UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/816,637	08/20/2007	Johannes Bruijns	2005P00346WOUS	1339

24737 7590 11/02/2016

PHILIPS INTELLECTUAL PROPERTY & STANDARDS
465 Columbus Avenue
Suite 340
Valhalla, NY 10595

EXAMINER
GISHNOCK, NIKOLAI A

ART UNIT	PAPER NUMBER
3715	

NOTIFICATION DATE	DELIVERY MODE
11/02/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

marianne.fox@philips.com
debbie.henn@philips.com
patti.demichele@Philips.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHANNES BRUIJNS

Appeal 2014-009904
Application 11/816,637[1]
Technology Center 3700

Before JOHN C. KERINS, STEFAN STAICOVICI, and LEE L. STEPINA, *Administrative Patent Judges*.

STAICOVICI, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Johannes Bruijns (Appellant) appeals under 35 U.S.C. § 134(a) from the Examiner's final decision rejecting claims 1, 2, 5–9, 12 and 14–16.[2] We have jurisdiction over this appeal under 35 U.S.C. § 6(b).

---

[1] According to Appellant, the real party in interest is Koninklijke Philips Electronics, N.V. Appeal Br. 1 (filed Aug. 24, 2011).

[2] Claims 3, 4, and 10 were canceled prior to the final decision, and claims 11 and 13 were canceled in Appellant's after-final amendment, filed May 31, 2011 ("May 2011 Amendment"). *See* May 2011 Amendment 4. The May 2011 Amendment was entered by the Examiner in the Advisory Action transmitted June 8, 2011 ("June 2011 Adv. Act."). *See* June 2011 Adv. Act. 1.

SUMMARY OF DECISION

We AFFIRM-IN-PART.

INVENTION

Appellant's invention relates to "a method for the prediction of the course of a (micro-) catheter within a vessel system," and "a data processing unit for the execution of the prediction method." Spec. 1, ll. 1–3.

Claims 1, 7, and 14 are independent.[3] Claims 1 and 7 are illustrative of the claimed invention and read as follows:

> 1. A method for predicting a course of a catheter between a starting location and a target location in a modeled vessel system, comprising:
>
> a) with one or more processors, defining a corridor tube within which a catheter may run from the starting location to the target location through the modeled vessel system;
>
> b) with the one or more processors, identifying an initial course center line of said corridor tube;
>
> c) with the one or more processors, defining a micro-catheter tube to estimate a shape of a micro-catheter running from the starting location to the target location through the modeled vessel system, the micro-catheter tube having an initial center line coincident with a course center line of the corridor tube and being smaller in transverse cross-section than the corridor tube;

---

[3] In an amendment filed with the Appeal Brief on August 24, 2011 (August 2011 Amendment), Appellant rewrote claim 12 in independent form. *See* Appeal Br. 22–23 (Claims App.). The August 2011 Amendment was not entered by the Examiner in the Advisory Action transmitted October 2011 ("October 2011 Adv. Act."). *See* October 2011 Adv. Act. 1. Accordingly, our analysis of claim 12 is based on claim 12 in dependent form (dependent from claim 1) as presented in the May 2011 Amendment.

d) with the one or more processors, adjusting the initial micro-catheter tube center line such that the micro-catheter tube lies within the modeled vessel system; and

e) on a display device, displaying the modeled vessel system with the adjusted micro-catheter tube.

7. An apparatus for predicting a course of a micro-catheter between a starting location and a target location in a modeled vessel system comprising a data processor programmed to:

a) define a micro-catheter tube that predicts a shape of a micro-catheter running from the starting location to the target location;

b) determine an initial micro-catheter center line of the micro-catheter tube, the micro-catheter center line including an alternating sequence of:

aa) straight-lined sections, an associated tube section of which lies in an interior of the vessel system, and

bb) curved sections, an associated tube section of which lies in the interior of the vessel system, the curved section associated tube section at least one of touching a vessel wall of the modeled vessel system turning and into a side branch of the modeled vessel system;

c) iteratively:

aa) determine a catheter corner as one of (i) an intersection of a current straight-lined section with the vessel wall and (ii) a first point on the current straight-lined section lying at a same distance from a start of said current straight-lined section as a farthest vessel wall of a side branch which the micro-catheter follows;

bb) shift a second point of the current straight-lined section that is close to the catheter corner by an initial shift vector towards the catheter corner; and

cc) introduce a transition from the current straight-lined section to a following curved section at the aforementioned shifted second point.

REJECTIONS[4]

The following rejections are before us for review:

I. The Examiner rejected claim 12 under 35 U.S.C. § 101.

II. The Examiner rejected claim 12 under 35 U.S.C. § 112, second paragraph, as being indefinite.

III. The Examiner rejected claims 1, 2, 5, 6, 12, 14, and 15 under 35 U.S.C. § 102(b) as being anticipated by Anderson (US 2002/0137014 A1, pub. Sept. 26, 2002).

