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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ALAN LEE PROCTOR, DAVID AUSTIN PARKS, and RONALD JOE HORNER

Appeal 2020-001068
Application 14/683,589
Technology Center 3600

Before JOHN C. KERINS, WILLIAM A. CAPP, and GEORGE R. HOSKINS, *Administrative Patent Judges*.

CAPP, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant[1] seeks our review under 35 U.S.C. § 134(a) of the final rejection of claims 1–7, 11–28, 32–40, and 43. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies Navico Holding AS as the applicant and real party in interest. Appeal Br. 1.

THE INVENTION

Appellant's invention relates to sonar systems. Spec. ¶ 3. Claim 1, reproduced below with our emphases added, is illustrative of the subject matter on appeal.

> 1. A sonar system comprising:
>
> a housing mountable to a watercraft capable of traversing a body of water;
>
> at least one transducer array positioned within the housing and aimed downwardly from the watercraft,
>
> wherein the transducer array comprises a transmit/receive transducer element defining a length and a width, wherein the transmit/receive transducer element is mounted within the housing with the length of the transmit/receive transducer element extending along a first axis, wherein the transducer array comprises a second transducer element defining a length and a width, wherein the second transducer element is mounted within the housing with the length of the second transducer element extending along a second axis that is parallel to the first axis,
>
> wherein the transmit/receive transducer element is configured to transmit sonar pulses into the water;
>
> wherein the transmit/receive transducer element is configured to receive first sonar returns from the sonar pulses produced by the transmit/receive transducer element and convert sound energy of the first sonar returns into first sonar return data,
>
> wherein the second transducer element is configured to receive second sonar returns from the sonar pulses produced by the transmit/receive transducer element and convert sound energy of the second sonar returns into second sonar return data, and
>
> wherein the transmit/receive transducer element is positioned within the housing at a predetermined distance from the second transducer element; and

a sonar signal processor configured to:

process the first sonar return data and the second sonar return data to generate a set of 2D sonar data, wherein each sonar return of the set of 2D sonar data defines a distance value and an angle, wherein the angle associated with each sonar return is based on the predetermined distance between the transmit/receive transducer element and the second transducer element, wherein *the distance value associated with each sonar return corresponds to a distance between a position of the sonar return and the at least one transducer array*;

generate a plurality of sets of 2D sonar data as the watercraft traverses the body of water, wherein each of the plurality of sets of 2D sonar data is associated with a location of the watercraft where the first sonar return data and second sonar return data for that set of 2D sonar data was captured such that each sonar return defines a three dimensional position corresponding to a distance value, an angle, and a location;

generate a 3D point cloud of sonar returns from the plurality of sets of 2D sonar data based on the three dimensional position of each sonar return in the plurality of sets of 2D sonar data; and

generate 3D mesh data based on the 3D point cloud, wherein the 3D mesh data is a basis for a 3D image of an underwater environment in a three dimensional coordinate system.

THE REJECTIONS

The Examiner relies upon the following as evidence in support of the rejections:

Name	Reference	Date
Kosalos	US 5,200,931	Apr. 6, 1993
Freking	US 8,767,509 B2	July 1, 2014
Zimmerman	US 2005/0007880 A1	Jan. 13, 2005
Dubuis	US 2008/0239870 A1	Oct. 2, 2008
Maguire	US 2011/0013485 A1	Jan. 20, 2011
Coleman	US 2013/0208568 A1	Aug. 15, 2013
Willacy	GB 2,294,763 A	May 8, 1996
Griffiths	H.D. Griffiths et al., *Interferometric Synthetic Aperture Sonar for High-Resolution 3D Mapping of the Seabed*, 144 IEE Proceedings-Radar, Sonar Navigation 2	April 1997
Coda Octopus	CodaOctopus Echoscope Read-Time 3D Sonar-2D Multibeam vs 3D Echoscope[2]	May 2008

The following rejections are before us for review:

1. Claims 1, 2, 21, 23, and 36–38 are rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, and Zimmerman.

2. Claims 11–13, 32, 33, and 43 are rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, and Griffiths.

3. Claims 3–7, 18, 20, 24–28, 39, and 40 are rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, and Coleman.

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[2] *https://www.youtube.com/watch?v=2d1r2bjibCE*, posted October 19, 2011

4. Claims 14, 17, and 35 are rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, and Maguire.

5. Claim 15 is rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, and Freking.

6. Claims 16 and 34 are rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, and Dubuis.

7. Claim 19 is rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, Coleman, and Kosalos.

8. Claim 22 is rejected under 35 U.S.C. § 103 as being unpatentable over Coda Octopus, Willacy, Zimmerman, and the Examiner's taking of Official Notice.

