

DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

RELATED APPLICATIONS

[0001] This patent application is related to and claims priority to U.S. Provisional Patent Application No. 61/333,428, entitled "Mobile Railway Car Sensor System," filed on 05/11/2010, which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] Aspects of the disclosure are related to the field of vehicle monitoring devices, and in particular, railway car sensor systems.

TECHNICAL BACKGROUND

[0003] Railway cars, such as those found in freight trains and passenger trains, include undercarriage portions to roll the railway car and an associated payload across railroad tracks. The undercarriage portion typically includes wheels and related equipment, such as axles, bearings, trucks, brakes, journals, gears, and other moving parts, which can experience harsh conditions while in use. These harsh conditions can include elevated temperatures while under heavy loads and during start/stop conditions. Stationary equipment, such as thermal imaging inspection equipment, or 'hotbox' detectors can be positioned at various points along a railroad track to take a snapshot of railway car bearing status. Stationary impact detectors can also be installed in the rails and used to detect wheel damage.

OVERVIEW

[0004] What is disclosed is a mobile railway car monitoring system. The mobile railway car monitoring system includes a plurality of sensor nodes coupled to an undercarriage portion of a railway car, and a control node coupled to the railway car. Each of the plurality of sensor nodes is configured to monitor the undercarriage portion of the railway car when in motion and transmit information about the undercarriage portion to the control node. The control node is configured to receive the information about the undercarriage portion, process the information to determine a fault condition for the undercarriage portion, and wirelessly report the fault condition to a collection system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Many aspects of the disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views. While several embodiments are described in connection with these drawings, the disclosure is not limited to the embodiments disclosed herein. On the contrary, the intent is to cover all alternatives, modifications, and equivalents.

[0006] Figure 1 is a system diagram illustrating a railway car monitoring system.

[0007] Figure 2 is a flow diagram illustrating method of operating a railway car monitoring system.

[0008] Figure 3 is a system diagram illustrating a railway car monitoring system.

[0009] Figure 4 is a graph illustrating example monitored values.

[0010] Figure 5 is a block diagram illustrating a control node.

[0011] Figure 6 is a block diagram illustrating a sensor node.

DETAILED DESCRIPTION

[0012] Figure 1 is a system diagram illustrating railway car monitoring system 100.

System 100 includes railway car 110, undercarriage elements 111-114 of railway car 110, sensor nodes 121-124, control node 130, communication network 140, and collection node 150.

Control node 130 and each of sensor nodes 121-124 communicate over links 161-164, respectively. Control node 130 and communication network 140 communicate over wireless link 165. Communication network 130 and collection node 150 communicate over link 166. In this example, sensor node 121 is coupled to undercarriage element 111, sensor node 122 is coupled to undercarriage element 112, sensor node 123 is coupled to undercarriage element 113, and sensor node 124 is coupled to undercarriage element 114. It should be understood that although four sensor nodes and undercarriage elements are shown in Figure 1, a different number of sensor nodes or undercarriage elements could be included.

[0013] Railway car 110 comprises a vehicle used on a rail transport system, such as a freight car, truck, wagon, coach, or passenger car. Railway car 110 could be used to carry freight, cargo, passengers, or other items. Railway car 110 includes undercarriage portions, shown as undercarriage elements 111-114 in Figure 1. Undercarriage elements 111-114 each are an element or portion of the undercarriage of railway car 110. Undercarriage elements 111-114

typically each comprise equipment related to the rolling motion of railway car 110, such as a wheel, axle, gearbox, bearing, bearing box, journal box, trucks, brakes, or other equipment.

[0014] Sensor nodes 121-124 each include equipment to sense and report information about undercarriage elements of a railway car. Each of sensor nodes 121-124 includes a sensor portion, and the sensor portion could include thermometers, thermocouples, thermistors, thermopiles, infrared (IR) emitters/detectors, microphones, ultrasonic emitters/detectors, accelerometers, strain gauges, flow gauges, chemical sensors, micro-electromechanical system (MEMS) sensors, electrical sensors, among other sensing equipment and circuitry. Each of sensor nodes 121-124 also includes a transceiver portion for communication with control node 130. In some examples, the transceiver portion includes a wireline transceiver for communicating with control node 130 over a wire, optical fiber, or other medium. In other examples, the transceiver portion includes a wireless transceiver and antenna for wirelessly communicating with control node 130. Each of sensor nodes 121-124 could also include a processing portion for receiving the sensor information, amplifying, scaling, modifying, adjusting, digitizing, or converting the sensor information, as well as controlling the transceiver portion and sensor portions. Each of sensor nodes 121-124 could also comprise a power system, such as a battery or solar cell.

[0015] Sensor nodes 121-124 are each attached or coupled to the associated undercarriage element of railway car 110. In some examples, sensor nodes 121-124 are fastened to the associated undercarriage element with a mechanical fastener, such as a screw, rivet, wire, harness, weld, latch, or tie. In other examples, sensor nodes 121-124 are each coupled to the associated undercarriage element with an adhesive, such as glue, tape, Velcro, suction, or other adhesive or adhesive method. In yet further examples, sensor nodes 121-124 are each coupled to

the associated undercarriage element with a magnet, such as an electromagnet, permanent magnet, rare-earth magnet, ceramic magnet, or other magnetic attachment device. Sensor nodes 121-124 could each be encased in a weatherproof or sealed enclosure, or may have openings for air circulation.

[0016] Control node 130 includes circuitry and equipment to exchange communications with each of sensor nodes 121-124 over links 161-164, respectively. In many examples, control node 130 also includes circuitry and equipment to exchange communications with a base station of a wireless communication network, such as a cellular communication device, satellite communication device, mobile phone circuitry, satellite phone, mobile network device, or other equipment. Control node 130 may also include RFID equipment for exchanging data with RFID devices. Control node 130 may also include user interface systems, memory devices, computer-readable storage mediums, software, processing circuitry, or some other components. In some examples, control node 130 includes a positioning system, such as a global positioning system (GPS) receiver, to receive and interpret signals from positioning satellites to determine geographic coordinates of control node 130. Control node 130 could also comprise a power system, such as a battery or solar cell.

[0017] Control node 130 is attached or coupled to railway car 110. In some examples, control node 130 is fastened to railway car 110 with a mechanical fastener, such as a screw, rivet, wire, harness, weld, latch, or tie. In other examples, control node 130 is coupled to railway car 110 with an adhesive, such as glue, tape, Velcro, suction, or other adhesive or adhesive method. In yet further examples, control node 130 is coupled to railway car 110 with a magnet, such as an electromagnet, permanent magnet, rare-earth magnet, ceramic magnet, or other magnetic attachment device. Control node 130 could be coupled to railway car 110 internally or externally,

on a side or end portion, among other locations. Control node 130 could be encased in a weatherproof or sealed enclosure, or may have openings for air circulation.

[0018] Communication network 140 could include base stations, base station control systems, Internet access nodes, telephony service nodes, wireless data access points, routers, gateways, or other wireless communication systems, including combinations thereof.

Communication network 140 may also comprise optical networks, asynchronous transfer mode (ATM) networks, packet networks, metropolitan-area networks (MAN), or other network topologies, equipment, or systems, including combinations thereof. In typical examples, communication network 140 includes many base stations and associated equipment for providing communication services to many wireless and mobile devices across a geographic region.

[0019] Collection node 150 comprises equipment for receiving fault conditions, sensor information, location information, or other information from control node 130 through communication network 140. Collection node 150 also includes a computer system, microprocessor, circuitry, or some other processing device or software system, and may be distributed among multiple processing devices. Examples of collection node 150 may also include software such as an operating system, logs, utilities, drivers, networking software, and other software stored on a computer-readable medium. Collection node 150 could also include application servers, application service provider systems, database systems, logistics systems, web servers, or other systems.

[0020] In the example shown in Figure 1, collection node 150 communicates with control node 130 through communication network 140, although other configurations could be employed. Collection node 150 could collect fault conditions and other information from many control nodes. For example, on a train where many railway cars are connected in series, a

control node could be coupled to each railway car along with associated sensor nodes.

Collection node 150 could receive information from each control node of the train, and thus monitor the entire train. In some examples, control nodes include a GPS receiver, and could also provide positioning information to collection node 150. Collection node 150 could determine a position of a train based upon this information, as well as differentiate railway cars from each other within the train. Fault conditions could be isolated to a particular railway car. In further examples, the information received from multiple control nodes could be used to determine an order of railway cars in a train.

[0021] Communication links 161-164 each use various communication media, such as air, space, metal, optical fiber, or some other signal propagation path, including combinations thereof. Communication links 161-164 could each use various communication protocols, such as Internet Protocol (IP), Ethernet, Wireless Fidelity (WiFi), Bluetooth, Controller Area Network (CAN) bus, Inter-Integrated Circuit (I2C), 1-Wire, Radio Frequency Identification (RFID), optical, circuit-switched, communication signaling, or some other communication format, including combinations, improvements, or variations thereof. Communication links 161-164 could each be direct links or may include intermediate networks, systems, or devices. In some examples, communication links 161-164 each operate using wireless protocols as described for wireless link 165.

[0022] Wireless link 165 uses the air or space as the transport media. Wireless link 165 may use various protocols, such as Code Division Multiple Access (CDMA), Evolution-Data Optimized (EV-DO), single-carrier radio transmission technology link (1xRTT), Worldwide Interoperability for Microwave Access (WIMAX), Global System for Mobile Communication (GSM), Universal Mobile Telecommunications System (UMTS), Long Term Evolution (LTE),

Wireless Fidelity (WiFi), High Speed Packet Access (HSPA), Radio Link Protocol (RLP), satellite networks (such as Inmarsat, GlobalStar, OrbComm, Iridium), satellite phone communications (such as Iridium), or some other wireless communication format, including combinations, improvements, or variations thereof. In further examples, wireless link 165 is a Radio Frequency Identification (RFID) link.

