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.
14/161,747	01/23/2014	William Cherrick Schoonmaker	268790-2 (552-206US)	2358

91959 7590 11/21/2019

The Small Patent Law Group, LLC
225 S. Meramec, Suite 725
St. Louis, MO 63105

EXAMINER	
TUNGATE, SCOTT MICHAEL	

ART UNIT	PAPER NUMBER
3628	

NOTIFICATION DATE	DELIVERY MODE
11/21/2019	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):

Docket@splglaw.com
TransportationPatentCorrespondence@ge.com
john.kramer1@ge.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WILLIAM CHERRICK SCHOONMAKER,
DAVID ALLEN ELDREDGE,
JARED KLINEMAN COOPER, JOHN WELSH McELROY,
and TIMOTHY ROBERT BROWN

Appeal 2018-0005860
Application 14/161,747[1]
Technology Center 3600

Before JOHN A. EVANS, JOHN P. PINKERTON, and
MICHAEL M. BARRY, *Administrative Patent Judges*.

PINKERTON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 1, 3, 4, 6–11, 13, 15–20, and 22, which are all of the claims pending in this application. Appellant canceled claims 2, 5, 12, 14, and 21. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

---

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as General Electric Company. Appeal Br. 3.

STATEMENT OF THE CASE

Introduction

Appellant's disclosed and claimed invention is directed generally to a system for simulating performance of a mission over a route by a vehicle using route and vehicle information. Spec. ¶ 27.[2]

Claims 1, 6, and 15 are independent claims. Claim 1 is representative of the subject matter on appeal and reads as follows (with format changes and paragraph lettering added):

> 1. A system comprising at least one processor configured to:
>
> [a] simulate performance of a first mission over at least one route by a first vehicle, the at least one route comprising a track including one or more rails configured for passage thereon by a rail vehicle, the at least one processor configured to simulate the performance of the first mission using route information corresponding to one or more characteristics of the at least one route and vehicle information corresponding to one or more characteristics of the first vehicle, the at least one processor configured to determine performance characteristics for the first mission, the performance characteristics comprising at least one fuel usage characteristic evaluated for plural sections of the at least one route;
>
> [b] provide a fuel efficiency map describing fuel usage along at least a portion of the at least one route using the performance characteristics;

[2] Our Decision refers to the Final Office Action mailed June 29, 2017 ("Final") and Advisory Action mailed September 29, 2017 ("Advisory"); Appellant's Appeal Brief filed January 22, 2018 ("Appeal Br.") and Reply Brief filed May 17, 2018 ("Reply Br."); the Examiner's Answer mailed March 19, 2018 ("Ans."); and the original Specification filed January 23, 2014 ("Spec.").

> [c] determine at least one rail wear characteristic resulting for the first mission based at least on the at least one fuel usage characteristic; and
>
> [d] control tractive efforts of at least one of the first vehicle or one or more other vehicles, while said at least one of the first vehicle or the one or more other vehicles actually travel over the at least one route, said control based at least in part on at least one of the fuel efficiency map or the at least one rail wear characteristic.

Appeal Br. 27 (Claims App.).

Rejections on Appeal[3]

1. Claims 1, 3, 4, 6–11, 13, 15–20, and 22 stand rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Final 12–15.

2. Claims 1, 3, 4, 6–11, 13, 15–20, and 22 stand rejected under 35 U.S.C. § 103 as being unpatentable over Sujan et al. (US 2012/0239588 A1; Sept. 20, 2012) ("Sujan") and Kumar et al. (US 2010/0023190 A1; Jan. 28, 2010) ("Kumar"). *Id.* at 15–27.

ANALYSIS

I. Section 101 Rejection

A. Applicable Law

Section 101 of the Patent Act provides that "any new and useful process, machine, manufacture, or composition of matter, or any new and

[3] The Examiner also rejected claims 3, 4, 6–11, and 13 under 35 U.S.C. § 112(b), as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor regards as the invention. Final 11–12. However, the Examiner withdrew this rejection. Ans. 3.

useful improvement thereof" is patent eligible. 35 U.S.C. § 101. But the Supreme Court has long recognized an implicit exception to this section: "Laws of nature, natural phenomena, and abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014) (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)). To determine whether a claim falls within one of these excluded categories, the Court has set out a two-part framework. The framework requires us first to consider whether the claim is "directed to one of those patent-ineligible concepts." *Alice*, 573 U.S. at 217. If so, we then examine "the elements of [the] 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." *Alice*, 573 U.S. at 217 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 78, 79 (2012)). That is, we examine the claim for an "inventive concept," "an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Alice*, 573 U.S. at 217–18 (alteration in original) (quoting *Mayo*, 566 U.S. at 72–73).

