

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUM INDUSTRIAL TECHNOLOGY, INC.,
Petitioner,

v.

AMSTED RAIL COMPANY, INC.,
Patent Owner.

IPR2023-00540

PATENT NO. 10,137,915

ISSUED: NOVEMBER 27, 2018

**TITLE: SYSTEM AND METHOD SYSTEM AND METHOD FOR
DETECTING OPERATIONAL ANOMALIES IN TRAIN CONSISTS
AND RAILCARS**

EXHIBIT 2010

**DECLARATION OF MICHAEL I. SHAMOS, PH.D. IN SUPPORT
OF PATENT OWNER'S REVISED MOTION TO AMEND REPLY**

AMSTED 2010
IPR2023-00540

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1. I, Michael I. Shamos, declare as follows in connection with the proceedings identified above.

I. INTRODUCTION AND QUALIFICATIONS

2. I have been retained as an expert on behalf of Patent Owner to provide technical analysis and opinions relating to the Petition for *Inter Partes* Review (“Petition,” Paper 1) filed by Hum Industrial Technology, Inc. (“Hum” or “Petitioner”) challenging the validity of Claims 1, 21-30, 36, and 37 (the “Challenged Claims”) of U.S. Patent No. 10,137,915 (“the ’915 Patent” or “the Patent”). I have also been asked to provide opinions relating to the allegations presented in Petitioner’s Opposition to Patent Owner’s Revised Motion to Amend (“Opp’n,” Paper No. 27), which itself is responsive to Patent Owner’s Revised Motion to Amend (“RMTA,” Paper No. 23).

3. I am aware of contemporaneous litigation involving the parties in a case styled *Amsted Rail Company, Inc. v. Hum Industrial Technology, Inc. and Brett Wilson*, 4:22-cv-00445-AGF (E.D. Mo.) (the “Litigation”).

4. I previously submitted four declarations in this matter. The first, “Declaration of Michael I. Shamos, Ph.D. on Behalf of Patent Owner,” was dated May 15, 2023 (“Shamos 1,” EX2001). My background, qualifications and compensation were set forth in ¶¶ 4-14 and 21-22 of Shamos 1. The legal principles I was asked to follow were contained in ¶¶ 25-33 of Shamos 1. The

characterization of a POSITA appears in ¶¶ 34-39 of Shamos 1. The second was a “Declaration of Michael I. Shamos, Ph.D. in Support Of Patent Owner’s Response,” dated November 2, 2023 (“Shamos 2,” EX2006). The third was a “Declaration of Michael I. Shamos, Ph.D. in Support Of Patent Owner’s Motion to Amend,” dated November 2, 2023 (“Shamos 3,” EX2008). Additional legal principles I was asked to follow were contained in ¶¶ 14-17 of Shamos 3. The fourth was a “Declaration of Michael I. Shamos, Ph.D. in Support of Patent Owner’s Revised Motion to Amend,” dated March 8, 2024 (“Shamos 4,” EX2009).

5. The statements made and opinions provided in this Declaration are based on my own personal knowledge and, if called as a witness, I could and would testify in a manner consistent with the material in this Declaration.

6. In this Declaration, all emphasis has been added unless otherwise noted.

II. MATERIALS CONSIDERED

7. In preparing this Declaration, I have considered all the materials filed through the date of this Declaration in this proceeding and any other materials cited in this Declaration.

8. I have also relied on my education, skill, training, and experience in the relevant fields of technology. I have further considered the viewpoint of a person of ordinary skill in the art (“POSITA”) at the time of the invention of the ’915 Patent.

9. I reserve the right to supplement my opinions as expressed in this Declaration to address any new information obtained in the course of this proceeding, or based on any new positions taken by Petitioner.

III. SUMMARY OF MY OPINIONS

10. The following table summarizes the prior art grounds of challenge (“Grounds”) raised in the Opp’n:

Grd.	Sec.	References	Challenged Claims
1	§ 103	Armitage and Barone	38, 40, 42, 43, 45-48
2	§ 103	Armitage, Barone and Leitel	38, 40, 42, 43, 45–48
3	§ 103	Armitage, Barone, LeFebvre, and Leitel	39
4	§ 103	Armitage, Barone, Leitel, and Winfree	41, 44
5	§ 103	LeFebvre, Barone, and Armitage	38, 39, 40, 42, 43, 45-48
6	§ 103	LeFebvre, Barone, Armitage, and Leitel	38, 39, 40, 42, 43, 45–48
7	§ 103	LeFebvre, Barone, Armitage, and Winfree	41, 44

11. Petitioner also asserts in the Opp’n that Substitute Claim 43 lacks written description and that Substitute Claims 38, 43, 46 and 47 are indefinite.

