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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JUSTIN D. KEARNS, RONGSHENG LI, NAVEED HUSSAIN, KAYODE T. ARIWODOLA, CHRISTOPHER L. DAVIS, JACK S. HAGELIN, and LAWRENCE E. PADO[1]

Appeal 2018-008769
Application 15/090,326
Technology Center 3600

Before JAMES P. CALVE, BRETT C. MARTIN, and LISA M. GUIJT, *Administrative Patent Judges*.

GUIJT, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–22.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] The Boeing Company ("Appellant"), the Applicant as provided in 37 C.F.R. § 1.46, is also identified as the real party in interest. Appeal Br. 1.
[2] Appeal is taken from the Final Office Action dated February 8, 2018.

THE CLAIMED SUBJECT MATTER

Claims 1, 9, and 16 are independent. Claim 9, reproduced below, is illustrative of the claimed subject matter on appeal.

> 9. A method for structural load assessment of an aircraft, the method comprising:
>
> receiving flight parameters related to at least one of a ground or flight event of the aircraft, wherein the flight parameters include data recorded by one or more sensors during the at least one ground or flight event;
>
> calculating a response load on the aircraft as a result of the at least one ground or flight event, the response load being calculated from the flight parameters and using a machine learning algorithm and a structural dynamics model of the aircraft, the machine learning algorithm being used to account for any errors in the data recorded by the one or more sensors;
>
> comparing the response load to a corresponding design load, and based at least in part on the comparison, determining a structural severity of the at least one ground or flight event on the aircraft;
>
> automatically initiating a maintenance activity requirement for the aircraft in an instance in which the structural severity of the at least one ground or flight event causes a limit exceedance state of at least one of the aircraft or at least one structural element of the aircraft; and
>
> displaying information indicating the maintenance activity requirement to a user.

THE REJECTION

I. Claims 1–22 stand rejected under 35 U.S.C. § 101 as being directed to patent ineligible subject matter.

II. Claims 1–22 stand rejected under 35 U.S.C. § 103 as unpatentable over Beale (US 2017/0017736 A1; published Jan. 19, 2017), Hanks (US 8,949,668 B2; issued Feb. 3, 2015), and Wellman (US 9,223,007 B2; Dec. 29, 2015).

OPINION

Rejection I

Appellant argues claims 1–22 as a group. Appeal Br. 9–12. We select claim 9 as the representative claim, and claims 1–8 and 10–22 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

An invention is patent eligible if it claims a "new and useful process, machine, manufacture, or composition of matter." 35 U.S.C. § 101. However, the Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: "[l]aws of nature, natural phenomena, and abstract ideas" are not patentable. *E.g., Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Supreme Court's two-step framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is "directed to." *See Alice*, 573 U.S. at 219 ("On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk."); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) ("Claims 1 and 4 in petitioners' application explain the basic concept of hedging, or protecting against risk.").

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 69 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores” (*id.* at 183 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1853))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Supreme Court held that “[a] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 176; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Supreme Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, . . . and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.” *Id.* (citing *Benson* and *Flook*); *see, e.g., id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

If the claim is “directed to” an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where “we must examine the elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221 (citation omitted). “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].”’ *Id.* (quoting *Mayo*, 566 U.S. at 77 (alterations in original)). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

The PTO recently published revised guidance on the application of § 101. USPTO, *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“2019 Guidance”).[3] Under that guidance, we first look to whether the claim recites: (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human activity such as a fundamental economic practice, or mental processes); and (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP §§ 2106.05(a)–(c), (e)–(h)). Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim: (3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)); or (4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception. *See* 2019 Guidance.

[3] Although the Examiner issued the rejection before the Guidance was published, because the document provides the PTO’s guidance for evaluating subject matter eligibility under existing law, the methodology set forth in the Guidance applies to examinations of all pending claims, including those at issue in this Appeal.