The Patent Office recently issued guidance about this framework. *See* 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) ("Revised Guidance"). Under the Revised Guidance, to decide whether a claim is directed to an abstract idea, we evaluate whether the claim (1) recites one of the abstract ideas listed in the Revised Guidance ("Prong One") and (2) fails to integrate the recited abstract idea into a practical application ("Prong Two"). *See* Revised Guidance, 84 Fed. Reg. at 51, 54. If the claim is directed to an abstract idea, as noted above, we then

determine whether the claim has an inventive concept. The Revised Guidance explains that when making this determination, we should consider whether the additional claim elements add "a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field" or "simply append[] well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality." Revised Guidance, 84 Fed. Reg. at 56.

With these principles in mind, we first analyze whether claim 1 is directed to an abstract idea.[4]

B. Abstract Idea

The Examiner determines that the claims are directed to an abstract idea. Final 13–14. In particular, the Examiner determines claims 1, 6, and 15 "are directed to the abstract idea of obtaining performance information, analyzing it and displaying certain results of the collection and analysis" and are "described by . . . obtaining information, performing a simulation, determining performance characteristics, determining wear characteristics, and providing a fuel efficiency map." *Id.* at 13. The Examiner explains that, these claims recite limitations "similar to the idea of collecting information, analyzing it, and displaying certain results of the collection and analysis found by the courts to be abstract in *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016)." *Id.* at 14.

Appellant contends that claim 1 is directed not to an abstract idea itself or the mere obtaining of performance characteristics, but instead to "the control of tractive efforts of a vehicle." Appeal Br. 15, *see id.* at 11–16;

[4] Appellant argues claim 1 as representative of all the pending claims (hereinafter "the claims"). *See* Appeal Br. 9–16.

Reply Br. 4–5. More specifically, Appellant argues the Examiner's analysis under *Step 2A* of the *Alice/Mayo* framework ignores the control-related limitations of claim 1, which "expressly and particularly recite[] . . . the control of a vehicle based at least in part on at least one of a fuel efficiency map or at least one rail wear characteristic." Appeal Br. 12. According to Appellant, "controlling tractive efforts of a vehicle while the vehicle travels over a route as fully set forth by Claim 1 . . . . is a physical activity, not an abstract idea." Reply Br. 4; *see also* Appeal Br. 11.

The Examiner responds that although the "claims may recite a physical control operation . . . , not every claim that recites concrete, tangible components escapes the reach of the abstract-idea inquiry." Final 3 (quoting *In re TLI Commc'ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016)). In that regard, the Examiner cites several cases where the Federal Circuit concluded claims were directed to patent-ineligible abstract ideas despite reciting physical elements, such as a scanner, interface, network, database, or playing cards. *Id.* at 3–4 (citing *Alice*, 573 U.S. at 225–26); *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass'n*, 776 F.3d 1343, 1347 (Fed. Cir. 2014); *Mortg. Grader, Inc. v. First Choice Loan Serv. Inc.*, 811 F.3d 1314, 1324–25 (Fed. Cir. 2016); *In re Smith*, 815 F.3d 816, 819 (Fed. Cir. 2016). Thus, in the Examiner's view, that "claims [are] necessarily performed in the physical rather than the conceptual realm . . . is beside the point." Ans. 4 (citing *Smart Sys. Innovations, LLC v. Chicago Transit Auth.*, 873 F.3d 1364, 1373 (Fed. Cir. 2017)).

Appellant responds that "[i]n contrast to the cases listed by the Final Office Action, the present claims are not limited to computer-related

elements such as a network or database, but instead relate, among other things, to the physical movement of a vehicle along a track." Appeal Br. 13–14.

1. USPTO Step 2A, Prong One

Beginning with *Prong One* of the first step of *Alice*, we must determine "whether the claims at issue are directed to one of those patent-ineligible concepts," including the abstract ideas enumerated in the Revised Guidance. *Alice*, 573 U.S. at 217. One of the subject matter groupings identified as an abstract idea in the Revised Guidance is "mental processes—concepts performed in the human mind (including an observation, evaluation, judgment, opinion)." *See* Revised Guidance, 84 Fed. Reg. at 52, 53. The Revised Guidance explains that "mental processes" include acts that people can perform in their minds or using pen and paper, even if the claim recites that a generic computer component performs the acts. *See id.* at 52 n.14 ("If a claim, under its broadest reasonable interpretation, covers performance in the mind but for the recitation of generic computer components, then it is still in the mental processes category unless the claim cannot practically be performed in the mind.").

Limitations [a] and [c] of claim 1 recite steps that "simulate performance of a first mission over at least one route by a first vehicle . . . using route information . . . and vehicle information . . . to determine performance characteristics for the first mission . . . comprising at least one fuel usage characteristic . . . [and] determine at least one rail wear characteristic resulting for the first mission based at least on the at least one fuel usage characteristic." Considered together, these limitations recite the concept of simulating performance of an activity by determining

performance and activity information—i.e., evaluation that could be performed in the human mind or with pen and paper. Accordingly, consistent with our Office Guidance and case law, we determine that limitations [a] and [c] of claim 1 recite a mental process and, thus, an abstract idea. *See* Revised Guidance, 84 Fed. Reg. at 52; *see also, e.g.*, *Papst Licensing GmbH & Co. KG v. Xilinx Inc.*, 193 F.Supp.3d 1069, 1084, 1090–91 (N.D. Cal. 2016), *aff'd*, 684 F. App'x 917 (Fed. Cir. 2017) (concluding claims reciting "the use of a simulator to determine whether a memory test violates a set of rules" as "capable of being performed mentally or with pencil and paper" and, thus, drawn to an abstract idea); *Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA, LLC*, 635 F. App'x 914, 916–17 (Fed. Cir. 2015) (concluding claims that "screen equipment operators for impairment, selectively test those operators, and control the equipment if an impairment is detected . . . . are drawn to a patent-ineligible concept, specifically the abstract idea of testing operators of any kind of moving equipment for any kind of physical or mental impairment").