[0023] Communication link 166 uses various communication media, such as air, space, metal, optical fiber, or some other signal propagation path, including combinations thereof. Communication link 166 could use various communication protocols, such as Time Division Multiplex (TDM), asynchronous transfer mode (ATM), Internet Protocol (IP), Ethernet, Wireless Fidelity (WiFi), synchronous optical networking (SONET), circuit-switched, communication signaling, or some other communication format, including combinations, improvements, or variations thereof. Communication link 166 could be a direct links or may include intermediate networks, systems, or devices. In some examples, communication link 166 operates using wireless protocols as described for wireless link 165.

[0024] Links 161-166 may each include many different signals sharing the same link – as represented by the associated lines in Figure 1 – comprising access channels, forward links, reverse links, user communications, communication sessions, overhead communications, frequencies, other channels, carriers, timeslots, spreading codes, transportation ports, logical transportation links, network sockets, packets, or communication directions.

[0025] Figure 2 is a flow diagram illustrating method of operating railway car monitoring system 100. The operations of Figure 2 are referenced herein parenthetically. In Figure 2, each of sensor nodes 121-124 sense and monitor (201) the undercarriage portion of railway car 110. Each of sensor nodes 121-124 could sense and monitor other equipment associated with railway

car 110. The information monitored could include undercarriage element temperature, ambient temperature, vibration, noise, among other information. In typical examples, sensor nodes 121-124 will sense and monitor the equipment while railway car 110 is in motion, such as when rolling.

[0026] Each of sensor nodes 121-124 transmits (202) the monitored information about the undercarriage portion to control node 130 coupled to railway car 110. In this example, each of sensor nodes 121-124 transmits the monitored information to control node 130 over the associated link 161-164. In some examples, each of sensor nodes 121-124 is configured to wirelessly transmit the monitored information about the undercarriage portion to control node 130. Each of sensor nodes 121-124 could also process the sensor information, which may include amplifying, scaling, modifying, adjusting, digitizing, or converting the sensor information, and transfer the processed sensor information to control node 130. Each of sensor nodes 121-124 could also report other information to control node 130, such as position, time, battery life, sensor status, inoperative sensors, serial numbers, sensor identifiers, among other information.

[0027] Control node 130 receives (203) the information about the undercarriage portion. The information received could include sensor information, or modified sensor information, from each of sensors 121-124 received over wireline or wireless links. Control node 130 processes (204) the information to determine a fault condition for the undercarriage portion. The fault condition could include conditions such as hotbox conditions, dragging equipment, wheel impact or sliding wheel conditions, high car or shifted load conditions, hot wheel conditions, door opening, tank level, humidity, temperature, shock, bearing temperature, vibration signatures, truck tracking deviations, among other conditions. A hotbox condition includes

where an equipment box, shroud, enclosure, or other equipment container, experiences an elevated temperature. A hotbox condition is typically caused by a fault with the equipment contained within the box, such as a loss of lubricant or coolant in the box, damage, or from ambient conditions around the box, among other causes, including combinations thereof.

[0028] Control node 130 then wirelessly reports (205) the fault condition to a collection system. In this example, the collection system includes collection node 150. In Figure 1, collection node 150 communicates with control node 130 through communication network 140, although other configurations could be employed. Control node 130 could also report other information to collection node 150, such as position, time, battery life, sensor status, inoperative sensors, serial numbers, network addresses, railway car identifiers, among other information.

[0029] In some examples, to determine the fault condition, control node 130 is configured to process the information received from each of sensor nodes 121-124 over a period of time to determine a threshold for reporting the fault condition. In many examples, sensor information can be affected by ambient temperature, motion, time-dependent effects, noise, or other phenomena. Control node 130 could process the sensor information to determine anomalies from an average, such as an anomaly from a running average of the temperature of all wheels on railway car 110. In other examples, a dynamic threshold is determined. The dynamic threshold could be adjusted *in situ* as railway car conditions change, such as during motion, acceleration, ascent/descent, cornering, during weather events, time of day, position, or due to other conditions. For example, while railway car 110 is cornering, a different temperature may be sensed for wheels on the outside portion of the turn than for wheels on the inside portion of the turn. Control node 130 could take this cornering into account when determining if an anomaly exists before reporting a fault condition to collection node 150. In other examples, the ambient

temperature or weather conditions could be evaluated to determine an anomaly of an undercarriage element.

[0030] In some examples of analyzing the sensor information, a moving average and trend analysis is employed on the entire population of the undercarriage elements, such as those monitored by sensor nodes 121-124. Statistically significant deviations are derived from a series of sensor data captured over time for one or several members of the population of sensors. Each of sensor nodes 121-124 typically measure similar conditions for the undercarriage elements even though the conditions themselves may change or trend together. Deviations from these similar conditions are monitored. When one or more of the sensor nodes begin to deviate from the others in the population, then a failure condition could be determined. In this example, the deviations are not deviations of data of a single data reading or a single undercarriage element, but instead deviations from a time series of data readings for all undercarriage elements of railway car 110.

[0031] Figure 3 is a system diagram illustrating railway car monitoring system 300. Railway car monitoring system 300 includes railway car 310, wheel assemblies 312-315 of railway car 310, sensor nodes 320-327, control node 330, and collection node 340. Control node 330 and each of sensor nodes 320-327 communicate over wireless links, not shown for clarity in Figure 3. Control node 330 and collection node 340 communicate over wireless link 360, which is a Radio Frequency Identification (RFID) link in this example. In this example, sensor nodes 320-321 monitor wheel assembly 312, sensor nodes 322-323 monitor wheel assembly 313, sensor nodes 324-325 monitor wheel assembly 314, and sensor nodes 326-327 monitor wheel assembly 315. It should be understood that although eight sensor nodes and four wheel

assemblies are shown in Figure 3, a different number of sensor nodes or wheel assemblies could be included, among other undercarriage assemblies of railway car 310.

[0032] Railway car 310 comprises a vehicle used on a rail transport system, such as a freight car, truck, wagon, coach, or passenger car. Railway car 310 could be used to carry freight, cargo, passengers, or other items. Railway car 310 includes undercarriage portions, shown as wheel assemblies 312-315 in Figure 3. Wheel assemblies 312-315 typically each comprise equipment related to the rolling motion of railway car 310, such as a wheel, axle, gearbox, bearing, bearing box, journal box, or other equipment.

[0033] Sensor nodes 320-327 each include equipment to sense and report information about undercarriage elements of a railway car. Each of sensor nodes 320-327 includes a sensor portion, and the sensor portion could include thermometers, thermocouples, thermistors, thermopiles, infrared (IR) emitters/detectors, microphones, ultrasonic emitters/detectors, accelerometers, strain gauges, flow gauges, chemical sensors, micro-electromechanical system (MEMS) sensors, electrical sensors, among other sensing equipment and circuitry. Each of sensor nodes 320-327 also includes a transceiver portion for wireless communication with control node 330. In this example, the transceiver portion includes a wireless transceiver and antenna for wirelessly communicating with control node 330 using a Radio Frequency Identification (RFID) communication link. Each of sensor nodes 320-327 could also include a processing portion for receiving the sensor information, amplifying, scaling, modifying, adjusting, digitizing, or converting the sensor information, as well as controlling the transceiver portion and sensor portions. Each of sensor nodes 320-327 also comprises a power system, such as a battery or solar cell.

[0034] Sensor nodes 320-327 are each attached or coupled to the associated wheel assembly, preferably to a non-rotating portion, such as a bracket, bearing mount, or other non-rotating structure, although sensor nodes 320-327 could be coupled to a rotating portion of the associated wheel assembly, such as an axle, driveshaft, wheel, or other rotating member. In some examples, sensor nodes 320-327 are fastened to the associated wheel assembly with a mechanical fastener, such as a screw, rivet, wire, harness, weld, latch, or tie. In other examples, sensor nodes 320-327 are each coupled to the associated wheel assembly with an adhesive, such as glue, tape, Velcro, suction, or other adhesive or adhesive method. In yet further examples, sensor nodes 320-327 are each coupled to the associated wheel assembly with a magnet, such as an electromagnet, permanent magnet, rare-earth magnet, ceramic magnet, or other magnetic attachment device. Sensor nodes 320-327 could each be encased in a potted, weatherproof, or sealed enclosure, or may have openings for air circulation.

[0035] Control node 330 includes circuitry and equipment to exchange communications with each of sensor nodes 320-327. In many examples, control node 330 also includes circuitry and equipment to wirelessly exchange communications with a collection node, such as a maintenance system, maintenance personnel, or may provide a user interface for displaying a status of sensor nodes 320-327 to a user. Control node 330 may also include user interface systems, memory devices, computer-readable storage mediums, software, processing circuitry, or some other components. In some examples, control node 330 includes a positioning system, such as a global positioning system (GPS) receiver, to receive and interpret signals from positioning satellites to determine geographic coordinates of control node 330. Control node 330 could also comprise a power system, such as a battery or solar cell.

[0036] Control node 330 is attached or coupled to railway car 310. In some examples, control node 330 is fastened to railway car 310 with a mechanical fastener, such as a screw, rivet, wire, harness, weld, latch, or tie. In other examples, control node 330 is coupled to railway car 310 with an adhesive, such as glue, tape, Velcro, suction, or other adhesive or adhesive method. In yet further examples, control node 330 is coupled to railway car 310 with a magnet, such as an electromagnet, permanent magnet, rare-earth magnet, ceramic magnet, or other magnetic attachment device. Control node 330 could be coupled to railway car 310 internally or externally, on a side or end portion, among other locations. Control node 330 could be encased in a potted, weatherproof, or sealed enclosure, or may have openings for air circulation.

[0037] Collection node 340 comprises equipment for receiving fault conditions, sensor information, location information, or other information from control node 330 over wireless link 360. Collection node 340 also includes a computer system, microprocessor, circuitry, or some other processing device or software system, and may be distributed among multiple processing devices. Examples of collection node 340 may also include software such as an operating system, logs, utilities, drivers, networking software, and other software stored on a computer-readable medium. Collection node 340 could also include application servers, application service provider systems, database systems, logistics systems, web servers, or other systems.

