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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/850,370	08/04/2010	Jeroen D. Hol	29600/50002	9706
57726	7590	06/03/2019	EXAMINER	
MILLER, MATTHIAS & HULL LLP ONE NORTH FRANKLIN STREET SUITE 2350 CHICAGO, IL 60606			NGUYEN, CHUONG P	
			ART UNIT	PAPER NUMBER
			3646	
			NOTIFICATION DATE	DELIVERY MODE
			06/03/2019	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JEROEN D. HOL, FREERK DIJKSTRA,
HENDRIK JOHANNES LUINGE, DANIEL ROETENBERG,
and PER JOHAN SLYCKE¹

Appeal 2017-011144
Application 12/850,370
Technology Center 3600

Before BENJAMIN D. M. WOOD, BRETT C. MARTIN, and
NATHAN A. ENGELS, *Administrative Patent Judges*.

WOOD, *Administrative Patent Judge*.

DECISION ON APPEAL

¹ Appellants state that the real party in interest is Xsens Holding B.V.
App. Br. 1.

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from a rejection of claims 1–4, 6, 7, 9–15, 17, and 18. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

THE INVENTION

The claims are directed to the use of a positioning system to aid inertial motion tracking. Sole independent claim 1, reproduced below, is illustrative of the claimed subject matter:

1. An inertial motion capture method for determining a position of a segmented object, the method comprising:
 - receiving at one or more physical signal readers one or more position aiding signals;
 - determining position aiding estimates including 3D position and orientation estimates of a plurality of body segments of the object in a pre-defined coordinate system at a motion capture computing device using as input position aiding data based on the one or more position aiding signals;
 - deriving at the motion capture computing device an inertial estimate of the plurality of body segments of the object, wherein the inertial estimates and position aiding estimates exhibit a difference there between;
 - resolving the difference in body segment position estimates from the inertial estimates and the position aiding estimates at the motion capture computing device using constraints imposed by a biomechanical model by one or more of:
 - i. adjusting the estimated body segment positions,
 - ii. adjusting the estimated body segment orientations,

- iii. adjusting the estimated or predefined alignment orientation between inertial sensor and body segment-using a model of soft tissue deformations,
 - iv. performing state augmentation to account for temporal or spatial measurement errors; and
- estimating relative segment orientations without use of magnetometers.

REFERENCES

Kramer	US 6,148,280	Nov. 14, 2000
Bentley	US 7,264,554 B2	Sep. 4, 2007
Foxlin	US 7,395,181 B2	July 1, 2008

REJECTIONS

Claims 1–4, 6, 7, 9–15, 17, and 18 are rejected under 35 U.S.C. § 101 as directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more.

Claims 1–4, 6, 7, 9–15, 17, and 18 are rejected under 35 U.S.C. § 112 (pre-AIA), first paragraph,² as failing to comply with the written description requirement.

Claims 1–4, 6, 7, 9–15, 17, and 18 are rejected under 35 U.S.C. § 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

² Because Appellants' application was filed before September 16, 2012, the effective date of the amendments to 35 U.S.C. § 112 enacted by the Leahy-Smith America Invents Act (AIA), we apply pre-AIA version of the statute. Pub. L. No. 112–29, § 4(e), 125 Stat. 284, 297 (2011).

Claims 1, 4, 6, 7, 9–15, and 18 are rejected under 35 U.S.C. § 103(a)³ as unpatentable over Foxlin and Bentley.

Claims 2, 3, and 17 are rejected under 35 U.S.C. § 103(a) as unpatentable over Foxlin, Bentley, and Kramer.