In view of the foregoing, we determine that claim 1 recites an abstract idea in the "mental processes" grouping, pursuant to the Revised Guidance. *See* Revised Guidance, 84 Fed. Reg. at 52. Thus, we determine that claim 1 recites an abstract idea.

With respect to Appellant's argument that the Examiner "overgeneralizes the claim language, which is much more tailored and specific than the mere obtaining, analyzing, and displaying," we do not agree. Appeal Br. 11, *see also id.* at 15–16 (disputing the Examiner's characterization of the claims as "allowing a train to go faster downhill" in the Advisory Action); Reply Br. 7–8. Rather, the Examiner identifies and

considers the underlying steps of claim 1 as a basis for describing and explaining the abstract idea. Final 12–14. For example, in the Final Office Action, having identified the recited abstract idea, the Examiner explains that "the concept of 'obtaining performance information, analyzing it and displaying certain results of the collection and analysis,' is described by the obtaining information, performing a simulation, determining performance characteristics, determining wear characteristics, and providing a fuel efficiency map." *Id.* at 13–14. The Examiner further explains in the Answer how the identified abstract idea maps to the particular limitations of the claims. Ans. 5–6, *see also id*. at 11 ("although Appellant submits that the claimed subject matter is not as general as the identified abstract idea, the elements identified by Appellant merely add a degree of particularity to the underlying abstract idea."). The Examiner's approach is consistent with Supreme Court and Federal Circuit precedent, which support reasonably synthesizing the claim language when identifying a recited abstract idea. *See*, *e.g.*, *Bilski*, 561 U.S. at 611 ("Claims 1 and 4 in [P]etitioners' application explain the basic concept of hedging, or protecting against risk . . . . The concept of hedging, described in claim 1 and reduced to a mathematical formula in claim 4, is an unpatentable abstract idea, just like the algorithms at issue in *Benson* and *Flook*."); *Alice*, 573 U.S. at 218–219; *Smart Sys. Innovations*, 873 F.3d at 1371 n.8 (concluding that the district court did not err in determining that claims covered the abstract concept of paying for a subway or bus ride with a credit card: "[t]he District Court here, as we have instructed, looked to the language of the claims to discern the character of the patent."). Those claim elements not addressed while

identifying the recited abstract idea have been addressed as additional limitations in *Step 2A, Prong Two* or *Step 2B* of the § 101 analysis.

Additionally, contrary to Appellant's argument that the Examiner's *Step 2A* analysis ignores the control-related limitations of claim 1 (Appeal Br. 12), the Examiner directly addresses these limitations by explaining that, although the "claims may recite a physical control operation . . . , not every claim that recites concrete, tangible components escapes the reach of the abstract-idea inquiry." Final 3–4; Ans. 4; *see also* Revised Guidance, 84 Fed. Reg. 52 n.14. Moreover, claim 1's control-related limitations are not part of the recited abstract idea, but instead are additional limitations addressed in further detail in *Step 2A, Prong Two* and *Step 2B* of the § 101 analysis.

2. USPTO Step 2A, Prong Two

Because we determine that claim 1 recites an abstract idea, we turn to *Prong Two* of *Step 2A* of the *Alice/Mayo* framework analysis and consider whether claim 1 integrates this abstract idea into a practical application. *See* Revised Guidance, 84 Fed. Reg. at 51. In doing so, we consider whether there are any additional elements beyond the abstract idea that, individually or in combination, "integrate the [abstract idea] into a practical application, using one or more of the considerations laid out by the Supreme Court and the Federal Circuit."[5] *Id.* at 54–55.

[5] We acknowledge that some of these considerations may be properly evaluated under step two of *Alice* (*Step 2B* of the Revised Guidance). Solely for purposes of maintaining consistent treatment within the Office, we evaluate them under step 1 of *Alice* (*Step 2A, Prong Two*, of the Revised Guidance). *See* Revised Guidance, 84 Fed. Reg. at 54–55.