IV. The Examiner rejected claims 7–9 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Anderson and Geiger (US 2004/0209234 A1, pub. Oct. 21, 2004).

ANALYSIS

Rejection I

Claim 12 recites, "[a] non-transitory computer-readable medium on which a computer program for predicting a course of a catheter is stored, said program being adapted to control a data processing device to execute a method according to claim 1." May 2011 Amendment 4.

The Examiner finds that "a single claim which claims both an apparatus and the method steps of using the apparatus is directed to neither a 'process' nor a 'machine'; but rather embraces or overlaps two different

---

[4] A rejection of claims 1, 2, 5–9, and 11–16 under 35 U.S.C. § 101 was withdrawn by the Examiner. *See* June 2011 Adv. Act. 2. A rejection of claim 13 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement, was obviated because Appellant cancelled claim 13. *See* May 2011 Amendment 4; *see also* June 2011 Adv. Act. 1.

statutory classes of invention set forth in 35 U.S.C. §101," and thus fails to recite statutory subject matter, because 35 U.S.C. § 101 "is drafted so as to set forth the statutory classes of invention in the alternative only." Final Act. 3 (citing MPEP 2173.05(p)(II)).

Appellant argues that "claim 12, being directed to an article of manufacture, [and thus] complies with 35 U.S.C. § 101." Appeal Br. 18.

We agree with Appellant because claim 12 is directed to an article of manufacture, namely, a non-transitory computer-readable medium. Although such medium has a stored computer program that controls a data processing device to execute a method according to claim 1, claim 12 does not require that the recited method steps be actually performed, and thus claim 12 is not also a method claim, as the Examiner contends. Accordingly, we do not sustain the rejection of claim 12 under 35 U.S.C. § 101.

Rejection II

Similar to Rejection I, the Examiner finds that "a single claim which claims both an apparatus and the method steps of using the apparatus is indefinite under 35 U.S.C. 112, second paragraph." Final Act. 4–5 (citing *IPXL Holdings v. Amazon.com, Inc.*, 430 F.2d 1377, 1384 (Fed. Cir. 2005); *Ex parte Lyell*, 17 USPQ2d 1548 (Bd. Pat. App. & Inter. 1990)). The Examiner concludes that claim 12 "is ambiguous because it is not sufficiently precise to provide to a person of ordinary skill in the art an accurate determination of the 'metes and bounds' of protection involved,

when a user of an apparatus also performs the claimed method of using the apparatus." *Id.* at 5 (citing MPEP 2173.05(p)(II)).

Appellant argues that "even though the article of manufacture references method claim 1, its meaning is clear and the claim is definite." Appeal Br. 18.

As discussed *supra*, claim 12 does not require that the recited method steps be actually performed, and thus claim 12 is not also a method claim, as the Examiner contends. One of ordinary skill in the art would reasonably be able to determine what is required of the computer readable medium to meet the claim. Therefore, we also do not sustain the rejection under 35 U.S.C. § 112, second paragraph, of claim 12.

Rejection III

Claim 1 recites, in part, "the micro-catheter tube having an initial center line coincident with a course center line of the corridor tube . . . adjusting the initial micro-catheter tube center line such that the micro-catheter tube lies within the modeled vessel system." Appeal Br. 20 (Claims App.). Independent claim 14 includes a similar recitation. *See id.* at 23.

The Examiner's position is that the "central line geometry" of Anderson is a tube center line. Final Act. 6 (citing Anderson, para. 90; Fig. 5, dashed line). The Examiner considers that Anderson discloses "adjusting the initial micro-catheter tube center line such that the micro-catheter tube lies within the vessel system," because Anderson discloses that "an edge routing technique with constant radius is used to construct a feature of the simulated device that may provide safe access to the blood [vessel] walls.

Id. (citing Anderson, paras. 13, 14, and 125, noting that "the simulated device fits into the body cavity or lumen path).

Appellant argues that Anderson's "[p]aragraph [0090] refers to determining the center line of the model of the vessel system and the dashed line of Figure 5 referenced by the Examiner is the central line of the vascular system, not a center line of a micro-catheter tube." Appeal Br. 11. Appellant asserts that in Anderson, "the center line of the four modeled segments are more akin to the three straight solid lines shown in Figure 5 which are initially not coincident with the vessel system model center line," and that "Anderson adjusts the four piecewise linear catheter segments whose center lines do not initially lie on the vessel system model center line, to approach the vessel system model center line," which is the opposite of the claimed adjusting step. *Id.* at 11–12.