[0038] Collection node 340 could collect fault conditions and other information from many control nodes. For example, on a train where many railway cars are connected in series, a control node could be coupled to each railway car along with associated sensor nodes. Collection node 340 could receive information from each control node of the train, and thus monitor the entire train. In some examples, control nodes include a GPS receiver, and could also provide positioning information to collection node 340. Collection node 340 could determine a

position of a train based upon this information, as well as differentiate railway cars from each other within the train. Fault conditions could be isolated to a particular railway car, or to a specific location, which may detect track failure or be used to assess root cause of the failure. In further examples, the information received from multiple control nodes could be used to determine an order of railway cars in a train.

[0039] In yet further examples, collection node 340 is a rail-side or handheld device which receives information from control node 330 over a RFID wireless link as an operator passes by railway car 310 or as railway car 310 passes by an operator. Collection node 340 could include a user interface for displaying a status of control node 330 or sensor nodes 320-327 to a user. In some examples, a generalized condition (e.g., green, yellow, red) may be communicated over an RFID interface from control node 330 or from each of sensor nodes 320-327, but a handheld device could be used to download detailed logs from railway car 310. Sensor data logs and analytics may exceed the capacity of an RFID message payload, and the detailed logs or data could be stored within control node 330 or each of sensor nodes 320-327. The detailed logs or data could then be downloaded using handheld equipment when railway car 310 comes in to a repair area be serviced, perhaps due to an indication of the generalized condition.

[0040] Figure 4 is a graph illustrating example monitored values for railway car 310. Control node 330 or collection node 340 could analyze information or data from each of sensor nodes 320-327 in a manner similar to that described in Figure 4, although alternate analysis could be performed as described herein. Graph 400 in Figure 4 includes 2 axes, the vertical axis indicating a magnitude and the horizontal axis indicating a monitored parameter. For example, if the monitored parameter is vibration, then the horizontal axis of graph 400 could indicate a

vibration frequency, and the vertical axis could indicate vibration amplitude. Each of sensor nodes 320-327 could report an associated vibration at an associated frequency and amplitude. As the reported values for each of sensor nodes 320-327 are plotted along the horizontal axis, their magnitudes indicate two peaks, one centered on the data for sensor node 325 and the other centered around data for the remaining sensor nodes.

[0041] In Figure 4, the data plotted for each of sensor nodes 320-327 could be accumulated on graph 400 over time, creating a smooth curve instead of discrete points. As time passes, and the data on graph 400 continues to indicate a peak outside of the main cluster of data for each of sensor nodes 320-327, then control node 330 or collection node 340 could indicate a problem with sensor node 325 or the associated equipment monitored by sensor node 325. Thus, the population of all of sensor nodes 320-327 is taken into account to determine a dynamic threshold of failure. In some examples, a standard deviation metric is employed to determine when data from one or more sensor nodes becomes an outlier from a main cluster of sensor node data, such as when data from a sensor node deviates by more than three standard deviations, among other examples.

[0042] Failure alerts could be tailored to the number of sensor nodes 320-327 which become outliers, or based on the value of the monitored parameter if outside of expected norms. For example, when only one of sensor nodes 320-327 indicates outlier data as shown in Figure 4, it could be determined that a wheel bearing or hotbox condition for a single wheel has occurred. A single wheel sensor anomaly might also indicate a 'wheel out of round' or 'flat spot' condition, where a non-round geometry of a wheel can cause vibrations or shocks at a certain portion of each rotation of a wheel. Taking sensor node 325 as an outlier in this example, then the right wheel of wheel assembly 314 could have a failure. In examples where two outliers

occur for the same wheel assembly, then a failure of the entire wheel assembly could be determined, such as when an axle is damaged or brake applied mistakenly. Likewise, outliers for sensor nodes on an entire side of railway car 310 could indicate a cornering failure, or an off-track condition. Wheel assemblies can be referred to as 'trucks' in some examples, where two trucks are included on a railcar, each truck including four wheels on two axles. If four sensors, all on the same truck, deviate from the other four sensors on a railcar, a truck bearing failure condition could be determined. Other failure modes could be determined based on outlier data determined by any of sensor nodes 320-327.

[0043] Some examples describe a dynamic normalization, where the application of a sensor network on each railway car is employed to dynamically define norms of operation for each of the critical mechanical components. In the example shown in graph 400, the cluster of data from sensor nodes 320-324 and 326-327 could be considered the norm, while the data for sensor 325 could be considered a deviation or outlier. Other examples could be determined. Data is streamed from an array of sensors to a Data Correlation Unit (DCU) installed on each railway car. In some examples, the DCU comprises control node 130 or 330, or collection node 150 or 340. Analysis in both the temporal and sensor domains could be used to define a dynamic set of norms for the operating conditions of each mechanical component. Any significant deviation from these measurements is indicative of failure or projected failure. The population of sensors on each railway car, and the collection of measurements over a period of time, provides a baseline which is independent of railway car loading, weather, grade, track condition, component wear, and other environmental conditions. The degree to which any specific sensor deviates from this population is indicative of the severity of the mechanical condition of the component. When a deviation is detected, a wireless transmitter associated with the DCU could

be activated and an alert generated. For example, when a sensor exhibits ‘significant’ deviation from the normal conditions, an event is generated by the DCU.

[0044] Each event could be ranked by severity and status could be provided periodically, such as twice daily, to provide railcar location and system status. The event ranking could include a ‘yellow’ condition which indicates that a railway car requires service, and a ‘red’ condition which indicates that a sensor has detected a serious deviation from normal operations that requires immediate service. In some examples, each railway car sensor array reports every ‘n’ seconds to the DCU, and the DCU aggregates and continuously analyzes the datastream from the sensors. The analysis is designed to be ‘agnostic’ to the specific sensor. Trend modeling identifies specific sensor telemetry that lies outside norms, where ‘normal’ can be defined dynamically by assessing the set of sensors on each railway car. Realtime, continuous monitoring of all critical railway car components can be monitored and predictive analytics performed for wheels, bearings and trucks which is dynamically adjusted to operating conditions. Rapid detection of handbrake sets can also be performed. A railway car health ‘scorecard’ could be provided to a user, presented via email, text message, web page, or discrete software interfaces.

[0045] In another embodiment, vibration is monitored as graph 400. The vibration could be monitored with a three-dimensional accelerometer, such as a solid state accelerometer device. The accelerations monitored by the 3-D accelerometer are interpreted as vibrations. In some examples, axial vibration is monitored along a single axis, such as a z-axis aligned with the axle of a particular wheel or wheel assembly, and vibrations in other axes are ignored, such as radial axes including an x-axis aligned with the horizontal and a y-axis aligned with the vertical with respect to the railway car or wheel. 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. Axial vibration data could still indicate wheel flat conditions, which are typically high impact, 'loud' events, vibrationally. By only sampling a portion of the wheel rotation a determination could be made on how much of the circumference of a wheel is damaged or flat based on the vibration characteristics. In an example wheel rotation, 60 milliseconds of vibration are sampled every two seconds and the vibrations are averaged (along with determining minimums and maximums) every sixty seconds and stored. Time series analysis could then performed on the readings to determine the failure conditions.

[0046] Although graph 400 is shown in Figure 4 for clarity, it should be understood that a graph need not be employed in the processing of data received from sensor nodes 320-327, as the underlying data could be processed non-graphically. Also, although vibration is discussed above, it should be understood that any measured or monitored parameter could be employed for plotting data of each of sensor nodes 320-327 on graph 400. The monitored parameter could be any of the parameters of railway car 310 or any associated wheel assembly monitored by sensor nodes 320-327. As discussed herein, examples of sensor types may include thermometers, thermocouples, thermistors, thermopiles, infrared (IR) emitters/detectors, microphones, ultrasonic emitters/detectors, accelerometers, strain gauges, flow gauges, chemical sensors, micro-electromechanical system (MEMS) sensors, electrical sensors, among other sensing equipment and circuitry.

[0047] Figure 5 is a block diagram illustrating control node 500, as an example of control node 130 found in Figure 1 or control node 330 found in Figure 3, although control node 130 or

control node 330 could use other configurations. Control node 500 includes wireless transceiver 510, processing system 520, sensor interface 530, and power system 540. Wireless transceiver 510, processing system 520, sensor interface 530, and power system 540 communicate over bus 550. Control node 500 may be distributed among multiple devices that together form elements 510, 520-522, 530, 540, 550, and 560-561.

[0048] Wireless transceiver 510 comprises a communication interface for communicating with a wireless access node, such as a terrestrial base station or satellite station. Wireless transceiver 510 could include transceiver equipment and antenna elements for wirelessly exchanging fault conditions, sensor information, or other information, with a collection node, omitted for clarity, over wireless link 560. Wireless transceiver 510 also receives command and control information and instructions from processing system 520. Wireless transceiver 510 could use various protocols or communication formats as described herein for wireless links 161-165 or 270, including combinations, variations, or improvements thereof.

[0049] Processing system 520 includes storage system 521. Processing system 520 retrieves and executes software 522 from storage system 521. In some examples, processing system 520 is located within the same equipment in which wireless transceiver 510, sensor interface 530, or power system 540 are located. In further examples, processing system 520 comprises specialized circuitry, and software 522 or storage system 521 could be included in the specialized circuitry to operate processing system 520 as described herein. Storage system 521 could include a non-transient computer-readable medium such as a disk, tape, integrated circuit, server, or some other memory device, and also may be distributed among multiple memory devices. Software 522 may include an operating system, logs, utilities, drivers, networking software, and other software typically loaded onto a computer system. Software 522 could

contain an application program, firmware, or some other form of computer-readable processing instructions. When executed by processing system 520, software 522 directs processing system 520 to operate as described herein, such as receive information from sensor nodes, process the information to determine fault conditions, and report the fault conditions to a collection node.