As an initial matter, claim 1 additionally recites limitation [b], which "provide[s] a fuel efficiency map describing fuel usage along at least a portion of the at least one route using the performance characteristics." We note that this limitation, along with limitation [a]'s implied collection of route information and vehicle information, recite the type of extra-solution activity (i.e., in addition to the judicial exception) the courts have determined insufficient to transform judicially excepted subject matter into a patent-eligible application. *See* MPEP § 2106.05(g); 84 Fed. Reg. at 55, 55 n.31; *see Bancorp Servs, L.L.C. v. Sun Life Assur. Co. of Can.*, 771 F. Supp. 2d 1054, 1066 (E.D. Mo. 2011) *aff'd*, 687 F.3d 1266 (Fed. Cir. 2012) (explaining that "storing, retrieving, and providing data . . . are inconsequential data gathering and insignificant post solution activity"); *Bilski v. Kappos*, 561 U.S. 593, 612 (holding the use of well-known techniques to establish inputs to the abstract idea as extra-solution activity that fails to make the underlying concept patent eligible); *Elec. Power Grp.*, 830 F.3d at 1355 (explaining that "selecting information, by content or source, for collection, analysis, and display does nothing significant to differentiate a process from ordinary mental processes").

Claim 1 additionally requires "a system comprising at least one processor configured to," as recited in the preamble, and limitation [d], which recites that the processor is configured to

> control tractive efforts of at least one of the first vehicle or one or more other vehicles, while said at least one of the first vehicle or the one or more other vehicles actually travel over the at least one route, said control based at least in part on at least one of the fuel efficiency map or the at least one rail wear characteristic.

The Examiner determines that "[t]here is no indication that the combination of [claimed] elements improves the functioning of a computer or improves any other technology. Their collective functions merely provide conventional computer implementation." Final 15. The Examiner explains that the claims "do not recite a technical solution to a technical problem" and "do not offer an improvement in computer technology similar to the claims found eligible" in *Bascom*[6] and *Amdocs*,[7] but rather are limited to "improvements to the performance of the abstract idea itself." Ans. 10–11. The Examiner further explains that claim 1 does not recite a specific means or method that improves the relevant technology, but instead merely recites "a result because the claim broadly requires that the control is 'based on' the fuel efficiency map rather than describing what the control actually is or how the control is done." Final 4.

Appellant argues

> the control of a vehicle as recited in the independent claims . . . is not merely a result or effect of the abstract idea (e.g., the obtaining, analyzing, or displaying of performance information as asserted by the Office Action), but instead relates to specific improvements in relevant technology, such as the improved use or control of a vehicle traversing a route.

Appeal Br. 14–15.

We are not persuaded by Appellant's arguments. Instead, we agree with the Examiner that the claims do not recite an improvement in the functioning of a computer or other technology or technological field. *See*

[6] *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350 (Fed. Cir. 2016)
[7] *Amdocs (Isr.) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1300–01 (Fed. Cir. 2016)

Final 4, 15; Ans. 10–11. We see nothing in claim 1 or the Specification that suggests a technological advance or improvement. Appellant has failed to demonstrate that the operations of claim 1 invoke any asserted inventive programming, require any specialized computer hardware or other inventive computer components, i.e., a particular machine, or that the claimed invention is performed using other than generic computer components. Nor has Appellant demonstrated that the vehicle of claim 1 or the control of its tractive efforts is a meaningful limitation beyond generally linking the use of the abstract idea to a particular technological environment. Appellant asserts that the control of a vehicle as claimed amounts to the improved use or control of a vehicle traversing a route, but limitation [d] of claim 1 merely recites control of a travelling vehicle's tractive efforts based on one of a fuel efficiency map or a rail wear characteristic. Further, the portions of the Specification that discuss vehicle control do not provide any specificity as to how the vehicle is to be controlled based on a fuel efficiency map or rail wear characteristic. *See, e.g.*, Spec. ¶¶ 4, 15, 28, 42, 64, and 69. In other words, Appellant does not persuade us that the vehicle or its control based on a fuel efficiency map or a rail wear characteristic represents a technological advance or improvement over conventional vehicle control systems. Accordingly, the additional elements of claim 1 do not integrate the recited abstract idea into a practical application. *See Affinity Labs of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1262 (Fed. Cir. 2016) ("In this case, the claims are directed not to an improvement in cellular telephones but simply to the use of cellular telephones as tools in the aid of a process focused on an abstract idea. That is not enough to constitute patentable subject matter."); Revised Guidance, 84 Fed. Reg. at 55 (explaining that

courts have identified "merely us[ing] a computer as a tool to perform an abstract idea" as an example of when a judicial exception may not have been integrated into a practical application).

Thus, consistent with the Examiner's determinations, and in view of Appellant's Specification, we determine that claim 1 does not integrate the judicial exception into a practical application. In particular, we determine that claim 1 does not recite:

(i) an improvement to the functioning of a computer;
(ii) an improvement to another technology or technical field;
(iii) an application of the abstract idea with, or by use of, a particular machine;
(iv) a transformation or reduction of a particular article to a different state or thing; or
(v) other meaningful limitations beyond generally linking the use of the abstract idea to a particular technological environment.

See MPEP §§ 2106.05(a)–(c), (e)–(h).