12. After a review of the Substitute Claims and the alleged prior art asserted by Petitioner, it is my opinion that the Substitute Claims are not invalid under any of Petitioner’s arguments. My opinions, and the bases therefor, are detailed throughout this Declaration.

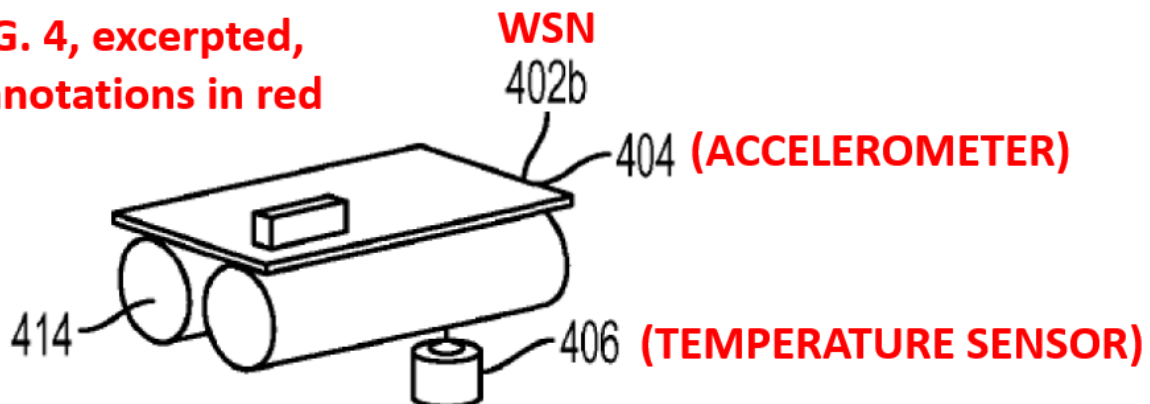
IV. SUBSTITUTE CLAIMS 38-48 COMPLY WITH §112

A. Substitute Claim 43 Is Adequately Described

13. I refer here to Substitute Claim 43 as amended.

14. Petitioner states, incorrectly, that the specification does not describe an embodiment including two sets of detectors as claimed. Opp’n, 2. That is a bald negative statement not backed up by any demonstration or reasoning. On the contrary, the support cited in the RMTA describes a wireless sensor node WSN 104 (labeled 402b in Fig. 4, below), which includes both an accelerometer 404 and a temperature sensor 406. EX1001, 6:28-36; see also *id.*, 5:33-35.

**FIG. 4, excerpted,
annotations in red**



The specification further describes that the WSN temperature is monitored only when the railcar is moving (e.g. EX1001, Fig. 11, 14:51-56), while other detectors are enabled once a critical speed has been reached (e.g. EX1001, 10:55-12:51 (referring to Fig. 10)). Cited Fig. 12 depicts “a generalized model for implementation of the data analysis portion of a WSN 104,” with multiple sets of

detectors, e.g., an Accelerometer 404 and various Feature Detectors 1206, 1212, 1218. EX1001, 3:1-3, Fig. 12.