[0050] Sensor interface 530 comprises communication interfaces for communicating with sensor nodes. Sensor interface 530 could include transceiver equipment or antenna elements for exchanging sensor information, omitted for clarity, over the associated links 561. In some examples, two or more of the associated links 561 are used to communicate with a single sensor node. Sensor interface 530 also receives command and control information and instructions from processing system 520 or wireless transceiver 510.

[0051] Power system 540 includes circuitry and a power source to provide power to the elements of control node 500. The power source could include a battery, solar cell, spring, flywheel, capacitor, thermoelectric generator, nuclear power source, chemical power source, dynamo, or other power source. In some examples, power system 540 receives power from an external source, such as a railway car. Power system 540 also includes circuitry to condition, monitor, and distribute electrical power to the elements of control node 500.

[0052] Bus 550 comprises a physical, logical, or virtual communication and power link, capable of communicating data, control signals, power, and other communications. In some examples, bus 550 is encapsulated within the elements of wireless transceiver 510, processing system 520, sensor interface 530, or power system 540, and may include a software or logical link. In other examples, bus 550 uses various communication media, such as air, space, metal, optical fiber, or some other signal propagation path, including combinations thereof. Bus 550

could be a direct link or might include various equipment, intermediate components, systems, and networks.

[0053] Figure 6 is a block diagram illustrating sensor node 600, as an example of sensor nodes 121-124 found in Figure 1 or sensor nodes 320-327 found in Figure 3, although sensor nodes 121-124 or sensor nodes 320-327 could use other configurations. Sensor node 600 includes transceiver 610, processing system 620, sensor 630, and power system 640. Transceiver 610, processing system 620, sensor 630, and power system 640 communicate over bus 650. Sensor node 600 may be distributed among multiple devices that together form elements 610, 620-622, 630, 640, 650, and 660.

[0054] Transceiver 610 comprises a communication interface for communicating with a control node, such as control node 130 or control node 330. Transceiver 610 could include transceiver equipment and antenna elements for exchanging sensor information, data, or other information, with a control node, omitted for clarity, over link 660. Transceiver 610 also receives command and control information and instructions from processing system 620. Transceiver 610 could use various protocols or communication formats as described herein for links 161-164, including combinations, variations, or improvements thereof.

[0055] Processing system 620 includes storage system 621. Processing system 620 retrieves and executes software 622 from storage system 621. In some examples, processing system 620 is located within the same equipment in which transceiver 610, sensor 630, or power system 640 are located. In further examples, processing system 620 comprises specialized circuitry, and software 622 or storage system 621 could be included in the specialized circuitry to operate processing system 620 as described herein. Storage system 621 could include a non-transient computer-readable medium such as a disk, tape, integrated circuit, server, or some other

memory device, and also may be distributed among multiple memory devices. Software 622 may include an operating system, logs, utilities, drivers, networking software, and other software typically loaded onto a computer system. Software 622 could contain an application program, firmware, or some other form of computer-readable processing instructions. When executed by processing system 620, software 622 directs processing system 620 to operate as described herein, such as monitor sensor 630, process the sensor information, and transfer sensor information or data.

[0056] Sensor 630 comprises a sensor or sensors for monitoring an undercarriage element of a railway car. Sensor 630 could include sensor circuitry, amplifiers, analog-to-digital converters, microcontrollers, among other circuitry. The sensor circuitry could include, for example, thermometers, thermocouples, thermopiles, infrared (IR) emitters/detectors, microphones, ultrasonic emitters/detectors, accelerometers, strain gauges, flow gauges, chemical sensors, micro-electromechanical system (MEMS) sensors, electrical sensors, among other sensing equipment and circuitry.

[0057] Power system 640 includes circuitry and a power source to provide power to the elements of sensor node 600. The power source could include a battery, solar cell, spring, flywheel, capacitor, thermoelectric generator, nuclear power source, chemical power source, dynamo, or other power source. In some examples, power system 640 receives power from an external source, such as a railway car or control node. Power system 640 also includes circuitry to condition, monitor, and distribute electrical power to the elements of sensor node 600.

[0058] Bus 650 comprises a physical, logical, or virtual communication and power link, capable of communicating data, control signals, power, and other communications. In some examples, bus 650 is encapsulated within the elements of transceiver 610, processing system

620, sensor 630, or power system 640, and may include a software or logical link. In other examples, bus 650 uses various communication media, such as air, space, metal, optical fiber, or some other signal propagation path, including combinations thereof. Bus 650 could be a direct link or might include various equipment, intermediate components, systems, and networks.

[0059] The included descriptions and figures depict specific embodiments to teach those skilled in the art how to make and use the best mode. For the purpose of teaching inventive principles, some conventional aspects have been simplified or omitted. Those skilled in the art will appreciate variations from these embodiments that fall within the scope of the invention. Those skilled in the art will also appreciate that the features described above can be combined in various ways to form multiple embodiments. As a result, the invention is not limited to the specific embodiments described above, but only by the claims and their equivalents.

CLAIMS:

What is claimed is:

1. A mobile railway car monitoring system, comprising:

a plurality of sensor nodes coupled to an undercarriage portion of a railway car;

a control node coupled to the railway car;

wherein each of the plurality of sensor nodes is configured to monitor the undercarriage portion of the railway car when in motion and transmit information about the undercarriage portion to the control node; and

wherein the control node is configured to receive the information about the undercarriage portion, process the information to determine a fault condition for the undercarriage portion, and wirelessly report the fault condition to a collection system.
2. The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to wirelessly transmit the information about the undercarriage portion to the control node.
3. The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is magnetically coupled to the undercarriage portion of the railway car.

4. The mobile railway car monitoring system of claim 1, wherein the control node is configured to process the information received from each of the plurality of sensor nodes over a period of time to determine a dynamic threshold for reporting the fault condition.
5. The mobile railway car monitoring system of claim 1, wherein the control node is configured to wirelessly report the fault condition over a wireless network.
6. The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to transfer the information about the undercarriage portion over a radio frequency identification (RFID) interface.
7. The mobile railway car monitoring system of claim 1, wherein the control node is configured to wirelessly receive the information from each of the plurality of sensor nodes over a radio frequency identification (RFID) interface.
8. The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to monitor vibration of the undercarriage portion of the railway car to determine vibration information, and wherein the information comprises the vibration information.

9. The mobile railway car monitoring system of claim 1, wherein the control node is configured to monitor for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes to determine the fault condition for the undercarriage portion.

10. The mobile railway car monitoring system of claim 1, wherein the undercarriage portion comprises a population of wheels, and wherein the fault condition for the undercarriage portion comprises a deviation in the information for at least one wheel of the population of wheels from the information for the population of wheels.

11. A method of operating a mobile railway car monitoring system, the method comprising:

in each of a plurality of sensor nodes coupled to an undercarriage portion of a railway car, monitoring the undercarriage portion of the railway car when in motion and transmitting information about the undercarriage portion to a control node coupled to the railway car; and

in the control node, receiving the information about the undercarriage portion, processing the information to determine a fault condition for the undercarriage portion, and wirelessly reporting the fault condition to a collection system.

12. The method of claim 11, wherein transmitting the information about the undercarriage portion to the control node comprises, in each of the plurality of sensor nodes, wirelessly transmitting the information about the undercarriage portion to the control node.

13. The method of claim 11, wherein each of the plurality of sensor nodes is magnetically coupled to the undercarriage portion of the railway car.

14. The method of claim 11, comprising:

in the control node, processing the information received from each of the plurality of sensor nodes over a period of time to determine a dynamic threshold for reporting the fault condition.

15. The method of claim 11, wherein wirelessly reporting the fault condition to the collection system comprises wirelessly reporting the fault condition over a wireless network.

16. The method of claim 11, wherein transmitting the information about the undercarriage portion to the control node comprises, in each of the plurality of sensor nodes, transferring the information about the undercarriage portion over a radio frequency identification (RFID) interface.

17. The method of claim 11, wherein receiving the information about the undercarriage portion comprises, in the control node, wirelessly receiving the information from each of the plurality of sensor nodes over a radio frequency identification (RFID) interface.

18. The method of claim 11, comprising:

in each of the plurality of sensor nodes, monitoring vibration of the undercarriage portion of the railway car to determine vibration information, wherein the information comprises the vibration information.

19. The method of claim 11, wherein processing the information to determine the fault condition for the undercarriage portion comprises, in the control node, monitoring for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes.

20. The method of claim 11, wherein the undercarriage portion comprises a population of wheels, and wherein the fault condition for the undercarriage portion comprises a deviation in the information for at least one wheel of the population of wheels from the information for the population of wheels.

ABSTRACT

What is disclosed is a mobile railway car monitoring system. The mobile railway car monitoring system includes a plurality of sensor nodes coupled to an undercarriage portion of a railway car, and a control node coupled to the railway car. Each of the plurality of sensor nodes is configured to monitor the undercarriage portion of the railway car when in motion and transmit information about the undercarriage portion to the control node. The control node is configured to receive the information about the undercarriage portion, process the information to determine a fault condition for the undercarriage portion, and wirelessly report the fault condition to a collection system.