3. USPTO Step 2B – Inventive Concept

We now consider whether claim 1 has an inventive concept, that is, whether any additional claim elements "'transform the nature of the claim' into a patent-eligible application." *Alice*, 573 U.S. at 217 (quoting *Mayo*, 566 U.S. at 78, 79). This requires us to evaluate whether the additional claim elements add "a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field" or "simply append[] well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality." Revised Guidance, 84 Fed. Reg. at 56. "Whether something is well-understood, routine, and conventional to a skilled artisan at the time of the patent is a factual

determination." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1369 (Fed. Cir. 2018).

The Examiner determines

> that the claims do not include additional elements that are sufficient to amount to significantly more than the judicial exception because the additional elements amount to nothing more than a generic computer performing generic computer function. The claims recite a generic computer performing generic computer function by reciting a tangible and non-transitory computer readable medium, and one or more processors. The claims recite generic computer functions by reciting receiving, processing, and displaying information. The claims recite well-understood, routine, and conventional activities previously known to the industry, specified at a high level of generality by controlling the vehicle.

Final 14.

Appellant argues that the additional elements of claim 1 are not well-understood, routine, and conventional at least because "the control of the vehicles is performed using the wear characteristics and/or fuel efficiency aspects recited by the claims, which are not well-understood, routine or conventional." Appeal Br. 13.

The Examiner finds that the control elements recited in the claims and specification are generic in view of paragraphs 15, 42, and 64 of the Specification. Ans. 4 (citing Spec. ¶¶ 15, 42, and 64). The Examiner explains that the claims are similar to those in *Smart Sys. Innovations*, which related to the control of a turnstile in a transit system, but were found patent-ineligible because the turnstile was generic and the claims were directed to the collection, storage, and recognition of data, i.e., an abstract idea. *Id.* at 6–7 (citing *Smart Sys. Innovations*, 873 F.3d at 1372), *see also id.* at 9.

Appellant responds that "the Examiner's Answer does not provide any of the four allowable ways of establishing that limitations are 'well-understood, routine, or conventional,'" pursuant to *Berkheimer* and the guidelines[8] issued thereafter by the USPTO. Reply Br. 7. Appellant argues that "a mere assertion that the controls are 'generic' or somehow not novel is not enough to properly support a finding that the limitations are conventional, well-understood, or routine." *Id.* at 6.

Appellant's arguments do not persuade us that the Examiner errs. As an initial matter, the Examiner's determinations that the additional computing elements are "well-understood, routine, and conventional" is amply supported by, and fully consistent with, the Specification, which describes Appellant's invention in a manner that requires no more than a general-purpose computer with generic computing elements. Spec. ¶¶ 4, 7, 70, 75–78. Additionally, contrary to Appellant's arguments, the Examiner provides sufficient evidence from the Specification to show that the control elements of the claim are no more than well-understood, routine, and conventional. Ans. 4 (citing Spec. ¶¶ 15, 42, and 64). And as discussed above, the Specification does not provide any specificity as to how the vehicle is to be controlled based on a fuel efficiency map or rail wear characteristic. *See, e.g.*, Spec. ¶¶ 4, 15, 28, 42, 64, and 69.

Further, Appellant has not established that the instant patent eligibility inquiry contains an underlying issue of fact. It is true that the court in *Berkheimer* held that "[t]he patent eligibility inquiry may contain

[8] *See* Robert W. Bahr, *Changes in Examination Procedures Pertaining to Subject Matter Eligibility, Recent Subject Matter Eligibility Decision (Berkheimer v. HP, Inc.)*, USPTO 1–5 (2018) ("*Berkheimer* Memo").

underlying issues of fact." *Berkheimer*, 881 F.3d at 1365 (quoting *Mortgage Grader, Inc.* v. *First Choice Loan Servs. Inc.*, 811 F.3d at 1325 ("[T]he § 101 inquiry '***may*** contain underlying factual issues.'")). The court also held, however, that "[w]hen there is *no genuine issue of material fact* regarding whether the claim element or claimed combination is well-understood, routine, [and] conventional to a skilled artisan in the relevant field, this issue can be decided on summary judgment as a matter of law." *Id.* at 1368 (emphasis added). Here, although Appellant asserts that certain limitations have not been shown as well-understood, routine, and conventional, Appellant does not explain specifically why these limitations are *not* well-understood, routine, and conventional, nor does Appellant identify any passages from the Specification that support their assertions. *See* Appeal Br. 13; Reply Br. 6–7. Thus, the record fails to show that any factual issues exist regarding a claim element's well-understood, routine, or conventional nature in light of *Berkheimer*.

In view of the foregoing, considering claim 1 as a whole, we determine that the additional elements recited in claim 1 do not provide "a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field." Revised Guidance, 84 Fed. Reg. at 56. Rather, these elements do no more than "simply append[] well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality." Revised Guidance, 84 Fed. Reg. at 56. Accordingly, we agree with the Examiner that claim 1 does not have an inventive concept.

4. Conclusion

Because we determine that claim 1 is directed to an abstract idea and does not contain an inventive concept, we sustain the Examiner's rejection of claim 1 under 35 U.S.C. § 101. For the same reasons, we sustain the Examiner's rejection under § 101 of independent claims 6 and 15, and the Examiner's rejection under § 101 of dependent claims 3, 4, 7–11, 13, 16–20, and 22, which are not separately argued.