OPINION

Unpatentability of Claims 1, 2, 21, 23, and 36–38 over Coda Octopus, Willacy, and Zimmerman

Claims 1, 2, 21, 23, and 36–38 are argued as a group. Appeal Br. 7–13. Claim 1 is representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that Coda Octopus discloses the invention substantially as claimed except for using two parallel, spaced apart transducers and 3D mesh data. Final Act. 2–5. The Examiner relies on Willacy as disclosing two transducers that are oriented and spaced apart as claimed. *Id.* at 5. The Examiner relies on Zimmerman as generating 3D mesh data based on a 3D cloud matrix in an underwater coordinate system. *Id.* at 6. The Examiner concludes that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Coda Octopus by the teachings of Willacy. *Id.* According to the Examiner, a person of ordinary skill in the art would have done this to provide an array to collect sonar returns. *Id.* The Examiner concludes that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to further modify Coda Octopus by the teachings of Zimmerman. *Id.* According to the Examiner, a person of ordinary skill in the art would have done this to clean the data from fish and boat noise returns. *Id.*

Appellant first argues that Coda Octopus does not form a 3D point cloud as claimed.[3] Appeal Br. 10. Appellant asserts that Coda Octopus, in the first section of the video, merely builds a picture "line-by-line" as the boat travels. Appeal Br. 10. Appellant then asserts that, in the second section of the video, Coda Octopus generates a real-time 3D image without using any post-processing. *Id.*

In response, the Examiner acknowledges that Coda Octopus does not explicitly mention 3D cloud points. Ans. 6. Nevertheless, the Examiner points out that it collects 2D data and then combines it into 3D data. *Id.* According to the Examiner, the use of 3D point cloud data is inherent. *Id.* In reply, Appellant reiterates that Coda Octopus merely builds a picture "line-by-line." Reply Br. 3.

> Such a waterfall approach is done without forming a 3D mesh. Instead, if a 3D mesh was formed, the entire image would be displayed at once – as opposed to being built-up line by line as disclosed.

Id. (emphasis omitted).

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[3] We use "1D", "2D" and "3D" herein as short-hand abbreviations for geometric constructs that exist in 1 dimension, 2 dimensions, and 3 dimensions.

In order to review the record, we accessed the video entitled – "*CodaOctopus Echoscope Real-Time 3D Sonar-2D Multibeam vs 3D Echoscope*" at URL *https://www.youtube.com/watch?v=2d1r2bjibCE*. The introductory graphic at the beginning of the video is captioned – "*A comparison of realtime 3D vs 2D multibeam data Hydrographic survey of G.B. Church artificial reef 48º 43' 19" N / 128º 21', 21" W May 2008*." An image screen capture from the beginning of the video that displays the above recited caption is reproduced below as Figure 1.

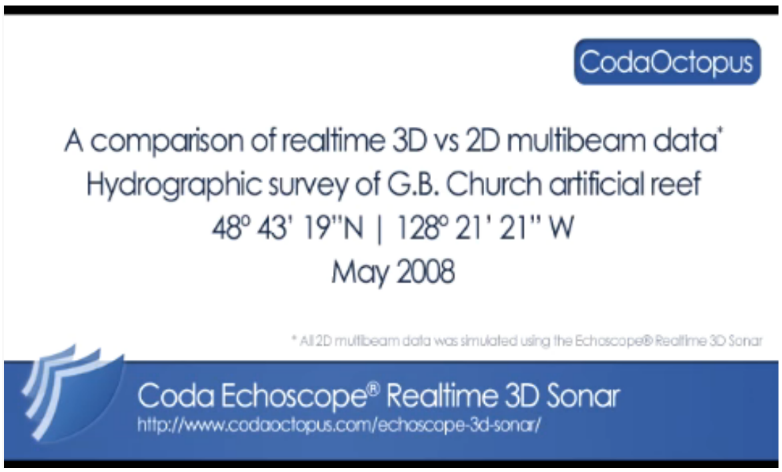

FIG. 1- SCREEN CAPTURE FROM BEGINNING OF CODA OCTOPUS VIDEO

The video presents itself as marketing promotional material for the maker's Real-time 3D Sonar product. *Id.* In that regard, the first half of the video (up to about 1:12, "What if the alternative . . . ") is devoted to an explanation of older technology that is improved upon by the product described and illustrated in the second half of the video. The video shows the animated collection of 2D multibeam data in the first half of the video. The video then compares such older technology to an animated display of real-time 3D multibeam data in the second half of the video (starting at about 1:15, "PROVEN ALTERNATIVE").