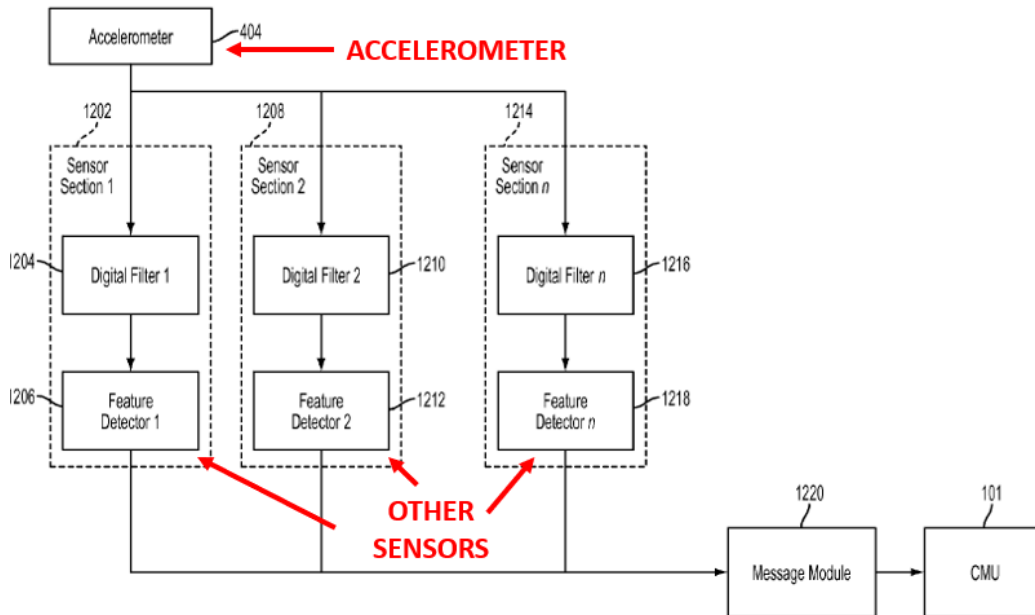


FIG. 12

Therefore, it is my opinion that the written description shows to a POSITA that the inventors had possession of the invention of Substitute Claim 43.

B. Substitute Claims 38, 43, 46, and 47 Are Not Indefinite

15. I point out the clear contradiction in Petitioner's positions that claims 38, 43, 46 and 47 are invalid for indefiniteness, yet somehow Petitioner finds them sufficiently understandable to mount an obviousness challenge.

1. Claims 38, 46, and 47: "one of the accelerations"

16. These claims recite tri-axis sensors. These sensor measure accelerations along three axes. *See, e.g.*, EX1001, 11:28-12:51 (longitudinal, vertical, and lateral axes). Acceleration is a vector, requiring measurements along

three coordinates. It is plain that “one of the accelerations” refers to one of the three acceleration measurements (longitudinal, vertical, and lateral). Therefore, it is my opinion that the term “one of the accelerations” is not indefinite because the specification informs a POSITA about the scope of the invention.

17. Furthermore, the term “accelerations” is used multiple times in the specification to refer to these directional accelerations. *See, e.g.*, EX1001, 9:15-17 (the WSN 104 measures accelerations and temperature); 14:10-14 (referring to “vertical accelerations”). “Accelerations” is used in the specification and the Substitute Claims according to its plain and ordinary meaning.

2. Claims 38, 46, and 47: “a plurality of detectors respectively coupled to the plurality of filters”/“a respective one of a plurality of different railcar conditions”

18. In attacking these limitations as indefinite, Petitioner raises irrelevant question regarding “correlations” that would ostensibly puzzle a POSITA. Opp’n, 3. I note that the term “correlation” does not appear anywhere in the Patent or the claims including the Substitute Claims. Petitioner seems to hang its hat on the word “respectively.” A POSITA would understand from Fig. 12 (reproduced above at ¶14) that each sensor is associated with a filter, which is the plain meaning of “respectively.” There is no confusion as to the meaning of these limitations.

**V. SUBSTITUTE CLAIMS 38-48 ARE PATENTABLE OVER THE
PRIOR ART OF RECORD**

19. I am not aware of any prior art that would anticipate or render obvious proposed Substitute Claims 38-48.

A. Winfree Is Not Analogous Art

20. Petitioner effectively argues that Winfree is analogous art simply because it “teaches a filter for mechanical waves from an accelerometer entering a sensor.” Opp’n, 4-5. This is the epitome of hindsight. Petitioner apparently searched for mechanical filters over a wide collection of fields of endeavor, and hit on Winfree, which uses filters for an entirely different purpose than does the Patent, namely, to protect the sensor from damage (EX1008, 2:30-34) and to eliminate dependence on elastomers (*Id.*, 2:34-36). Even if Winfree were in the same field of endeavor, which Petitioner concedes it is not, a POSITA would not have sought to use its teachings because it is directed at a different problem.

B. Petitioner Provides No Adequate Motivation To Combine

21. For limitation 38(c)(i), Petitioner says it would be an obvious duplication of parts to combine Armitage with the alleged knowledge of a POSITA. Opp’n, 10. What is required, however, is not mere duplication of parts. Different filters are needed on each axis each axial sensor detects different events. E.g., EX1001, 11:28-39 (longitudinal impact), 11:52-67 (vertical extreme vehicle dynamics), 12:36-51 (lateral hunting). Thus, this limitation is not a mere duplication

of parts for determining the same condition, but rather three ways to detect different railcar conditions.