II. Section 103 Rejection

A. Claims 1, 4, 6–11, and 15–20

We have reviewed the Examiner's rejection of claims 1, 4, 6–11, and 15–20 as unpatentable under 35 U.S.C. § 103 over the combination of Sujan and Kumar, and are not persuaded the Examiner has erred. Unless otherwise noted, with respect to the rejection of these claims under 35 U.S.C. § 103, we adopt as our own the findings and reasons set forth by the Examiner in the Office Action from which this appeal is taken (Final 16–27), and in the Examiner's Answer (Ans. 13–19), and we concur with the conclusions reached by the Examiner. Appellant proffers several contentions as to why the claims are not obvious in light of the cited prior art references. *See* Appeal Br. 18–24; *see also* Reply Br. 9–12. We are not persuaded by any of these arguments for the reasons provided below.

We begin our analysis with a brief overview of the Kumar reference. Kumar is directed generally to a system for determining and implementing an operating strategy for a train such that the train's operations may be monitored and controlled in order to improve performance while satisfying schedule and speed constraints. Kumar ¶ 36. In a disclosed embodiment, the

system monitors and controls speed, acceleration, and deceleration, especially in curves and track switches, to minimize a train's wheel wear and track wear. *Id.* According to Kumar, various equations may be employed to minimize a train's wheel and track wear, as well as its fuel consumption. *See id.* ¶¶ 55–65. For example, total fuel consumption *F* may be minimized based on the train's notch (throttle) command input over time *u(t)*: $\min_{u(t)} \int_0^{T_f} F\big(u(t)\big)dt$. *See id.* ¶ 58. In addition, the train's total wear rate *L*—"proportional to the combined loss rate of wheel and rail wear in (mm^3) of material at location x moving a [sic] speed v at time t"—may be minimized based in part on *u(t)*: $\min_{u(t)} \int_0^{T_f} L(x(t), v(t), u(t))dt$. Kumar ¶ 63. These equations may be used, along with others, to form an optimal control formulation such as an objective function minimized subject to certain constraints. *See id.* ¶¶ 53, 64, and 80. The optimal control function may be used in an optimized trip plan that optimizes performance components and meets trip objectives. *Id.* ¶¶ 4, 49, 53, 55, and 80. By implementing the optimized trip plan, Kumar's computerized system may control the tractive, accelerating, and braking forces of the train based on the trip objectives to optimize speed and reduce wear during operation of the train over a segment of track. *See id.* ¶¶ 12, 36, 44, 45, and 83.

In rejecting claim 1, the Examiner finds Kumar teaches, among other things: "determine at least one rail wear characteristic resulting for the first mission based at least on the at least one fuel usage characteristic." Final 18 (citing Kumar ¶¶ 57, 58, and 62–67).

Appellant argues "[t]he cited art does not teach determination of a rail wear characteristic based on a fuel usage characteristic . . . as fully set forth

by Claim 1." Appeal Br. 19. In particular, Appellant assert that because "Kumar teaches the simultaneous minimization of fuel and rail wear . . . , it is not possible for Kumar to teach determining either fuel usage or rail wear based on the other, as they are simultaneously determined in Kumar." *Id.* at 20. Additionally, Appellant assert that Kumar's disclosure of an objective function containing both fuel usage *F* and track wear *L* fails to teach the disputed limitation because "the fuel usage term and track wear term are separate factors that are determined independently (e.g., the 'F' and 'L' terms are used in separate and distinct integrals which are combined along with other terms for the minimization)." *Id.* at 21. Appellant further submits that Kumar's disclosure of optimizing a notch position does not teach solving for wear characteristic based on fuel usage. *Id.* at 22.

In response, the Examiner explains that

> that the claims recite a "fuel usage characteristic," not "fuel usage." If fuel usage is the amount of fuel used, then a fuel usage characteristic is a characteristic that describes or determines the fuel usage. In Kumar, the input u(t) represents the notch position of a locomotive. In a locomotive the notch position is a term used when describing the throttle. The amount of throttle being used determines the amount of fuel being used. More throttle means more fuel, and less throttle means less fuel. Therefore, u(t) has been mapped to the fuel usage characteristic in the claim because it determines the fuel usage.

Ans. 14. Accordingly, the Examiner finds Kumar teaches the disputed "determine" limitation in view of its "Minimize total wear" equation, which "teaches determining rail wear (L) based on a fuel usage characteristic (u(t))." *Id.* (citing Kumar ¶ 63).

Appellant respond that paragraph 63 of Kumar "does not show an 'equation,' but instead merely shows a function that may be minimized," and

"the Examiner's Answer provides no explanation regarding how the function of [0063] may be solved or otherwise used to determine 'rail wear(l)' based on u(t)." Reply Br. 9.