The Examiner relies on the first half of the video to reject claim 1. *See* Final Act. 2–5; Ans. 3–5. The text displayed on screen at various time points during the first half of the video states:

> A multibeam sonar system . . . is a *2D sonar* that is commonly used to map areas of the seabed and create underwater charts.

Coda Octopus, 0:09 (emphasis added).

> *All the data collected by these multibeam sonars is 2D* and must be post processed to create a 3D representation of the seafloor or object of interest.

Id. at 0:15 (emphasis added).

> In this view the Echoscope™ is being used to simulate *data collected with a 2D multibeam sonar*, by only viewing data collected with the center beam, in effect creating multibeam sonar with 128 beams acrosstrack.

Id. at 0:34 (emphasis added).

> A traditional multibeam sonar creates a narrow swath below the vessel and builds the picture line by line or ping by ping.

Id. at 0:39.

> With the survey vessel having made one pass, the user is able to move their eye around the image but as that data is collected from one angle the data density is not very high and information in the shadows is missing.

Id. at 0:46.

> As each ping from the multibeam only collects data from a single angle, when creating a surface[,] the software makes assumptions and joins up the individual data points obscuring the detail.

Id. at 0:59.

As we understand the video and Appellant's critique thereof, the "line-by-line" criticism of Coda Octopus is directed to the older 2D method of data collection and not to the real-time 3D sonar data collection that is featured in the second half of the video. Essentially, Appellant admits that, in the older 2D method: (1) Coda Octopus collects sonar data; and (2) post processes such data into a 3D image. Appeal Br. 10. We confess that we do not understand the significance of Appellant's "line-by-line" argument. A straight geometric "line" represents a first dimension ("1D"). When data from two parallel or co-planar lines is combined, it defines a plane in two dimensions ("2D"). When data from outside of the first plane is then combined, it defines a volumetric space in three dimensions ("3D"). If we were to believe Appellant, we would need to conclude that the 3D image described in the first half of Coda Octopus is digitally assembled in a single step from 1D ("line") data directly into a 3D image, as opposed to (1) forming a sequence of 2D data slices, and then (2) assembling such 2D slices into a 3D image. In other words, Appellant is understood as asserting that Coda Octopus necessarily collects 1D data and post-processes it directly into a 3D image.

Appellant presents an artificially strained interpretation of Coda Octopus. Persons of ordinary skill in the art familiar with 3D imaging, whether in the field of sonar, radar, or LIDAR, and ranging in applications from cartography to medical imaging, understand that 3D renderings are typically built up from a sequence of 2D slices of data. Assembling data from a 2D (*i.e.*, x, y) coordinate system into a 3D (*i.e.*, x, y, z) coordinate system entails what is commonly referred to as creating a 3D point cloud, which is nothing more than a set of data points in space.[4] Techniques for rendering point cloud data into a 3D surface or image are well known.[5] The

[4] *https://en.wikipedia.org/wiki/Point_cloud* (accessed September 30, 2020).
[5] *Id.*

language in Coda Octopus relating to "line-by-line" image creation is entirely consistent with assembling 2D image slices into a 3D image. The reference in Coda Octopus to using "2D sonar," and as well as the clear depiction of easily discernable 2D slices in the 3D images presented during the first half of the video, provide a sound basis to support the Examiner's finding regarding inherency.

Thus, the Examiner has stated a sound basis for believing that Coda Octopus generates a 3D image using point cloud data collected by 2D sonar imaging. This is sufficient to shift the burden to Appellant to prove that Coda Octopus does not, in fact, generate a 3D image from 2D data stored in a point cloud. Where the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977); *see also In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990) ("[W]hen the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not."). Here, the Examiner finds, with good reason, that Coda Octopus inherently generates 3D point cloud from sets of 2D sonar data. Ans. 6. Appellant's "line-by-line" evidence and argument is not sufficient to carry Appellant's burden to overcome the Examiner's inherency determination. Appellant provides no persuasive argument or technical analysis as to how Coda Octopus uses sonar data to generate a 3D image directly from 1D line data.

Appellant next argues that Willacy fails to inherently disclose that the distance associated with a sonar return corresponds to a distance between a position of the sonar return and a transducer array as found by the Examiner. Final Act. 6, Appeal Br. 12. Appellant considers the Examiner's inherency determination to be "conclusory." Appeal Br. 12. In response, the Examiner relies on generally well-known principles as to how sonar works to support the inherency determination. Ans. 8.

In active sonar, distance to an object is determined from the time of transmission of a sound pulse to the time a reflection of such sound pulse is received using the known speed of sound.[6] This principle is so fundamental and well-known that we would not expect a prior art reference to explicitly restate it. Again, more is required of Appellant to refute a reasonable determination and finding of inherency by the Examiner. *Spada*, *supra*; *Best*, *supra*. Appellant provides no analysis or explanation to support a belief that the claim language here refers to anything more than the fundamental principle by which sonar determines range to an object.