<u>Step One: Does Claim 1 Fall within a Statutory Category of § 101?</u>

Claim 9 recites a method and, thus, falls within the statutory categories of 35 U.S.C. § 101.

<u>Step 2A, Prong One: Does Claim 1 Recite a Judicial Exception?</u>

The Examiner determines that the claims recite "the abstract idea of using a machine learning algorithm to account for errors in the data received from sensors" (Final Act. 2), and further, "to [the] calculation of [an] assessment of structural load on an aircraft based on [a] flight events" by "receiv[ing] data, compar[ing] data, and initiat[ing] a requirement" (*id.* at 3).

Appellant argues that

> [t]he claimed invention, when properly characterized, is directed to an onboard structural load assessment of an aircraft during ground or flight events that accounts for errors in the data recorded by the sensors and *improves sensor technology* used in the structural load assessment by using machine learning and a structural dynamics model to increase reliability of the calculated response load. This is clearly not an abstract idea.

Appeal Br. 7 (emphasis added).

We determine that certain steps in claim 9 recite mental processes, or in other words, concepts performed in the human mind, or with pen and paper (i.e., observation, evaluation, judgment, and opinion), *and* certain other steps in claim 9 recite mathematical concepts (i.e., mathematical relationships, mathematical formulas or equations, mathematical calculations), which as set forth *supra*, are recognized to be abstract. *See* 2019 Guidance, 84 Fed. Reg. at 52.

Specifically, claim 9 *supra*, recites, in relevant part, "receiving flight parameters related to at least one of a ground or flight event of the aircraft, wherein the flight parameters include data recorded by one or more sensors during the at least one ground or flight event," which is the receipt of data. The human mind may receive data.

Claim 9 *supra*, also recites, in relevant part, calculating a response load on the aircraft as a result of the at least one ground or flight event, the response load being calculated from the flight parameters and using a machine learning algorithm and a structural dynamics model of the aircraft, the machine learning algorithm being used to account for any errors in the data recorded by the one or more sensors and "comparing the response load to a corresponding design load, and based at least in part on the comparison, determining a structural severity of the at least one ground or flight event on the aircraft." These claim limitations recite the use of mathematical concepts (i.e., a machine learning algorithm and a structural dynamics model), as evidenced by the Specification discussed *infra*. The comparison of response load to a corresponding design load also may be performed by the human mind, or by using pen and paper.

Regarding the claimed machine learning algorithm, the Specification discloses that "[i]n some implementations . . . calculating the response load includes calculating the response load using a machine learning algorithm comprising at least one of a Kalman filter algorithm or a heuristic algorithm." Spec. ¶ 7; *see also id.* ¶ 46 ("[i]n some examples, the machine learning algorithm may be or include a Kalman filter algorithm and/or a heuristic algorithm"). Wellman, of record, discloses that "[a] Kalman filter solves the general problem of estimating true values of variables/states of a linear dynamic system that is perturbed by white noise," wherein "the Kalman filter constantly adapts to noise in the system measurements and its changes from moment to moment," and further, that "[t]he Kalman filter is also known as a linear quadratic estimator (LQE)" and "an algorithm that uses a series of input measurements acquired over time," wherein "[t]he measurements contain noise (random variations in the measurements) and other errors, and the filter generates estimates of unknown system variables/states that tend to be more precise than those that would be based on a single measurement alone." Wellman 1:13–27; *cf.* Spec. ¶ 44 ("the machine learning algorithm may be trained based at least in part on example input and output data sets that may be analytically (e.g., using a numerical simulation) and/or experimentally (e.g., using flight test data) derived"). Thus, we determine that the claimed machine learning algorithm, as at least a Kalman filter, is a mathematical concept comprising mathematical relationships, mathematical formulas or equations, and/or mathematical calculations.