The Examiner responds that "the center lines of both the catheter tube and the lumen of Anderson coincide," and that "appellant's assertion that Anderson does not address 'two center lines' is not required by claim(s) 1." Ans. 12. The Examiner states that "the 'simulated device backbone geometry' defining a virtual catheter is best understood to be the center line of the micro-catheter tube." *Id.* at 13 (citing Anderson, paras. 122–123).

Appellant replies that the Examiner fails to identify where Anderson discloses "adjusting the micro-catheter tube center line." Reply Br. 3. Appellant argues that "Anderson's use of a finite element method to refine the three linear segments illustrated in Figure 5 is distinctly different than starting with the micro-catheter tube initial center line coincident with the course center line and being adjusted therefrom as called for in claim 1." *Id.*

at 4. Appellant contends that paragraph 122 of Anderson discloses that a catheter can be approximated using finite elements, and that paragraph 123 of Anderson discloses that the catheter is reconstructed as a series of surfaces such as four-node or eight-node elements. Appellant asserts that "these paragraphs emphasize that the Anderson technique is very different from the technique of claim 1 in which the initial center line of the micro-catheter tube is coincident with the course center line and adjusted from there." *Id.*

We agree with Appellant because the Examiner does not adequately identify where Anderson discloses an initial center line of the micro-catheter that is coincident with a course center line of the corridor tube and then adjusting the micro-catheter tube center line, as required by the claims. As Appellant notes, paragraph 90 and Figure 5 of Anderson relate to "a central line model of a vasculature," and neither paragraph 90 nor Figure 5 of Anderson define the position of the catheter relative to the vasculature. Although Anderson discloses that "the system simulates a path which represents at least a portion of the body cavity or lumen and determines [a] fit between the geometry of the device and the geometry of the path" (*see* Anderson, para. 14), it is speculation that the fit entails coincident center lines. Rather, Anderson provides that "[a]s used herein, to 'determine the fit between the geometry of the device and the geometry of the path' refers to displaying a representation of at least a portion of the device and simulating its placement within at least a portion of the body cavity or lumen." *Id.*, para. 50; *see also id.* at Figs. 8A-1–8A-3 and the relative location of the catheter and the lumen. Neither the disclosure nor the figures of Anderson

necessarily requires coincident center lines. Nor does Anderson's changing a "curvature or 'central curve' of the backbone" of a catheter device adequately establish that the center line is initially coincident with a center line of a corridor tube and is then adjusted. *Id.*, para. 122. As such, the Examiner has not established a prima facie case of anticipation.

Accordingly, for the foregoing reason, we do not sustain the rejection under 35 U.S.C. § 102(b) of claims 1, 2, 5, 6, 12, 14, and 15 as being anticipated by Anderson.

Rejection IV

Claim 7

Claim 7 recites, in part, iteratively "determin[ing] a catheter corner . . . and introduce[ing] a transition from the current straight-lined section to a following curved section." Appeal Br. 21–22 (Claims App.).

The Examiner recognizes that Anderson fails to teach the above recited limitation, but nonetheless, relies on Geiger for this limitation, and concludes that it would have been obvious "to have each iteration step of the design of the catheter of Anderson comprise the determination of a catheter corner," based on the teachings of Geiger, "in order to avoid designing a catheter that would be 'stuck' in a sharp bend or fold in a lumen of a blood vessel." Final Act. 9–10 (citing Geiger, paras. 10, 11, 34, 35; Figs. 2a–2c).

Appellant asserts that "Geiger is concerned with defining the 'flight path,'" which "is typically a center line of the colon." Appeal Br. 13 (citing Geiger, paras. 10, 11). Appellant argues that "finding the center line of the

tubular organ does not determine a catheter corner, much less determine a catheter corner in the manner defined in step aa) of claim 7." *Id.* at 15.

The Examiner responds that "Anderson discloses adjusting a center line of a catheter from an initial location (the device is modified in an iterative way, *see* Para. 0135 of Anderson)," and that Geiger adds the "steps of iteratively shifting and applying transition to determine the centerline, using the techniques described for voxel growing." Ans. 15 (citing Geiger, para. 22). The Examiner considers that the technique of Geiger "performs the steps in claim 7 because each iteration determines a score, used to qualify the most optimal path for the endoscope." *Id.*

In reply, Appellant asserts that Geiger does not suggest "custom designing an endoscope, much less designing or adapting a medical endoscope or the physical device based on the center line of the colon or other tubular anatomical structure." Reply Br. 6. Appellant argues that paragraphs 22 and 23 of Geiger "provide no teaching or suggestion of any technique for adjusting the center line of a physical catheter or otherwise adapting or generating a custom physical catheter." *Id.*