Appellant's arguments are not persuasive because the arguments are not commensurate with the scope of the claim and do not fully appreciate the teachings and suggestions of Kumar, which satisfy the disputed limitation. As an initial matter, we agree with the Examiner that claim 1's "fuel usage characteristic" broadly, but reasonably encompasses Kumar's function *u(t)*—notch (throttle) command input over time—because it is a determinant of fuel usage, such that a change in a train's notch (throttle) position will yield a change in fuel usage. *See* Ans. 14 (citing Kumar ¶ 58), *see also id.* ("More throttle means more fuel, and less throttle means less fuel."). This is consistent with Appellant's Specification, which does not provide a special definition of "fuel usage characteristic" (*see* Spec. ¶ 28) and, in fact, confirms the Examiner's asserted relationship between fuel usage and throttle (*see id.* ¶ 30, providing a table showing that as "average throttle" increases, "fuel used" increases). We also agree with the Examiner that Kumar's total wear rate *L*, which is proportional to the combined loss of wheel and rail wear, is a "rail wear characteristic" at least because of its relation to rail wear. This is consistent with Appellant's Specification, which does not provide a special definition of "rail wear characteristic," but instead merely provides non-limiting examples of the term. *See, e.g.*, *id.* ¶ 31. Contrary to Appellant's assertions, although the "rail wear characteristic" may be "rail wear" itself, the claim term is not so limiting and also reads on a variable such as Kumar's total wear rate *L*, which accounts for rail wear. Therefore, we agree with the Examiner that Kumar's "Minimize total wear"

equation— $\min_{u(t)} \int_0^{T_f} L(x(t), v(t), u(t))dt$—minimizes the total wear rate *L*—a "rail wear characteristic"—based in part on *u(t)*—a "fuel usage characteristic." *See* Kumar ¶ 63. Consistent with the Examiner's findings, Kumar also discloses that this equation may be used in an optimal control formulation (such as an objective function minimized subject to certain constraints) for creating an optimized trip plan that optimizes performance components and meets trip objectives for controlling a train. *See, e.g.*, *id.* ¶¶ 49, 53, 64, 80, 83, and 103. These disclosures would have suggested to one of ordinary skill in the art that by using the "Minimal total wear equation," a rail wear characteristic (Total wear *L*) for a mission would have been "determine[d]" based on a fuel usage characteristic (*u(t)*). Additionally, contrary to Appellant's assertions, one of ordinary skill in the art would have understood "how the function of [0063] may be solved or otherwise used to determine 'rail wear (L)' based on u(t)" (Reply Br. 9). *See KSR*, 550 U.S. at 418 (explaining that an obviousness analysis can take account of the inferences and creative steps of a person of ordinary skill in the art); *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006) (explaining that basic principles unlikely to be restated in cited references are considered as included in the prior art).

Appellant further argues that Kumar does not teach "the determination and control of a vehicle," but Appellant does not explain why beyond the reasons advanced for the "determine" limitation. Appeal Br. 19, *see also id.* at 22, 23; Reply Br. 9. As an initial matter, we are not persuaded of error for the same reasons as those discussed above with respect to the "determine" limitation. Moreover, because Appellant's argument does not specifically point out how the claim language at issue ("control tractive efforts of . . . the

first vehicle") is patentably distinguishable from the cited disclosure of the references, we are not persuaded because the argument amounts to a general allegation that the claims define a patentable invention. *See* 37 C.F.R. § 41.37(c)(1)(vii) (noting that an argument that merely points out what a claim recites is unpersuasive); *see also In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011) ("[T]he Board reasonably interpreted Rule 41.37 to require more substantive arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art.").

Additionally, Appellant's argument is not responsive to the Examiner's rejection, which relies on the combination of Sujan and Kumar, not Kumar alone, to teach or suggest claim 1. *See* Final 16–18. One cannot show non-obviousness by attacking references individually when the rejection is based on a combination of references. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *see also In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Claim 1 recites, in relevant part, a processor configured to

> control tractive efforts of at least one of the first vehicle or one or more other vehicles, while said at least one of the first vehicle or the one or more other vehicles actually travel over the at least one route, said control based at least in part on at least one of the fuel efficiency map and the at least one rail wear characteristic.

The Examiner finds, and Appellant does not rebut, that Sujan teaches a fuel efficiency map. Final 17 (citing Sujan ¶ 26). The Examiner additionally finds that Kumar teaches or suggests the concept of controlling the tractive efforts of a vehicle based at least on a rail wear characteristic. *See id.* at 18 (citing Kumar ¶ 83). The Examiner concludes it would have been obvious to

include Kumar's teachings in the system of Sujan

> since the claimed invention is merely a combination of old elements in the art of route planning, and in the combination each element merely would have performed the same function as it did separately, and one of ordinary skill in the art would have recognized that the results of the combination were predictable.

Final 18. The Examiner also reasons that the proposed combination would provide "improved functionality to manage rail specific parameters along the route." *Id.* Appellant does not persuade us that the Examiner's findings, reasoning, or conclusion are erroneous.