Regarding the claimed structural dynamics model, the Specification discloses, very generally, that "the structural dynamics model may be or include a model generated based on one or more physics laws and may be periodically updated for improvement using at least one flight test and/or flight operation data." Spec. ¶ 44. Thus, we determine that the claimed structural dynamics model, which is based on laws of physics, is a mathematical concept comprising mathematical relationships, mathematical formulas or equations, and/or mathematical calculations.

Claim 9 *supra*, further recites, in relevant part, "initiating a maintenance activity requirement for the aircraft in an instance in which the structural severity of the at least one ground or flight event causes a limit exceedance state of at least one of the aircraft or at least one structural element of the aircraft," which is an activity that may be performed by the human mind, for example, in giving a direction to a maintenance team.

Finally, claim 9 *supra*, recites, in relevant part, "displaying information indicating the maintenance activity requirement to a user," a step that may be performed by the human mind, for example, using pen and paper.

In sum, claim 9 recites an abstract idea because the claim limitations discussed *supra* recite a mental process *and* mathematical concepts.

Step 2A, Prong Two: Is There Integration into a Practical Application?

Following our Office guidance, having found that claim 9 recites a judicial exception, namely, a mental process and mathematical concepts, we are instructed next to determine whether the claim recites "additional elements that integrate the exception into a practical application" (*see* MPEP §§ 2106.05(a)–(c), (e)–(h)). *See* 2019 Guidance, 84 Fed. Reg. at 54.

Claim 9 recites, *in addition to* the mental process steps and mathematical concepts discussed *supra*, *automatically* initiating a maintenance activity. The Specification provides a definition as to the meaning of the claim term "automatically": "[i]n this regard, the system may be configured to perform one or more of its functions or operations automatically, that is, without being directly controlled by an operator." Spec. ¶ 27; *see also id.* ("[t]he system may be configured to perform a number of different functions or operations, either automatically, under direct operator control, or some combination or thereof"). The Specification also describes the "system" as including "one or more of each of a number of different subsystems (each an individual system) coupled to one another for performing one or more functions or operations," for example, with reference to Figure 1, "an approximator 102, analysis engine 104, and/or maintenance engine 106." *Id.* ¶ 29. The Specification further discloses that "the system 100 and its subsystems and/or components . . . may be implemented by various means," including "hardware, alone or under direction of one or more computer programs from a computer-readable storage medium." *Id.* ¶ 31.

Thus, we determine that automating the step of initiating maintenance activity in response to meeting a limit exceedance state is not a practical application of the abstract idea of accounting for errors in data received from sensors, but simply the generic use of system components (i.e., computing components) to perform the mental step automatically. *See* also Ans. 4–5 ("[t]he Specification describes the components of the invention in a high level of generality . . . as performing generic computer functions routinely used in computer applications") (citing Spec. ¶¶ 35, 60, 62). Claim limitations that merely include instructions to implement an abstract idea on a computer or a network of computers, or merely use a computer or a network of computers as a tool to perform an abstract idea, do not evidence the integration of an abstract idea into a practical application. *See* MPEP § 2016.05(f); *see also Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044 (Fed. Cir. 2017) (using a computer as a tool to process an application for financing a purchase).

Alternatively, we determine that automating the step of initiating maintenance activity is insignificant post-solution activity, wherein the solution is to account for errors in the data received from sensors.

Claim 9 also recites *supra*, in the preamble of the claim, that “the apparatus compris[es] a processor and a memory storing executable instructions that, in response to execution by the processor, cause the apparatus to at least” perform the claimed method steps. However, as discussed *supra*, the recitation of generic computing components, as a tool to perform the abstract idea, is not sufficient evidence of the integration of an abstract idea into a practical application.

We are also not persuaded by Appellant’s argument *supra* that the claims improve sensor technology. Rather, claim 9 merely requires the flight parameters to include data recorded by sensors. In other words, although the claims require a mathematical concept (i.e., a machine learning algorithm) to account for any errors in the data recorded by the one or more sensors, claim 9 does not require any improvement to the sensor itself. To the contrary, the Specification indicates that known sensors are utilized: “[e]xamples of suitable sensors and system include Avionics systems, Flight Controls systems, and/or other Flight Operations or Maintenance Operations systems or components thereof,” wherein “[e]xamples of suitable sensor data in addition to flight parameters may include strains and accelerations measured at key locations on the aircraft.” Spec. ¶ 40.