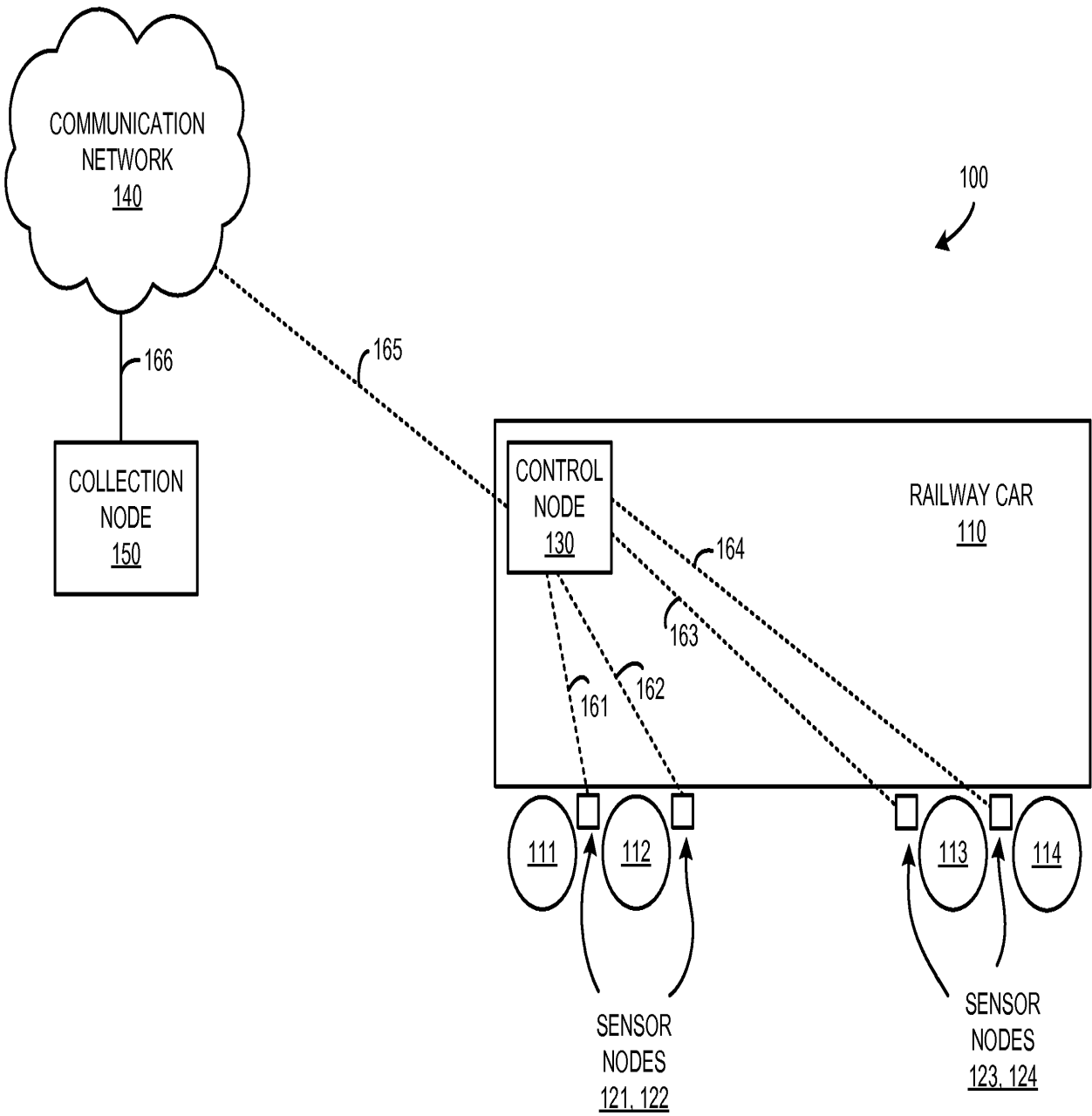


FIGURE 1

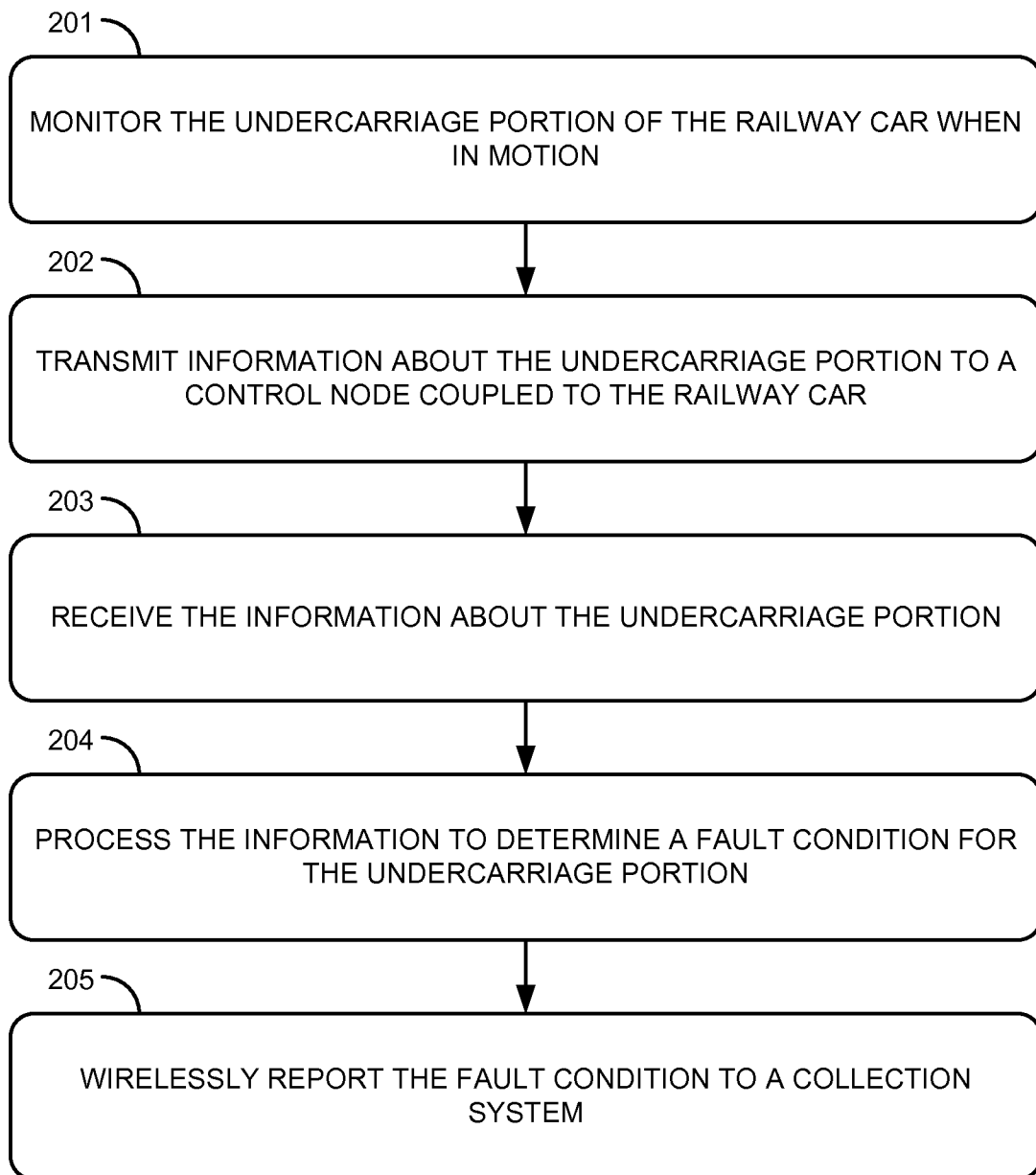


FIGURE 2

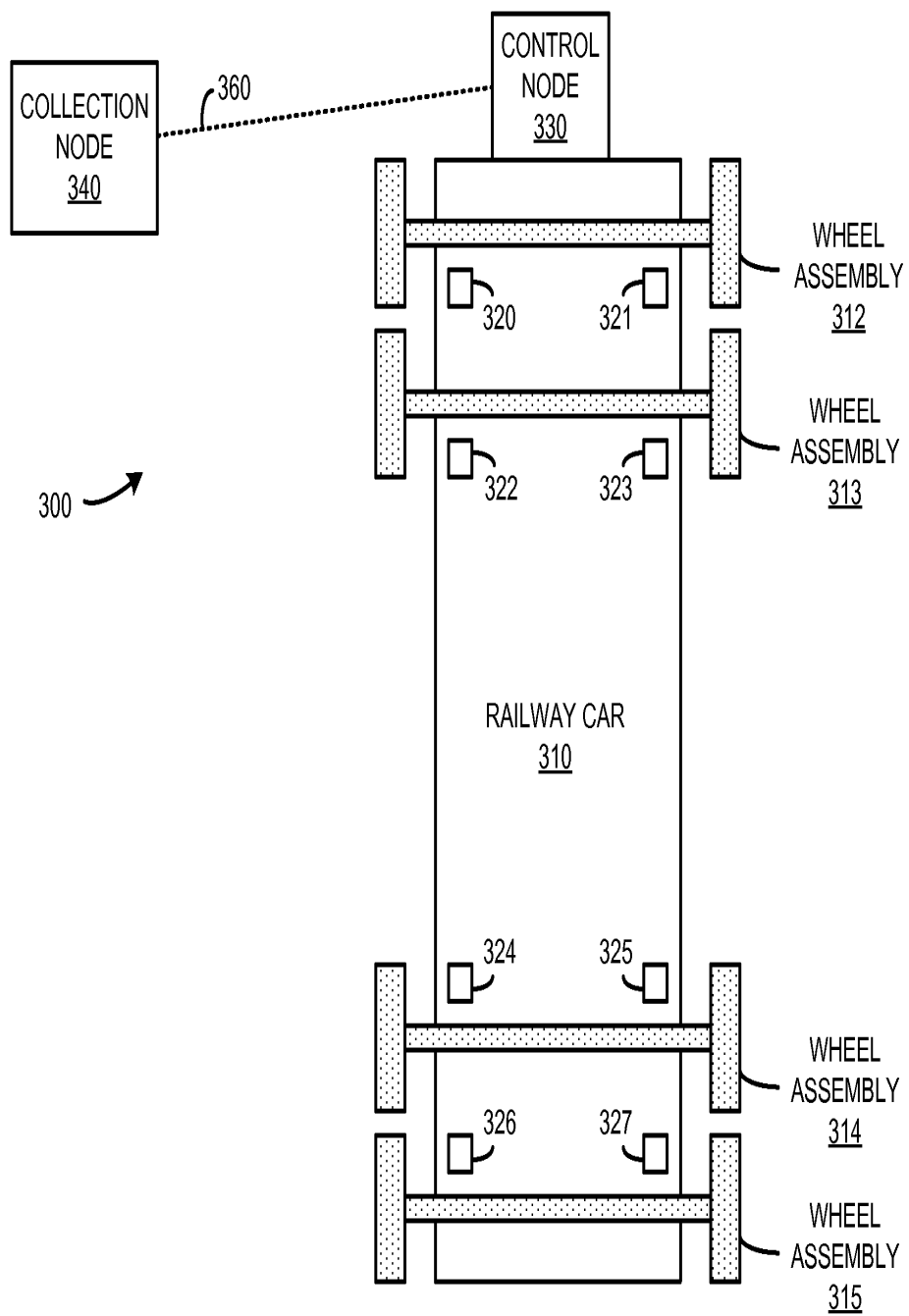


FIGURE 3

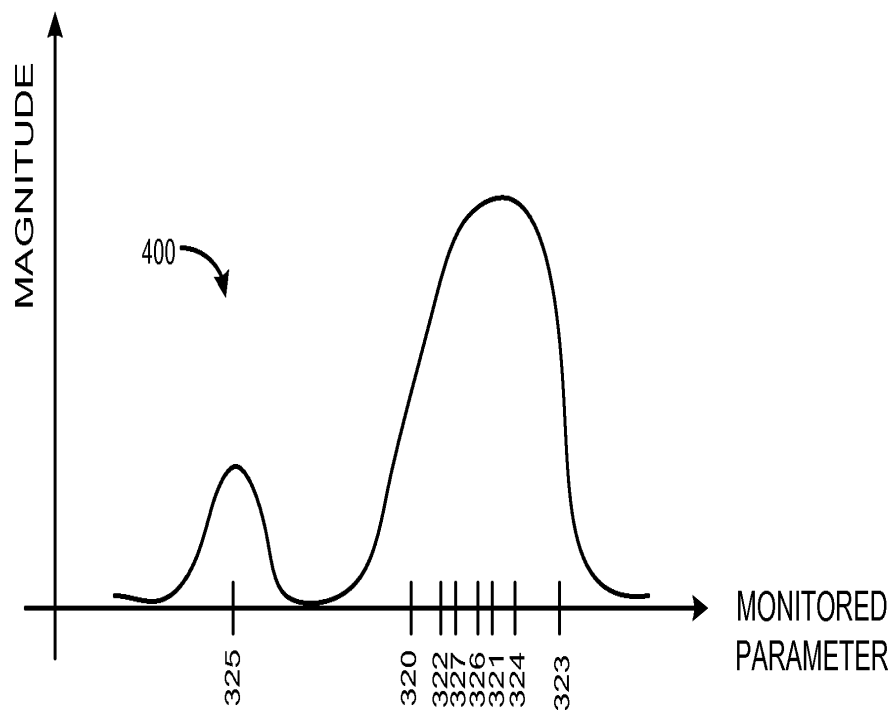


FIGURE 4

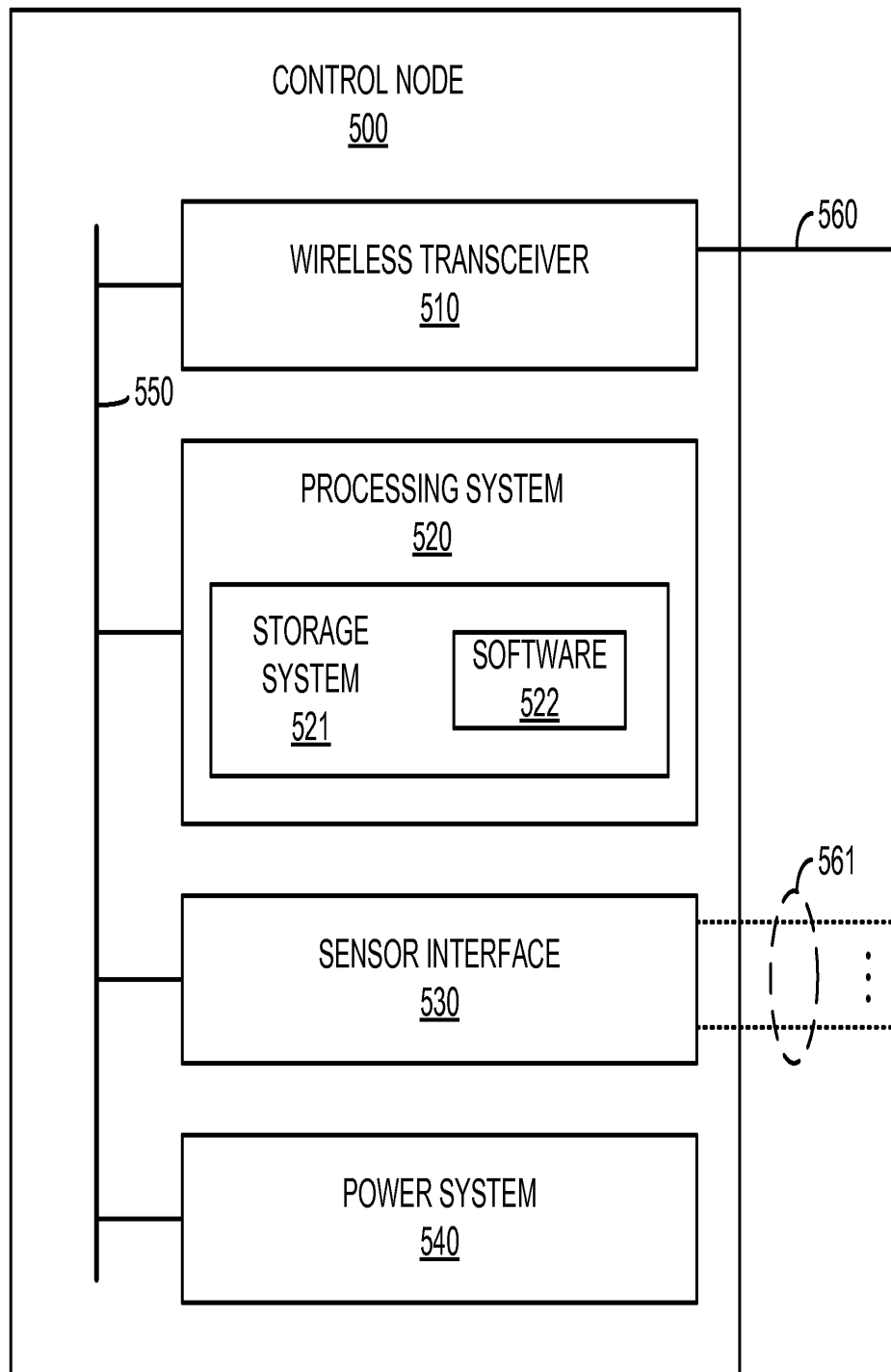


FIGURE 5

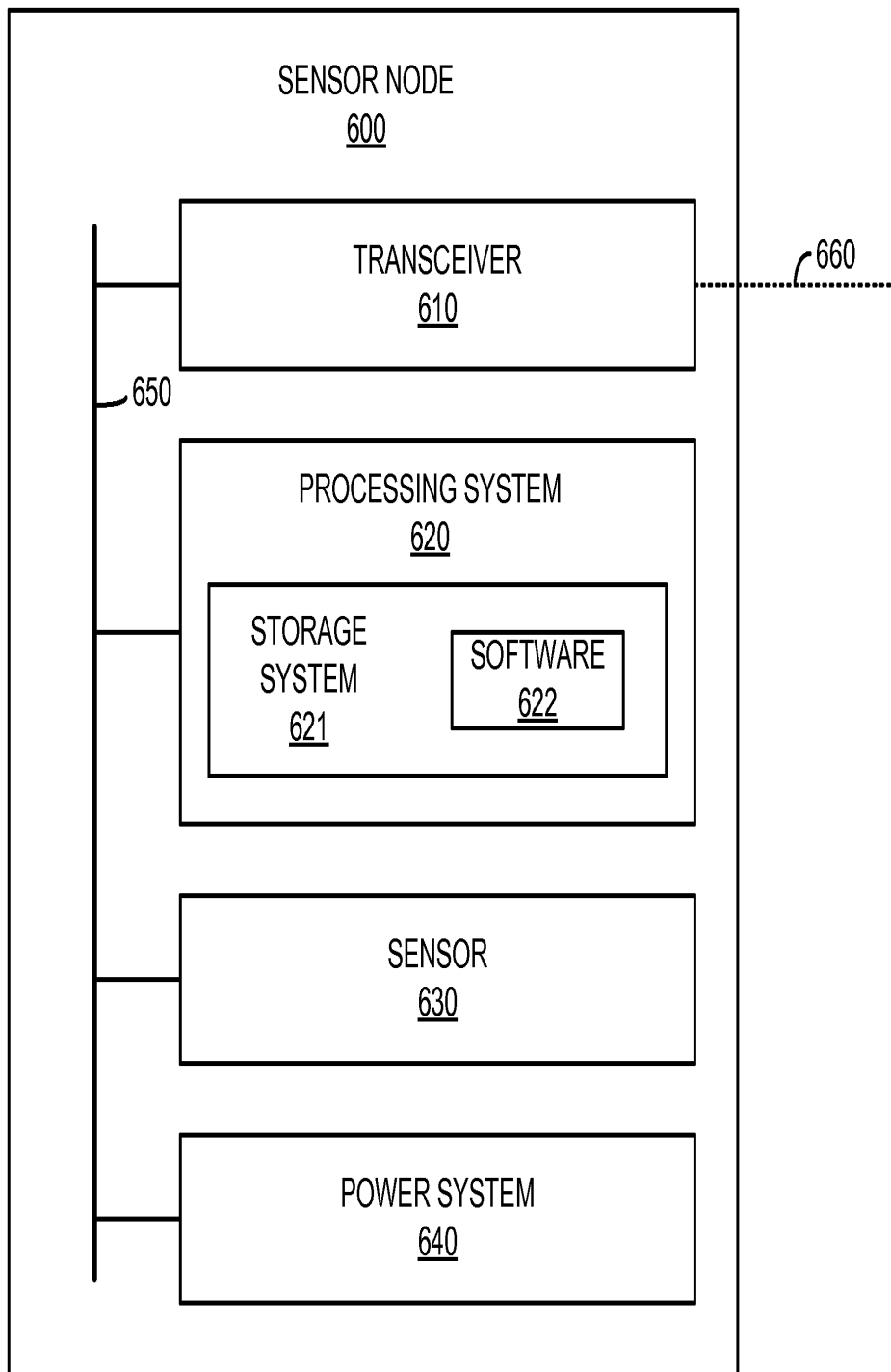


FIGURE 6

DECLARATION FOR PATENT APPLICATION

As the below named inventor(s), I/we hereby declare that:

I/we hereby declare that: (1) Each inventor's residence, mailing address, and citizenship are as stated below next to their name; and (2) I/we believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE, the specification of which:

☒ [X] is attached hereto.