ANALYSIS

Claims 1–4, 6, 7, 9–15, 17, and 18— Rejected as Directed to Ineligible Subject Matter

To determine whether a claim falls within a judicially recognized exception to patent eligibility under 35 U.S.C. § 101, we apply the two-step framework set forth in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012), and reaffirmed in *Alice Corporation Proprietary LTD. v. CLS Bank International*, 573 U.S. 208 (2014). For the first *Alice* step (Step 2A of the USPTO’s Subject Matter Eligibility Guidance as incorporated into MPEP § 2106), we determine whether the claims at issue are directed to a patent-ineligible concept such as an abstract idea, law of nature, or natural phenomenon. *Alice*, 573 U.S. 208 (citing *Mayo*, 566 U.S. at 78–79). If so, we advance to the second *Alice* step (Step 2B of the USPTO’s Subject Matter Eligibility Guidance) where “we consider the elements of each claim both individually and ‘as an ordered combination’ to determine whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application” of the otherwise patent-ineligible concept. *Id.* (quoting *Mayo*, 566 U.S. 78–79).

³ Because Appellants’ application was filed before March 16, 2013, the effective date of the amendments to 35 U.S.C. § 103 enacted by the AIA, we apply the pre-AIA version of § 103. Pub. L. No. 112–29, § 3(n)(1), 125 Stat. 284, 293 (2011).

The USPTO recently published revised guidance on applying step 2A. *See 2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Revised Guidance”).⁴ The Revised Guidance establishes a “two-prong inquiry” for determining whether a claim is directed to a judicial exception. *Id.* at 54. In prong one, we determine whether the claim *recites* a judicial exception, such as laws of nature, natural phenomena, or abstract ideas. *Id.* If so, we look to whether the claim recites additional elements that *integrate* the judicial exception *into a practical application*. *Id.* at 50. Thus, a claim is directed to a judicial exception only if the claim recites a judicial exception *and* does not integrate that exception into a practical application. *Id.*

The Revised Guidance also clarifies what constitutes an “abstract idea:” a matter will be treated as an abstract idea if it falls within the following specific groupings:

(a) Mathematical concepts—mathematical relationships, mathematical formulas or equations, mathematical calculations;

(b) Certain methods of organizing human activity—fundamental economic principles or practices (including hedging, insurance, mitigating risk); commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations); managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions); and

⁴ Available at <https://www.govinfo.gov/content/pkg/FR-2019-01-07/pdf/2018-28282.pdf>.

(c) Mental processes—concepts performed in the human mind (including an observation, evaluation, judgment, opinion). *Id.* at 52 (footnotes omitted). “Claims that do not recite matter that falls within these enumerated groupings of abstract ideas should not be treated as reciting abstract ideas” except in rare circumstances. *Id.* at 53.

In the rejection at issue, for step 2A, the Examiner determines that claim 1 is directed to an abstract idea because “it relates to comparing information and using rules to identify options [through] mathematical correlation.” Final Act. 2. For step 2B, the Examiner determines that claim 1 “does not include additional elements that are sufficient to amount to significantly more than the judicial exception because the abstract idea per se amount(s) to no more than mere instructions to implement the idea on a computer and recitation of generic computer structure that serves to perform generic computer functions (i.e., a computer with MVN studio software) that are well-understood, routine, and conventional activities previously known to the pertinent industry.”

Id. a 2–3.

Appellants respond that the Examiner “ignor[es] specific limitations” in concluding that claim 1 is directed to an abstract idea. App. Br. 3.

According to Appellants,

[T]he presently pending claims do not merely recite the performance of a known method from a time before computerized inertial motion capture was available, along with a requirement to perform it on a computerized inertial motion capture system. Instead, the claimed solution is necessarily rooted in computerized inertial motion capture in order to overcome a problem specifically arising in the realm of computerized inertial motion capture.

Id.

Under step 2A, Prong 1, we consider whether the claims recite a judicial exception. The Examiner finds that claim 1 recites a mathematical concept. Final Act. 2. But while claim 1 may include limitations that are based on mathematical relationships or require mathematical calculations or the application of mathematical equations or formulas, the Examiner does not identify any limitation that expressly *recites* a mathematical relationship, formula, equation, or calculation. Nor do we discern any such recitation. Moreover, to the extent that claim 1 does recite an abstract idea, the claim contains additional limitations that integrate the abstract idea into a practical application. Specifically, claim 1 is implemented with particular machines, such as the “physical signal readers” that receive position aiding signals, and the inertial sensors needed to “derive . . . an inertial estimate.” *See Spec.* ¶¶ 3–4.