Thus, we determine that limitations of claim 9, which are recited in addition to the abstract idea *supra*, fail to integrate the abstract idea into a practical application of the abstract idea. In other words, claim 9 is directed to the abstract idea of assessing a structural load of an aircraft by calculating a response load as a result of a ground or flight event, using mathematical concepts (i.e., a machine learning algorithm and a structural dynamics model), wherein the machine learning algorithm accounts for errors in the input data recorded by sensors.

Step 2B: Does Claim 9 Recite an Inventive Concept?

We next consider whether claim 9 recites elements, which are *in addition to* recitations of a mental process or mathematical concepts, individually or as an ordered combination, that transform the abstract ideas into a patent-eligible application, e.g., by providing an inventive concept. *Alice*, 573 U.S. at 217–18.

As discussed *supra*, claim 9's recitation of *automatically* initiating maintenance activity using a generic computing system merely applies the judicial exception without providing significantly more. *See* MPEP § 2106.05(f) ("Use of a computer or other machinery in its ordinary capacity for . . . tasks (*e.g.*, to receive, store, or transmit data) or simply adding a general purpose computer or computer components after the fact to an abstract idea (*e.g.*, a fundamental economic practice . . .) does not provide significantly more.").

Appellant argues that

> **[compared] to conventional technologies** solely relying on flight parameters measured by sensors that may include errors to calculate the response load, **the advantages of the claimed invention include providing safety margins** to account for errors measured by the sensors . . . and **improving the reliability** of the calculated response load to more accurately determine the structure severity and diagnose the impact of the structure severity.

Appeal Br. 8 (citing Spec. ¶¶ 2–3, 47–50); *see also* Reply Br. 3. However, a recitation of the advantages of the claimed invention does not apprise us of error in our determination that *in addition to* the abstract idea recited in claim 9, there are limitations that provide an inventive concept.

Moreover, consistent with our discussion *supra*, the Examiner determines that the claimed calculations "require no more than a generic computer to perform computer functions that are well understood, routine, and conventional activities in the industry." Ans. 4. Appellant argues that the Examiner failed to provide factual support for determining that the claimed system uses generic computing functions to perform the method steps of claim 9. Reply Br. 3. However, as discussed *supra*, the Specification discloses the use of conventional aircraft systems and subsystems to apply the claimed method steps, which involve a mental process and mathematical concepts.

Finally, we note that Wellman discloses that Kalman filters are well known for use in "numerous applications in technology," wherein "[a] common application is for guidance, navigation and control of vehicles, particularly aircraft and spacecraft." Wellman 1:33–35. Due to the lack of detail provided in the Specification regarding structural dynamics models, we understand that Appellant relies on the general knowledge of one skilled in the art to understand and employ well-known structural dynamics models, as claimed.

For the reasons discussed above, we find no element or combination of elements recited in claim 9 that contains any "inventive concept" or adds anything "significantly more" to transform the abstract concept into a patent-eligible application. *Alice*, 573 U.S. at 221.

Accordingly, we sustain the Examiner's rejection of claim 9, and claims 1–8 and 10–22 fall therewith, under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter.

Rejection II

Appellant argues claims 1–22 as a group. Appeal Br. 9–12. We select claim 9 as the representative claim, and claims 1–8 and 10–22 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Regarding independent claim 9, the Examiner finds that Beale generally discloses the claimed method, except that Beale "does not describe a machine learning algorithm." Final Act. 5–6. The Examiner relies on Hanks for disclosing "using a machine learning algorithm." *Id.* at 6 (citing Hanks 7:22–42, 8:38–9:22). The Examiner determines that it would have been obvious to combine Beale's apparatus with Hank's machine learning algorithm "to process the flight data to make determinations about the maintenance activity requirements, using standard computational techniques." *Id.*

The Examiner relies on Wellman for disclosing "a structural dynamics model of the aircraft" and reasons that it would have been obvious to combine Beale's apparatus, as modified by Hanks, with Wellman's structural dynamics model "to process the flight data to make determinations about the maintenance activity requirements, using standard computational techniques." Final Act. 6.

