

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

Case IPR2023-00538
Patent No. 9,365,223

Before JAMES P. CALVE, KEVIN W. CHERRY, and MICHAEL L. WOODS,
Administrative Patent Judges.

**DECLARATION OF STEVEN RICCA
IN SUPPORT OF PETITIONER'S REPLY TO PATENT OWNER'S
RESPONSE**

1. I, Steven Ricca, hereby declare that the following is true and correct. I previously provided a declaration filed as Ex. 1003 in support of Paper No. 1, Petition for *Inter Partes* Review, and my testimony from that first Declaration remains the same. I am competent to make this Declaration based upon my personal knowledge and technical expertise, which I addressed in my first Declaration. If called to testify, I could and would testify honestly, under oath, to the matters set forth herein.

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

3. In the Decision Granting Institution of *Inter Partes* Review (Paper No. 15) (“Institution Decision”), the Board correctly found that “no express claim construction is necessary for any claim terms.” Decision, 16. Patent Owner proposed a construction of “housing” as “an enclosure,” which the Board correctly declined to adopt.

4. I disagree with Patent Owner’s expert, Mr. Shamos, that the term “housing” means “an enclosure.” EX2010, ¶ 17. “Housing” is a broad term, and its plain and ordinary meaning is not limited to an “enclosure.” Additionally, the specification of the ’223 Patent clearly indicates that the “housing” is not limited to any particular configuration.

5. In my experience, the plain and ordinary meaning of “housing” is “one or more parts that covers, encloses, supports, or protects other components.” The purpose of a housing is to support and protect components, including delicate electronic components. Housings have been used to support and protect electronic components for as long as such components have existed; they allow for easier handling of electronic components, keep such components in place, and protect components from debris and damage. In the context of a railcar, which is outdoors and subject to a wide variety of weather conditions (e.g., wind, dust, rain, and snow) and physical impacts, a PHOSITA would understand that a housing serves to protect components from exposure to the harsh outdoor environment.

6. A PHOSITA would understand that the “housing” of the ’223 Patent is not limited to any particular configuration. The specification states that the notes “may be housed in *alternative housings* or built into the railcar itself. In one such embodiment, notes can be built into the form of an adapter pad similar to the type shown in U.S. Pat. Nos. 7,698,962 and 7,688,218...which could be adapted for use with the present invention.” EX1001, 15:18–24 (emphasis added). The specification does not provide any guidance about how to select an “alternative housing,” beyond referring to the two LeFebvre patents. But in my opinion, no guidance is required because selecting an appropriate housing is routine, predictable, and well within the ability of a PHOSITA. Many different types of

housings—in a variety of shapes, sizes, and materials—were known in the art, and a PHOSITA would have been able to select an appropriate housing for use in a railcar monitoring application.

7. Additionally, the specification of the '223 Patent teaches the housing may be filled with potting material to protect the components from harsh railroad environments.

“After the various components are installed within the housing 14 as described below, a potting material (not shown) is provided through openings in the housing 14 to maintain, encapsulate and environmentally seal the components within. Any suitable electrical potting material capable of protecting the electric circuitry and components from the harsh railroad environment can be used, where harsh weather, UV exposure, humidity, vibration, mechanical impact, thermal shocks and abrasion might occur while the device is in operation. Such materials include epoxies, polyurethanes and silicone compounds. A flexible urethane suitable for electrical use and through which wireless signals of the frequencies to be used can be transmitted is preferred.”

EX1001, 4:10–22. A PHOSITA would understand that potting material would fill most or all of the empty space within the housing, and would support and protect the components in the same way as the flexible, resilient polymer adapter pads disclosed by LeFebvre. Electronic components encased in potting material are generally not removable from the housing.

8. I also disagree with Mr. Shamos’s argument that LeFebvre fails to “predict potential or imminent failures based on a statistical analysis of said collected data”

as required by claim 5. *See* EX2010, ¶¶ 37–44.