Appellant's arguments are not persuasive, because they are not commensurate with the Examiner's rejection. Nonobviousness cannot be established by attacking the references individually when the rejection is predicated upon a combination of prior art disclosures. *See In re Merck & Co. Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Here, the Examiner uses the teachings of Geiger to iteratively shift a center line, and correctly notes that Anderson already shifts the center line of a catheter, but does not do so iteratively. *See* Ans. 15. Specifically, Anderson discloses that a user is

"able to change the material properties of the virtual catheter (or one or more segments of the catheter) in order to achieve an optimized solution (e.g., for optimal fit of the catheter within the path)." Anderson, para. 133. As such, Anderson adapts the segments of the catheter to the shape of the path followed by the catheter. Appellant does not adequately explain why Anderson's fit of the catheter within the path where the path is iteratively shifted, as taught by Geiger, does not meet the claimed limitation. Nor does Appellant adequately explain why determining the path through the corners of the vessel of Geiger as depicted, for example, in Figure 2c of Geiger, is not determining a catheter corner, as claimed. *See* Ans. 15. As such, Appellant has not persuasively shown error in the Examiner's findings and reasoning.

In the Reply Brief, Appellant also argues that Geiger is non-analogous art. Reply Br. 6.

We are not persuaded by this argument because the present invention "relates to a method for the prediction of the course of a (micro-) catheter within a vessel system," and Geiger teaches a "method for automatic local path planning such as may be utilized for virtual endoscopy and virtual colonoscopy," which "provides the endoscopist with important information prior to performing an actual endoscopic examination." *Compare* Spec. ¶ 1, *with* Geiger, paras. 3, 4. By calculating a virtual path through the system before actually entering the vessel system, Geiger is pertinent to the problem faced by the inventor of planning and preparing a catheter intervention with the help of suited modeling procedures (*see* Spec. 1) and thus, would have

been considered to be reasonably pertinent to a problem sought to be solved by Appellant. *See* Ans. 14.

For the foregoing reasons, we sustain the rejection under 35 U.S.C. § 103(a) of claim 7 as being unpatentable over Anderson and Geiger.

Claim 8

Claim 8 recites, in part,

> wherein a micro-catheter center line of a following curved section is piece by piece shifted in a direction of the initial shift vector with a shift length being [monotoniously] reduced such that the curved section associated tube contacts the vessel wall of the vessel system, wherein a following straight-lined section starts where contact to the vessel wall is lost.

Appeal Br. 22 (Claims App.).

The Examiner relies on paragraph 36 of Geiger for this limitation. *See* Final Act. 10–11.

Appellant asserts that this passage of Geiger "makes no suggestion that a curved section of a physical micro-catheter should contact the vessel wall of a vessel system," and that Anderson does not "suggest that a following straight line section start[s] where contact with the vessel is lost." Appeal Br. 15–16.

Geiger teaches a process for centering a path through a vessel (i.e., lumen) by determining when a virtual sphere collides with the wall of the vessel and the process is repeated for each point along the path to establish a center line path through the vessel. Geiger, para. 36; Fig. 4. If the catheter tube of Anderson were to be modeled using probes like Geiger's spheres, as the Examiner suggests (*see* Final Act. 11), it is not apparent how the catheter tube differentiates between curved sections and straight-lined sections of the

vessel as Geiger' spheres contact the vessel wall whether the section is curved or straight-lined. In other words, Geiger does not differentiate between a curved section where the sphere would contact the wall and a straight portion where the sphere loses contact with the wall. *See* Geiger, para. 36, Fig. 2c. The Examiner does not adequately explain how to determine when a following straight line section starts, where contact with the vessel is lost, as called for by claim 8, because all sections in Geiger, including straight-lined sections, collide with (are in contact with) the wall. Accordingly, the Examiner has not adequately established that the combined teachings of Anderson and Geiger would result in the apparatus of claim 8. Therefore, we do not sustain the rejection of claim 8.

Claims 9 and 16

The Examiner's use of the disclosure of Geiger does not remedy the deficiencies of the rejection of claims 1 and 14 based on Anderson, discussed *supra*. *See* Final Act. 9–11.

For the same reasons set forth above, the rejection of claims 9 and 16 based on the combined teachings of Anderson and Geiger is also not sustained.

SUMMARY

The rejection under 35 U.S.C. § 101 of claim 12 is reversed.

The rejection under 35 U.S.C. § 112, second paragraph, of claim 12 as being indefinite is reversed.

The rejection under 35 U.S.C. § 102(b) of claims 1, 2, 5, 6, 12, 14, and 15 as being anticipated by Anderson is reversed.

The rejection under 35 U.S.C. § 103(a) of claim 7 as being unpatentable over Anderson and Geiger is affirmed.

The rejection under 35 U.S.C. § 103(a) of claims 8, 9, and 16 as being unpatentable over Anderson and Geiger is reversed.

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