Appellant argues that Hanks fails to disclose that "machine learning component 325 [is] used to account for any errors in the data recorded by the one or more sensors during the at least one ground or flight event," nor do

Beale or Wellman teach or suggest this claim limitation. Appeal Br. 10 (emphasis omitted).

The Examiner responds that Hanks discloses that "the machine learning component . . . account[s] for any errors in the data" (Ans. 5 (citing Hanks 8:38–9:22)), and further, that Hanks "describes the purpose of the operation to include verification of the data from . . . faulty sensors" (*id.* (citing Hanks 7:65–8:17)). The Examiner also finds that "[a]ccounting for errors in the sensor data and using a machine learning algorithm are . . . well known in the industry." *Id.* at 5–6.

Appellant replies that

> Hanks discloses that the CEP component 315 can determine whether abnormalities are due to faulty sensors, and a **separate component**, i.e., the machine learning component 325, can generate alert[s] when detecting abnormalities . . . . That is, Hanks does not teach or suggest that **the machine learning component 325 uses any machine learning algorithm to account for any errors in the data recorded by the one or more sensors** during that at least one ground or flight event.

Reply Br. 6.

We are not persuaded by Appellant's argument. As relied on by the Examiner, Beale discloses receiving flight parameters including data recorded by sensors during a ground or flight event. Final Act. 5 (citing Beale ¶ 34 (disclosing that an aircraft's usage and loads based maintenance ("ULBM") system "reliably and automatically measures sensor data to estimate structural loads")); *see also* Beale ¶ 25 (disclosing that the ULBM system "measure[s] load information from a fleet and/or corresponding fleet database while ensuring data quality, identifying questionable load events for engineer review"); *id.* ¶ 37 ("sensor 122, 124 are strain gauges that measure the physical stress applied to a component of the aircraft 116 (e.g., a landing gear assembly, etc.)").

Beale also discloses, with respect to "virtual monitoring of loads for a maintenance benefit by a ULBM system 100," applying a method to the input data (i.e., "[t]he hyper-rectangle method"), which is "very useful in both identifying extreme conditions [(i.e., an extreme engine torque event)] and in isolating corrupt results due to failed sensors." Beale ¶¶ 58, 65; *see also id.* ¶ 70 (disclosing "[u]se of [a] model status parameter to identify out of domain data . . . to ensur[e] data quality," wherein "[o]ut of domain results" include "a single sample invalid sensor input which causes a spike in virtual monitoring of loads output" and "a totally failed sensor which remained failed for an entire flight"). Thus, a preponderance of the evidence supports the Examiner's reliance on Beale for disclosing methods to account for errors in the data recorded by the sensors.

Hanks discloses that "[c]omplex event processing (CEP) may be used to consume and process multiple streams of events," wherein "[u]sing pattern detection, abstraction and modeling, the CEP system may process many events and select the most meaningful events from [the collection of events available as input to a CEP system]." Hanks 2:56–63. Hanks also discloses, with reference to Figures 2, 3, and 4, which depict "an exemplary system for use in identifying abnormal behavior in a control system" (*id.* at 2:28–33), that "[m]onitoring device 230 receives periodic sensor readings from equipment health monitoring systems" and "CEP component 315 may determine whether *abnormalities* are due to . . . faulty sensors" and "may alert an operator to any abnormal activity or data disparities" (*id.* at 7:65–66, 8:9–13 (emphasis added)). Hanks further discloses that "a machine learning component 325 augments CEP component 315 *to detect system abnormalities* outside the scope of user policies." *Id.* at 8:38–40 (emphasis added). In particular, Hanks discloses that

> [e]vents 330 are created by an event processor component 335 from a plurality of sources and routed by event processor component 335 to both CEP component 315 and a past event database 340. Past even[t] database 340 is *accessed by a learning system 345 in machine learning component 325 to determine what normal and abnormal system behavior is*, such as by identifying repeated correlations between events 330. Such identified correlations are stored in AI event correlation model 310.