In sum, we are not persuaded that claim 1, as well as its dependent claims 2–4, 6, 7, 9–15, 17, and 18, are directed to patent-ineligible subject matter. Accordingly, we do not sustain this rejection.

*Claims 1–4, 6, 7, 9–15, 17, and 18—
Rejected as Failing to Comply with the Written-Description Requirement*

The Examiner determines that claims 1–4, 6, 7, 9–15, 17, and 18 lack adequate written-description support because the Specification fails to describe “the relationship of the variables for estimating the body segments positions and orientations.” Final Act. 4. According to the Examiner,

Applicant fails to give any guidance in the form of an algorithm/mathematical formulation or a portion of an algorithm/mathematical formulation as to which variables to use, how they correlate or relate to one another, how are they formulated, derived, and/or combined, how the errors in

position data of various sensors are calculated and resolved, or how they are ranked in priority to estimate the body segments positions and orientations necessary such that practice of the invention could be made by one having ordinary skill in the art at the time the invention was filed.

Id.

Appellants respond that, contrary to MPEP § 2163, “the Examiner does not cite any recited element as specifically lacking written support.” Br. 4. However, the Examiner clarifies in the Answer that the specific limitations found to lack adequate written description are: (1) “using constraints imposed by a biomechanical model”; (2) “adjusting the estimated or predefined alignment orientation between inertial sensor and body segment-using a model of soft tissue deformations”; and (3) “performing state augmentation to account for temporal or spatial measurement errors.” Ans. 4. Appellants do not address these limitations in a Reply Brief.

“Adequate written description means that, in the specification, the applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the claimed invention.” *Hyatt v. Dudas*, 492 F.3d 1365, 1370 (Fed. Cir. 2007) (internal quotations, citations, and modifications omitted). “When no such description can be found in the specification, the only thing the PTO can reasonably be expected to do is to point out its nonexistence.” *Id.* The Examiner must specify which claim limitation lacks adequate support in the written description. MPEP § 2163.04(I). As noted above, the Examiner did so in the Answer. Appellants do not thereafter specify where adequate written description could be found for these limitations, despite having the opportunity to do so. Further, it is not self-evident where such written

description can be found in the Specification. Accordingly, we sustain the Examiner's rejection.

Claims 1–4, 6, 7, 9–15, 17, and 18—Rejected as Indefinite

The Examiner determines that claim 1 is indefinite because “how and in what manner an inertial estimate of the plurality of body segments of the object is derived and what information or data to be used for such derivation is unclear and not readily understood.” Final Act. 6. In particular, the Examiner is unclear whether an inertial estimate is “from an inertial sensor.” *Id.* The Examiner further explains in the Answer that “an inertial detection system is not positively claimed.” Ans. 5. Appellants respond that “inertial estimates are . . . well known to those of skill in the art.” Br. 5.

To satisfy the definiteness requirement of 35 U.S.C. § 112, second paragraph, “a patent's claims, viewed in light of the specification and prosecution history, [must] inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). The Examiner has not persuaded us that one of ordinary skill in the art would not have understood “inertial estimate” with reasonable certainty. The Specification repeatedly refers to determinations of object position by an inertial motion capture system as “estimates” of the position. *See, e.g.*, Spec. ¶¶ 4, 11, 50. Thus, the Specification indicates that an “inertial estimate” is a determination of the motion of an object using an inertial motion tracking system.

The Examiner also determines that claim 1 is indefinite because the step of “deriving . . . an inertial estimate . . . , wherein the inertial estimates,” “is unclear [whether] one inertial estimate or a plurality of inertial estimates is derived and claimed.” Final Act. 6. Appellants respond that “the singular

use being referenced is expressly directed to creating such an estimate for a number of items, which is why multiple such estimates are created and thus the plural form is later used.” Br. 5–6. We agree. Read in context, the term “deriving . . . an inertial estimate of the plurality of body segments” is best understood to mean deriving an inertial estimate from *each* of the plurality of body segments, resulting in a plurality of inertial estimates.