Appellant next argues that the prior art fails to disclose generating 3D mesh data based on the 3D point cloud, wherein the 3D mesh data is used to form a 3D image of an underwater environment. Appeal Br. 12. Appellant's Specification explains that the invention may generate 3D "mesh data" – by interferometrically processing returns from the same area of the underwater environment with two or more transducer elements to determine the angle of each return and plot the returns in 3D space to generate a 3D image. Spec. ¶ 77. Appellant does not otherwise offer an operational definition of "mesh data." Under the circumstances, we apply a broad but reasonable construction of "mesh data." *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004) (explaining that during

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[6] *https://en.wikipedia.org/wiki/Sonar* (accessed September 30, 2020).

patent examination, claims are given their broadest reasonable construction consistent with the specification). A person of ordinary skill in the art would ordinarily understand "mesh data" as data that is organized into almost any kind of structured or unstructured grid format. Using such construction, Appellant fails to distinguish how it analyzes, filters, and organizes 3D data in a manner different from that of Zimmerman. We are, thus, not apprised of error in the Examiner's findings in this regard.

Finally, Appellant criticizes the Examiner's reasons for combining the prior art to achieve the claimed invention. Appeal Br. 12. Appellant accuses the Examiner's reasoning as being "conclusory." *Id.* However, the Examiner is deemed competent to make findings, informed by his scientific knowledge, as to the motivation that prior art references provide to person of ordinary skill in the art. *In re Berg*, 320 F.3d 1310, 1315 (Fed. Cir. 2003). Absent legal error or contrary factual evidence, those findings can establish a prima facie case of obviousness. *Id.* Here, the Examiner states a first reason that applies to combining the teaching of Willacy and then gives a second reason that applies to combining the teaching of Zimmerman. Final Act. 6 (to provide a transducer array and to clean data). This reasoning is adequate to support the rejection. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring an obviousness conclusion to be based on explicit articulated reasoning with rational underpinning), cited with approval in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Appellant cites no legal authority to support a proposition that the Examiner's reasoning needs to be stated in more length or detail than what is presented in the final rejection. When, as here, the Examiner makes out a prima facie case of obviousness, the burden shifts to Appellant to come forward with evidence and/or argument supporting patentability. *In re Giannelli*, 739 F.3d 1375, 1379 (Fed. Cir. 2014). Appellant's briefing on the matter is, itself, conclusory and presents neither evidence nor persuasive technical reasoning that making the proposed combination requires more than ordinary skill or produces unexpected results. Appeal Br. 12–13; Reply Br. 3.

In view of the foregoing, we determine that the Examiner's findings of fact are supported by a preponderance of the evidence and that the Examiner's legal conclusion of unpatentability is well founded. We sustain the Examiner's rejection of claims 1, 2, 21, 23, and 36–38.

Unpatentability of
Claims 3–7, 11–20, 22, 24–28, 32–35, 39, 40, and 43
over Combinations based on Coda Octopus, Willacy, and Zimmerman

These claims depend, either directly or indirectly, from one of independent claims 1, 23, or 37 and are not separately argued. They fall with claims 1, 23, and 37. *See* 37 C.F.R. § 41.37(c)(1)(iv) (failure to separately argue claims constitutes a waiver of arguments for separate patentability).

We sustain the Examiner's rejection of claims 3–7, 11–20, 22, 24–28, 32–35, 39, 40, and 43.

CONCLUSION

Claims Rejected	§	References	Aff'd	Rev'd
1, 2, 21, 23, 36–38	103	Coda Octopus, Willacy, Zimmerman	1, 2, 21, 23, 36–38	
11–13, 32, 33, 43	103	Coda Octopus, Willacy, Zimmerman, Griffiths	11–13, 32, 33, 43	
3–7, 18, 20, 24–28, 39, 40	103	Coda Octopus, Willacy, Zimmerman, Coleman	3–7, 18, 20, 24–28, 39, 40	
14, 17, 35	103	Coda Octopus, Willacy, Zimmerman, Maguire	14, 17, 35	
15	103	Coda Octopus, Willacy, Zimmerman, Freking	15	
16, 34	103	Coda Octopus, Willacy, Zimmerman, Dubuis.	16, 34	
19	103	Coda Octopus, Willacy, Zimmerman, Coleman, Kosalos	19	
22	103	Coda Octopus, Willacy, Zimmerman, Official Notice	22	
Overall Outcome			1–7, 11–28, 32–40, 43	

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