☐ [] was filed on _____ as Application Serial No. _____.

☐ [] was filed on _____ under U.S. Express Mail No. _____.

☐ [] is set forth in PCT International Application No. _____.

☐ [] filed on _____ and is amended Under PCT Article 19 on _____ (if any).

I/we hereby state that I/we have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I/we acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I/we hereby claim the benefit under Title 35, United States Code, 119(e) to provisional application number 61/333,428, entitled MOBILE RAILWAY CAR SENSOR SYSTEM, filed on May 11, 2010.

I/we hereby claim foreign priority benefits under Title 35, United States Code, 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America listed below and have also identified below any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed: NOT APPLICABLE.

I/we hereby appoint all attorneys and agents of Setter Roche LLP, who are listed under the USPTO Customer Number shown below as my/our attorneys and agents to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, recognizing that the specific attorneys and agents listed under that Customer Number may be changed from time to time at the sole

discretion of Setter Roche LLP, and request that all correspondence be addressed to the address filed under the same USPTO Customer Number.

76444

Please address all telephone calls, in the first instance, to Stephen S. Roche at telephone number: (720) 562-2280.

**Address all correspondence to: Stephen S. Roche
Setter Roche LLP
P.O. Box 780
Erie, Colorado 80516**

I/we hereby declare that all statements made herein of my/our 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 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's Signature: _____

Date: _____

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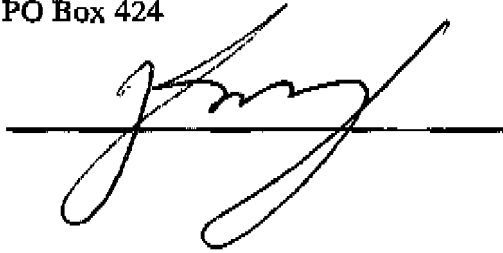
Inventor's Signature: _____

Date: _____

Attorney Docket No. 479.0002

Full Name of Fourth Inventor: Theodore Cutler Johnson Jr
Residence: 0764 Hunter's Circle Drive, Frisco, CO 80443
Citizenship: United States of America
Post Office Address: PO Box 424

Inventor's Signature: _____



Date: _____

5/19/11

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE		
First Named Inventor/Applicant Name:		David L. Armitage		
Filer:		David J. Bovitz/Sarah McLaughlin		
Attorney Docket Number:		479.0002		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	82	82
Utility Search Fee	2111	1	270	270
Utility Examination Fee	2311	1	110	110
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				462

Electronic Acknowledgement Receipt

EFS ID:	10067710
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	76444
Filer:	David J. Bovitz/Sarah McLaughlin
Filer Authorized By:	David J. Bovitz
Attorney Docket Number:	479.0002
Receipt Date:	11-MAY-2011
Filing Date:	
Time Stamp:	14:40:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

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Payment Type	Credit Card
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RAM confirmation Number	953
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part / Zip	Pages (if appl.)
Page 45 of 147					

IPR2023-00539

1		Application.pdf	118567	yes	31
			0a25161ba5db292aa6755285b56d574b44857180		
	Multipart Description/PDF files in .zip description				
	Document Description	Start	End		
	Specification	1	24		
	Claims	25	30		
	Abstract	31	31		
Warnings:					
Information:					
2	Drawings-only black and white line drawings	Drawings.pdf	38310	no	6
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3	Oath or Declaration filed	Declaration.pdf	252574	no	3
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New International Application Filed with the USPTO as a Receiving Office

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 13/105,293				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	82		N/A				
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	270		N/A				
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	110		N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	20	minus 20 = *	x 26 =	0.00	OR					
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2	minus 3 = *	x 110 =	0.00						
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$270 (\$135 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00						
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	462		TOTAL				
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	OR	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	OR	x	=
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
13/105,293	05/11/2011	3617	462	479.0002	20	2

CONFIRMATION NO. 2960

76444
Setter Roche LLP
P.O. Box 780
Erie, CO 80516

FILING RECEIPT



Date Mailed: 05/24/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

David L. Armitage, Golden, CO;
Gregory Froim Kushnir, Denver, CO;
Mark Alvin Mason, Thornton, CO;
Theodore Cutler Johnson JR., Frisco, CO;

Power of Attorney: The patent practitioners associated with Customer Number 76444

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/333,428 05/11/2010

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)

If Required, Foreign Filing License Granted: 05/20/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/105,293**

Projected Publication Date: 11/17/2011

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

Preliminary Class

105

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	479.0002

CONFIRMATION NO. 2960

PUBLICATION NOTICE



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Title:DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

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NOTICE OF PUBLICATION OF APPLICATION

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/105,293	05/11/2011	David L. Armitage	479.0002	2960
76444	7590	12/31/2012		
Setter Roche LLP P.O. Box 780 Erie, CO 80516			EXAMINER BENDIDI, RACHID	
			ART UNIT 3664	PAPER NUMBER
			NOTIFICATION DATE 12/31/2012	DELIVERY MODE 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):

jamie@setterroche.com
sarah@setterroche.com

Office Action Summary	Application No.	Applicant(s)	
	13/105,293	ARMITAGE ET AL.	
	Examiner	Art Unit	
	RACHID BENDIDI	3664	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 May 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1-20 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-20 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) ☒ Notice of References Cited (PTO-892) | 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____. | 4) ☐ Other: ____. |

DETAILED ACTION

This is a non-final Office Action on the merits. Claims 1- 20 are currently pending and are addressed below.

Priority

1. Acknowledgment is made of applicant's claim for priority provisional application No. 61333428, filed on 05/11/2010.

Information Disclosure Statement

2. No information disclosure statement (IDS) was submitted as of 12/17/2012.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless – (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4, 5, 8-10, 11, 12, 14, 15, 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent (7034711) to Sakatani et al.

Regarding claim 1, Sakatani teaches a mobile railway car monitoring system, comprising: a plurality of sensor nodes coupled to an undercarriage portion of a railway car (see at least figure 1);
a control node coupled to the railway car (see at least figure 1);
wherein each of the plurality of sensor nodes is configured to monitor the undercarriage portion of the railway car when in motion and transmit information

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about the undercarriage portion to the control node (see at least abstract and figure 1);

and wherein the control node is configured to receive the information about the undercarriage portion, process the information to determine a fault condition for the undercarriage portion, and wirelessly report the fault condition to a collection system (The management apparatus 66/(control node) has a communication tool 11/(to transmit information), and a signal processing unit 12, and the running conditions of respective machinery can be analyzed by the signal processing unit 12, furthermore, the detection data transmitted to the monitor 2112 a recorder 2116 performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least column 19, lines 30-44 and column 12, lines 53- 59 and column 17, lines 32 -34).

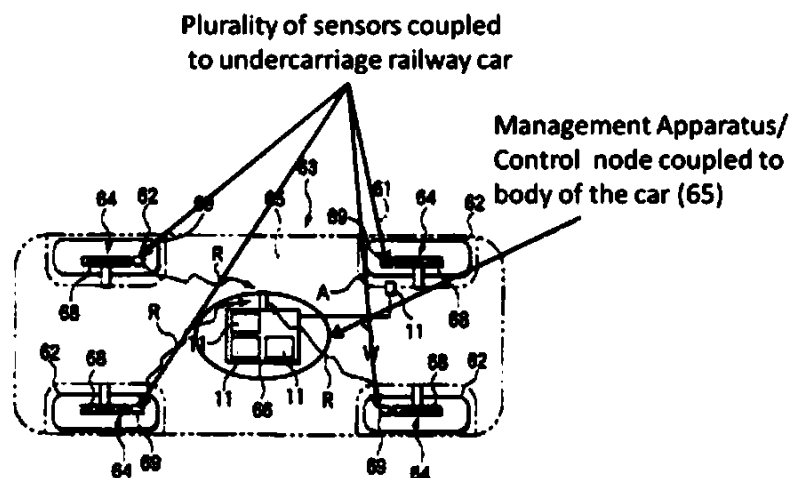


Figure 1

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Regarding claim 2, Sakatani teaches the mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to wirelessly transmit the information about the undercarriage portion to the control node (The management apparatus 3/control node) configured thus receives signals R transmitted from a plurality of wireless sensors about the body 65/ (undercarriage) see at least column 12, lines 44- 59).

Regarding claim 4, Sakatani teaches the mobile railway car monitoring system of claim 1, wherein the control node is configured to process the information received from each of the plurality of sensor nodes over a period of time to determine a dynamic threshold for reporting the fault condition (the instruction signal/(processed all information including the fault condition) maybe transmitted from the management apparatus 3 at any time interval/(period of time) so as to acquire the latest detection data of a desired wireless sensor see at least column 11, lines 61-64, column 17, lines 32-34 and figure 2 and figure 2).

