argument is unpersuasive for not being responsive to the Examiner's rejection: Appellant attacks the teachings of Lin and Antonellis separately, whereas the Examiner concludes claim 6 is obvious in view of the combined teachings of the references. *See* Final Act. 23–25; Lin Fig. 2; Karkkainen ¶ 32; Antonellis ¶¶ 37–41, 42 ("At one point, one or both of the actors A and B are positioned 'off stage' behind the viewer," and their "positions are tracked and/or plotted from the video component object tracking map and corresponding audio object tracks are processed with 3D space position cues to correspond to these positions by component."); *see also Keller*, 642 F.2d at 425 ("[T]he test [for obviousness] is what the combined teachings of the references would have suggested to those of ordinary skill in the art."). Particularly, the Examiner finds, and Appellant does not challenge, that one of ordinary skill (in view of the cited references) would determine that "moving from localized sound to a surround sound is

obvious.” Final Act. 25. As the Examiner’s obviousness findings and reasoning are not challenged, we are not persuaded the Examiner’s obviousness rejection is in error. We sustain the rejection of dependent claim 6.

### DECISION SUMMARY

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1	103	Lin, Karkkainen	1	
8, 9	103	Heinemann, Karkkainen, Lester		8, 9
16–18	103	Heinemann, Karkkainen, Nair		16–18
2, 4, 5, 7	103	Lin, Karkkainen, Heinemann	2, 4	5, 7
3	103	Lin, Karkkainen, Lester	3	
6	103	Lin, Karkkainen, Antonellis	6	
10	103	Heinemann, Karkkainen, Lester, Antonellis		10
11	103	Heinemann, Karkkainen, Lester, McRae		11
12	103	Heinemann, Karkkainen, Lester, Shizuya		12
13	103	Heinemann, Karkkainen, Lester, Shizuya, Norris		13
14	103	Heinemann, Karkkainen, Lester, Nair		14
15	103	Heinemann, Karkkainen, Lester, Norris		15
19	103	Heinemann, Karkkainen, Nair, Norris		19
20	103	Heinemann, Karkkainen, Nair, Brown		20
<b>Overall Outcome</b>			1–4, 6	5, 7–20

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TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED IN PART