Id. at 8:40–48 (emphasis added). Thus, a preponderance of the evidence supports that Examiner's finding that Hanks discloses a machine learning algorithm, and further, that Hanks discloses a machine learning algorithm used to detect system abnormalities, which accesses a past event database that may include faulty sensor data, regardless of the incorporation of the machine learning algorithm into a CEP system.

Notably, the Examiner relies on Beale, and not Hanks, for disclosing a method for accounting for errors in the data recorded by sensors during a ground or flight event. Appellant's argument also does not apprise us of error in the Examiner's reasoning *supra* that it would have been obvious to use Hank's machine learning algorithm, rather than the methods disclosed in Beale, to detect errors in the recorded sensor data with respect to ground or flight events of an aircraft to process the flight data to make determinations about maintenance activity requirements, nor does Appellant address the Examiner's alternative finding *supra* that accounting for sensor data errors and using machine learning algorithms are well-known concepts in the aircraft industry.

Appellant also argues that "Wellman discloses adjusting smoothing parameters **in order to tailor the variance estimate such that it models the structural dynamic flexure of the structure**," however, "Wellman and therefore Beale in view of Hanks and Wellman does not teach or suggest **using the structural dynamics flexure of the aircraft to calculate** the response load on the aircraft." Appeal Br. 11; *see also* Reply Br. 7.

We are not persuaded by Appellant's argument. As set forth *supra*, the Examiner relies on Beale for disclosing "calculating a response load on the aircraft as a result of . . . at least one ground or flight event, the response load being calculated from the flight parameters," as required by claim 9 *supra*. Indeed, Beale discloses "[a] system and method for an application of a virtual load monitoring of an aircraft to determine a component retirement time," wherein "[t]he system and method includes estimating component loads from aircraft state parameters." Beale, Abstract. As set forth *supra*, the Examiner relies on Wellman for disclosing a structural dynamics model of an aircraft, and reasons that it would have been obvious to use Wellman's structural dynamics model to process the flight data (or flight parameters), as disclosed in Beale, to calculate a response load, as disclosed in Beale.

The Specification does not expressly define the claim term "structural dynamics model;" the Specification merely discloses that "in some examples, the structural dynamics model may be or include a model generated based on one or more physics laws and may be periodically updated for improvement using at least one of flight test and/or flight operation data." Spec. ¶ 44. Although perhaps used for a different purpose than to calculate response load, as claimed and as argued by Appellant *supra*, Appellant does not apprise us of error in the Examiner's finding *supra* that a structural dynamics model is disclosed by Wellman. Wellman 9:9–14 (disclosing that "[i]n practice, vehicle manufacturers are reluctant to provide [vehicle structural dynamics models]," however, "weighting may be developed empirically"). Appellant's argument also does not apprise us of error in the Examiner's reasoning *supra* that it would have been obvious to use a structural dynamics model, as disclosed in Wellman, to process the flight data (i.e., calculate a response load from flight parameters), as disclosed in Beale.

Accordingly, we sustain the Examiner's rejection of claim 9, and claims 1–8 and 10–22 fall therewith, under 35 U.S.C. § 103 as unpatentable over Beale, Hanks, and Wellman.

DECISION

The Examiner's decision to reject claims 1–22 under 35 U.S.C. § 101 is AFFIRMED.

The Examiner's decision to reject claims 1–22 under 35 U.S.C. § 103 is AFFIRMED.

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