Finally, the Examiner determines that “it is unclear and not readily understood of what considered as a biomechanical model or a model of soft tissue deformations.” Final Act. 6. Appellants have no response to this determination. Moreover, the Specification does not expressly set forth the meanings of these terms, or otherwise render their meanings self-evident. Accordingly we sustain the Examiner’s rejection of claims 1–4, 6, 7, 9–15, 17, and 18 as indefinite.

*Claims 1, 4, 6, 7, 9–15, and 18—
Rejected as Unpatentable over Foxlin and Bentley*

Based on Appellants’ arguments, Br. 6–7, we decide the appeal of the rejection of claims 1, 4, 6, 7, 9–15, and 18 on the basis of claim 1 alone. 37 C.F.R. § 41.37(c)(1)(iv). The Examiner finds that Foxlin teaches the method of claim 1 except that the method is applied to a single body segment rather than a plurality of body segments. Final Act. 7–9 (citing Foxlin, 2:23–38, 3:34–67, 4:1–24, 4:51–5:20). The Examiner further finds that Bentley teaches “in the same field of endeavor such step of determining position aiding estimates including 3D position and orientation estimates of a plurality of body segments of the object at a motion capture computing device (i.e. PC) using as input position aiding data based on the one or more position aiding signals.” *Id.* at 9. The Examiner determines that it would

have been obvious to one of ordinary skill in the art to apply Foxlin's method to track a plurality of body segments, as Bentley teaches, "to gain the advantage of effectively improving accuracy and reliability in determining and tracking the positions and orientations of an object." *Id.* at 9–10. The Examiner explains in the Answer that Foxlin teaches tracking the movement of a human head, which is a single segment of a multi-segment body. Ans. 6. Thus, we understand the Examiner's position to be that one of ordinary skill in the art would have recognized that it is more accurate to track multiple segments of a multi-segmented body rather than a single segment of a multi-segmented body, and thus would have been motivated to apply Bentley's multi-segment tracking technique to Foxlin's tracking method.

Appellants respond that "Foxlin does not find the position of [a] segmented object, i.e., a human body, but only the position of a rigid singular body like a submarine (or a human head)." Br. 6. This argument is not persuasive, as the Examiner is relying on Bentley, not Foxlin, to teach tracking a plurality of segments. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) ("Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.").

Appellants also dispute that combining Foxlin with Bentley would have improved Foxlin's accuracy. According to Appellants, "the sole impact of the combination would be to change Foxlin to a multi-segment model," and "modeling a rigid object as a multi-segment object would *degrade* accuracy, not improve it." Br. 7. This argument misstates the Examiner's rejection. The Examiner is not proposing modeling a rigid object as a multi-segment object, but rather to apply Foxlin's method to a

plurality of segments, as taught by Bentley. Thus, this argument is also not persuasive.

Finally, Appellants assert that “nothing in *either* reference teaches the correction of *inertial* measurements for *multi*-segment object components through *position aiding*.” *Id.* Again, however, the Examiner is not relying on either Foxlin or Bentley, individually, to teach these limitations, but rather on the combination of Foxlin and Bentley. Thus this argument is not responsive to the rejection at issue. Because Appellants have not persuaded us that the Examiner erred in rejection claims 1, 4, 6, 7, 9–15, and 18 as unpatentable over Foxlin and Bentley, we sustain the rejection.

Claims 2, 3, and 17—

Rejected as Unpatentable over Foxlin, Bentley, and Kramer

Appellants do not separately argue the patentability of claims 2, 3, and 17, which ultimately depend from claim 1. Accordingly, for the reasons discussed above with respect to claim 1, we sustain the Examiner’s rejection of claims 2, 3, and 17 as unpatentable over Foxlin, Bentley, and Kramer.

DECISION

For the above reasons, we reverse the Examiner’s rejection of claims 1–4, 6, 7, 9–15, 17, and 18 under 35 U.S.C. § 101 as directed to ineligible subject matter, and affirm the Examiner’s remaining rejections.

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