22. There is also no motivation to combine Armitage with Leitel to filter data into three distinct outputs, each corresponding to an axis, as Petitioner claims. Opp’n, 14-15. Instead, Armitage teaches away from Petitioner’s asserted combination because it teaches monitoring only along the z-axis and ignoring data from any other axis to achieve best results. EX1006, [0045] (“At high sampling rates of the accelerometer, the sampling only occurs for a portion of a wheel rotation, and radial acceleration or vibration (x-axis or y-axis) data could be ignored. Ignoring radial acceleration can allow for gravity and wheel balance effects to be minimized in the processing of vibration data for the wheel assemblies or wheels.”)

23. Petitioner is incorrect in asserting at Opp’n, 9, that Armitage does discourage filtering along the three axes. On the contrary, it teaches that sampling should only occur for a portion of the wheel and that “[i]gnoring radial acceleration can allow for gravity and wheel balance effects to be minimized.” EX1006, [0045]. Thus, Armitage teaches that more accurate results can be achieved when monitoring is only done along one axis, even if a three-dimensional accelerometer is used.

24. Petitioner tries to justify that a POSITA would have been motivated to combine Barone’s electronic frequency filters with Armitage’s system because

Barone's filtering system was well-known and would improve data monitoring.

Opp'n, 11; EX1003, ¶¶44-45. However, Petitioner fails to explain why Armitage, a provisional of which was filed three years after Barone was published, did not adopt Barone's supposedly well-known and superior filtering methods "to remove unwanted data and/or amplify relevant accelerations data to accurately predict anomalous conditions and avoid false or inaccurate data processing." This is evidence of lack of motivation to combine.

25. Petitioner's arguments relating to LeFebvre actually point in the opposite direction than that intended by Petitioner. LeFebvre and the '915 Patent share an inventor in common. Petitioner does not attempt to explain why it took that inventor nearly ten years to invent the disclosures in the '915 Patent if a POSITA would have been so motivated to combine the allegedly well-known concepts in Petitioner's four other references with LeFebvre.

C. Petitioner's Characterization of What a POSITA Would Have Known Is Purely Speculative

26. For Substitute Claim 43, Petitioner provides no support for or analysis of its assertions about what would be obvious to a POSITA. Opp'n 21. Petitioner says it would be obvious to include a detector that is only enabled when the railcar is moving to save power. However, some other mechanism would have to be provided to turn the detector on and off, and that mechanism would require power.

27. Petitioner does not explain why detections “when the railcar is stopped or moving at a low speed” are not needed. Indeed, having a sensor that is “always enabled when the railcar is moving” as provided in Claim 43 is contrary to Petitioner’s assertion that detections “when the railcar is ... moving at a lower speed” are not needed. Petitioner’s argument instead suggests that both detectors should have speed thresholds, which would render Claim 43 nonobvious.

D. Dependent Claims 39-42, 44-45, and 48 Are Not Obvious

28. Petitioner subtly tries to shift the burden to the Patent Owner to show that claims 39-42, 44-45 and 48, are not obvious over Petitioner’s own prior art, alleging that “PO has not identified any features of these claims that patentably distinguish the prior art.” Opp’n, 23. I am informed that it is Petitioner’s burden to show obviousness, not Patent Owner’s burden to prove non-obviousness.

29. Petitioner fails to meet its burden because it does not advance any specific arguments with respect to dependent claims 39-42, 44-45 and 48 beyond what was previously presented in its Petition and discussed with respect to Claim 38. Thus, for the reasons discussed above, Petitioner has not shown these dependent claims to be obvious.

VI. CONCLUDING STATEMENT

30. Relying on my education, experience, skill, and training in the relevant field of art, and after reviewing the materials identified above, it is my opinion that

the Substitute Claims find written description support in the '915 Specification and are not indefinite. Further, the Substitute Claims are patentable over the prior art applied in the Opposition.

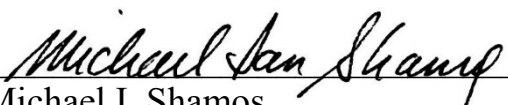
31. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination remotely within the United States during the time allotted for such cross-examination at a time and place agreed by counsel.

32. I reserve the right to supplement my opinions in the future to respond to any arguments that Petitioner raises and to take into account new information as it becomes available to me.

33. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

RMTA Declaration of Michael I. Shamos
U.S. Patent 10,137,915

Executed May 10, 2024 at Pittsburgh, PA.


Michael I. Shamos