9. In my experience, the plain and ordinary meaning of “statistical analysis” is quite broad: it is a branch of mathematics dealing with the collection, analysis, interpretation, and presentation of masses of numerical data. A PHOSITA would understand that many of LeFebvre’s disclosed methods involve statistical analysis. For example, paragraph [0058] of LeFebvre describes monitoring “long term trends to link to bearing condition.” A PHOSITA would understand that “long term trends” are generated using statistical techniques. In fact, I am unaware of any method that could be used to generate a “trend” from a large collection of data points *without* the use of statistics. Similarly, paragraph [0060] of LeFebvre describes detecting high amplitude loads that repeat periodically. A PHOSITA would understand that, starting with a large collection of data points, repeating or periodic signals can be identified using statistical techniques. Again, I am unaware of any method that could be used to identify repeating periodic signals in a large collection of data points *without* the use of statistics.

10. I also disagree with Mr. Shamos’s argument that “Frequency Spectrum Analysis” “does not refer to a statistical analysis.” EX2010, ¶ 43. Frequency Spectrum Analysis is used to identify repeating patterns or trends in a set of collected data points, and is therefore statistical in nature. More generally, a PHOSITA would understand that in the course of performing Frequency Spectrum

Analysis, statistical methods are used that expose minimums, maximums, mean values, degrees of deviation, and rates of change from previous data. While the capturing of the data has many forms, vibration analysis in particular relies heavily on statistical methods to decipher complex signal processing.

11. LeFebvre also expressly discloses that its sensor units engage in statistical sampling. EX1005, ¶¶ [0034]–[0035]:

“The rationale for the choice of sampling frequencies and the selection of sensors to be read is based on the type of behavior being monitored and the particular application. Sampling should be at a frequency several times the highest frequency to be detected from the data. More frequent sampling will gain no further intelligence but increase power consumption. The periodicities of sampling and reporting are controlled by the data control unit 23. . . .”

The principle discussed in paragraph [0034], that beyond a certain point “more frequent sampling will gain no further intelligence,” is based on the Nyquist–Shannon sampling theorem and would have been well-known to a PHOSITA.

12. LeFebvre teaches that “the microprocessor on an instrumented pad 16 is normally in a passive, low power state, but is programmed to switch on briefly, periodically. It gathers readings from each of the sensors and performs preliminary analysis of the readings.” EX1005 ¶ [0034]. As I explained in my first declaration, LeFebvre’s power management technique therefore involves collecting data from a sensor at periodic intervals. EX1003, ¶¶ 145–146. If a sensor periodically awakens

to collect data, and enters a low-power sleep state between its collection windows, then it will “periodically collect data” (as required by claim 5) and *also* save power (as required by claim 1).

13. I do not agree with Mr. Shamos’s argument that, because Armitage aims to provide “continuous monitoring of all critical railway car components” (EX1006, ¶ [0044]), it could not utilize the power management techniques disclosed by LeFebvre. *See* EX2010, ¶¶ 71–73. A PHOSITA would understand that power management techniques for electronic components can involve entering a low-power state “sleeping” for very short periods, on the order of milliseconds. In comparison, most components on a railcar will change their state very slowly. Railcar wheel bearings, for example, are large metallic components having a very high thermal mass. Taking a bearing temperature reading every few seconds is more than enough to capture any meaningful changes in bearing temperature, and would be considered “continuous” monitoring by anyone in the railroad industry. In fact, LeFebvre accurately describes its own system as “continuously monitoring” the condition of the railcar. EX1005, ¶¶ [0004], [0006]. This is in contrast to non-continuous monitoring, which is monitoring conducted by hand on a set maintenance schedule (typically daily or weekly).

14. I have personal experience with both types of monitoring. From 1990 to 1995, I worked as an engineer at IRD Mechanalysis in Columbus, Ohio. At that

beginning of that period, a person walked around the plant daily or weekly and placed a magnetically attached sensor on various machine locations (typically the x- and y-axes of bearings). Readings were collected by a handheld data collector device, and then downloaded into a PC at the end of the collection route. The PC made trend graphs, and a report about vibration levels, alarms etc. The maintenance technicians would then focus on problem areas, schedule a machine outage for a bearing change, etc. This was **non-continuous** monitoring. During the course of my employment, we developed a new type of **continuous** monitoring system, which was my primary focus. Our continuous monitoring system used distributed sensors to collect thousands of measurement points every hour, every minute, or even more frequently (on the order of seconds), which would have been impossible with manual, non-continuous monitoring methods.

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As provided in 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Executed on: January 26, 2024



STEVEN RICCA