Accordingly, for the reasons provided above, we sustain the Examiner's rejection of claim 1 under 35 U.S.C. § 103. For the same reasons, we sustain the Examiner's § 103 rejection of independent claims 6 and 15, and the Examiner's § 103 rejection of dependent claims 4, 7–11, and 16–20, which are not separately argued.

B. Claim 3, 13, and 22

Claim 3 recites, in relevant part,

> wherein the at least one processor is configured to determine a portion of fuel consumed for a curved section of the track attributable to a curvature in the curved section of the track using a proportion of resistance due to the curvature to a total resistance, wherein the total resistance is for the curved section of the track.

Appeal Br. 28 (Claims App.). In finding Kumar teaches this limitation, the Examiner cites Kumar's disclosures that fuel consumption is a trip/mission performance component and that total wear *L* is being determined based on the radius of curvature *R*. Final 19 (citing Kumar ¶¶ 64–67, 80).

Appellant argues

> the mere use of a radius in determining rail wear does not teach anything with respect to the proportion of resistance used as claimed or determining an amount of fuel consumed that is attributable to the curvature, let alone the determination of a rail wear characteristic using the fuel consumed that is attributable to the curvature.

Appeal Br. 24.

In response, the Examiner maintains that Kumar teaches the disputed limitation, explaining that "Kumar discusses throughout the reference segmentation of routes" and "[b]oth fuel usage and rail wear equations are integrated over the travel time of the route to account for each segment of the route." Ans. 20. The Examiner additionally cites paragraphs 68 and 72 of Kumar as describing a "cant deficiency" formula that accounts for "rail wear due to the radius of a particular curve" and is applied to each segment of a route. *See id.* (citing Kumar ¶¶ 68, 72).

Appellant respond that paragraph 68 of Kumar "merely teaches use of 'useful surrogate for the exact rate of wear in curved track . . . with wear defined in terms of a cant deficiency.'" Reply Br. 12 (quoting Kumar ¶ 68 (internal quotation marks omitted)). Accordingly, Appellant argues that "[s]uch a cant deficiency does not teach, for example, determining a portion of fuel consumed attributable to curvature, or, as another example, using a proportion of resistance due to curvature to total resistance as fully set forth by Claim 3."

We are persuaded by Appellant's arguments that the Examiner erred. Paragraphs 64 through 66 of Kumar describe an objective function based on the minimization of the total wear rate L and the total fuel consumption F, subject to adjoined constraints such as a fuel consumption limit. Kumar

¶¶ 64–66. Paragraph 67 of Kumar discloses that total wear rate *L* may be determined based in part of the radius of curvature of the track. *Id.* ¶ 67. Paragraph 80 of Kumar discloses that the optimal control function may be amended to consider certain objectives, such as reducing emissions or wheel and track wear, wherein trip/mission performance components may include, for example, fuel consumption and wheel or track wear. *Id.* ¶ 80. Paragraphs 68 and 72 of Kumar describe a "cant deficiency" formula that accounts for the radius of curvature of a track and may be used to determine wear cost through a curved track segment. *Id.* ¶¶ 68, 72. But the Examiner has not persuasively shown—nor do we determine—that any of the cited disclosures of Kumar teach or suggest "determin[ing] a portion of fuel consumed . . . attributable to a curvature in the curved section of the track" or "using a proportion of resistance due to the curvature to a total resistance." Nor does the Examiner cite Sujan or otherwise articulate an obviousness rationale to cure this deficiency. *See* Final 16–19.

Accordingly, on this record, we are constrained to find the Examiner erred because the Examiner has not shown that the combination of Sujan and Kumar teaches or suggests the disputed limitation of claim 3 and, therefore, that the combination of Sujan and Kumar renders claim 3 obvious under 35 U.S.C. § 103. Thus, we do not sustain the Examiner's rejection under § 103 of claim 3. For the same reasons, we do not sustain the Examiner's rejection under § 103 of claims 13 and 22, which recite similar limitations.

CONCLUSION

We affirm the Examiner's rejection of claims 1, 3, 4, 6–11, 13, 15–20, and 22 under 35 U.S.C. § 101.

We affirm the Examiner's rejection of claims 1, 4, 6–11, and 15–20 under 35 U.S.C. § 103.

We reverse the Examiner's rejection of claims 3, 13, and 22 under 35 U.S.C. § 103.

Because we affirm at least one ground of rejection with respect to each claim on appeal, the Examiner's decision is affirmed. *See* 37 C.F.R. § 41.50(a)(1).

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). *See* 37 C.F.R. § 41.50(f).

In summary:

Claims Rejected	**35 U.S.C. §**	**Basis**	**Affirmed**	**Reversed**
1, 3, 4, 6–11, 13, 15–20, 22	101	Eligibility	1, 3, 4, 6–11, 13, 15–20, 22	
1, 3, 4, 6–11, 13, 15–20, 22	103	Sujan, Kumar	1, 4, 6–11, 15–20	3, 13, 22
Overall Outcome			1, 3, 4, 6–11, 13, 15–20, 22	

AFFIRMED