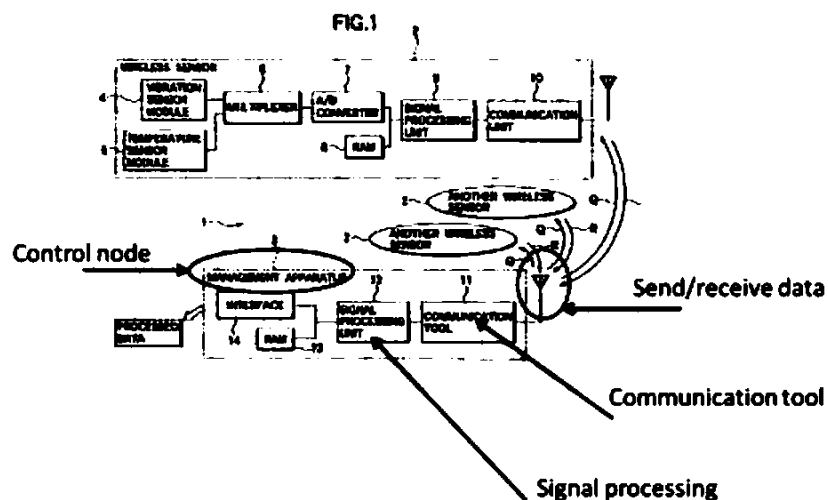


Figure 2

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Regarding claim 5, Sakatani teaches the mobile railway car monitoring system of claim 1, wherein the control node is configured to wirelessly report the fault condition over a wireless network (radio transmission/ (wireless communication) is used for the communication between the relay unit 27 and the management apparatus 3, where the apparatus send data/ (running condition) see at least column 14, line 44-45 and figure 3 and claim 61 and 62).

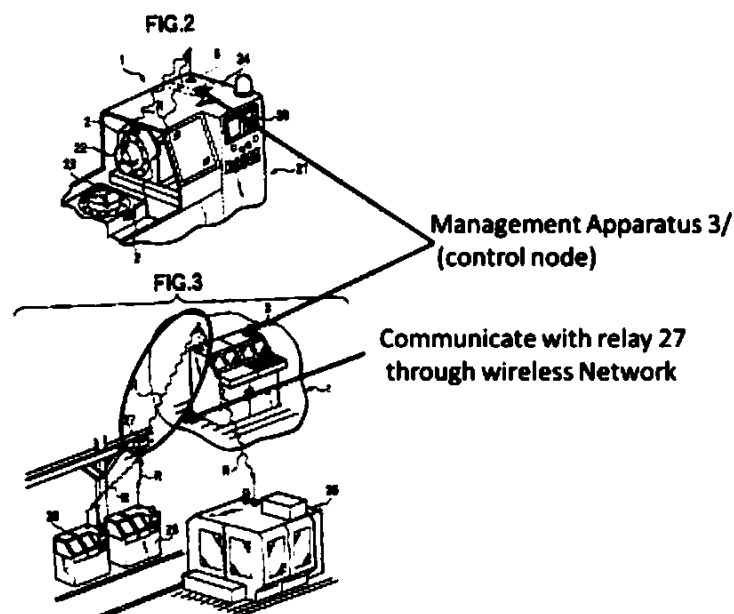


Figure 3

Regarding claim 8, Sakatani teaches the mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to monitor vibration of the undercarriage portion of the railway car to determine vibration information, and wherein the information comprises the vibration information (a vibration sensor with an accelerometer is used to monitor vibration

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and the detection vibration data is transmitted to the monitor 2112, see at least column 1 lines 47-48, column 2 lines 37-55 and figure 4).

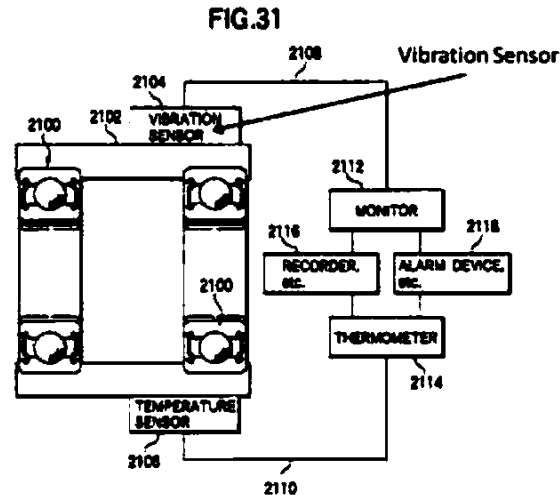


Figure 4

Regarding claim 9, Sakatani teaches 9. The mobile railway car monitoring system of claim 1, wherein the control node is configured to monitor for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes to determine the fault condition for the undercarriage portion (there are plurality of sensors that are used and each wheel has vibration sensor, the detection data transmitted to the monitor 2112 a recorder 2116 performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least column 17, lines 32 -34).

Regarding claim 10, Sakatani teaches the mobile railway car monitoring system of claim 1, wherein the undercarriage portion comprises a population of

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wheels, and wherein the fault condition for the undercarriage portion comprises a deviation in the information for at least one wheel of the population of wheels from the information for the population of wheels (The monitoring system 63 shown in figure 1 (see above) has hub bearing units 64 attached to the wheels 62/(four wheels) of the automobile 61 respectively, and management apparatus 66 attached to a body 65/ (undercarriage) and each wheel the detection data transmitted to the monitor 2112 a recorder 2116 performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least column 17 ,lines 32 -34 and figure 1).

Regarding claim 11, Sakatani teaches a method of operating a mobile railway car monitoring system, the method comprising:

in each of a plurality of sensor nodes coupled to an undercarriage portion of a railway car (see at least figure 1), monitoring the undercarriage portion of the railway car when in motion and transmitting information about the undercarriage portion to a control node coupled to the railway car; and in the control node, receiving the information about the undercarriage portion, processing the information to determine a fault condition for the undercarriage portion, and wirelessly reporting the fault condition to a collection system (wireless sensor attached to a railway vehicle so as to transmit signals showing running condition by wireless; a bearing unit or a linear motion unit having the wireless sensor; a management apparatus for receiving the transmitted signals; and a monitoring system and the detection data transmitted to the monitor 2112 a recorder 2116

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performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least abstract and column 1, lines 23-29 and column 17, lines 32 -34)

Regarding claim12, Sakatani teaches the method 12 the method of claim 11, wherein transmitting the information about the undercarriage portion to the control node comprises, in each of the plurality of sensor nodes, wirelessly transmitting the information about the undercarriage portion to the control node (The management apparatus 3/control node) configured thus receives signals R transmitted from a plurality of wireless sensors about the body 65/(undercarriage) see at least column 12, lines 44- 59).

Regarding claim14, Sakatani teaches the method of claim 11, comprising: in the control node, processing the information received from each of the plurality of sensor nodes over a period of time to determine a dynamic threshold for reporting the fault condition (the instruction signal/(processed all information including the fault condition) maybe transmitted from the management apparatus 3 at any time interval/(period of time) so as to acquire the latest detection data of a desired wireless sensor see at least column 11, lines 61-64, column 17, lines 32-34 and figure 2).

Regarding claim15, Sakatani teaches the method of claim 11, wherein wirelessly reporting the fault condition to the collection system comprises wirelessly reporting the fault condition over a wireless network (radio

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transmission/(wireless communication) is used for the communication between the relay unit 27 and the management apparatus 3, where the apparatus send data/(running condition) and the detection data transmitted to the monitor 2112 a recorder 2116 performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least column 14, line 44-45 column 17, line 32-34, figure 3, claim 61 and 62).

Regarding claim18, Sakatani teaches the method of claim 11, comprising: in each of the plurality of sensor nodes, monitoring vibration of the undercarriage portion of the railway car to determine vibration information, wherein the information comprises the vibration information (a vibration sensor with an accelerometer is used to monitor vibration and the detection vibration data is transmitted to the monitor 2112, see at least column 1 lines 47-48, column 2 lines 37-55 and figure 4).

Regarding claim19, Sakatani teaches the method of claim 11, wherein processing the information to determine the fault condition for the undercarriage portion comprises, in the control node, monitoring for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes (there are plurality of sensors that are used and each wheel has vibration sensor, the detection data transmitted to the monitor 2112 a recorder 2116 performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least column 17, lines 32 -34).

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Regarding claim 20, Sakatani teaches the method of claim 11, wherein the undercarriage portion comprises a population of wheels, and wherein the fault condition for the undercarriage portion comprises a deviation in the information for at least one wheel of the population of wheels from the information for the population of wheels(The monitoring system 63 shown in figure 1 (see above) has hub bearing units 64 attached to the wheels 62/(four wheels) of the automobile 61 respectively, and management apparatus 66 attached to a body 65/ (undercarriage) and each wheel the detection data transmitted to the monitor 2112 a recorder 2116 performs recording/tabulating processing about the vibration condition, while an alarm device 2118 performs monitoring/alarming processing about the change of vibration/(fault condition) see at least column 17 ,lines 32 -34 and figure 1).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent (7034711) to Sakatani et al. in view of US Patent (6714858) to Oblizajek et al.

Regarding claims 3 and 13 where all the limitations of claims 1 and 11 is disclosed by Sakatani who does not specifically disclose the further limitation of “sensors are magnetically coupled”

Oblizajek is directed to on road corner dynamic balancing for vehicle wheels. Oblizajek disclosed magnetically coupled sensors are used in each counter of the wheel (see at least column 4, lines 30-34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sakatani by the teachings of Oblizajek, where Sakatani and Oblizajek are both directed to the same field of endeavor of car monitoring system and the modification of Sakatani by Oblizajek would result in the reducing or eliminating vibrations of the vehicle (see at least column 3, lines 9-10).

7. Claims 6, 7, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent (7034711) to Sakatani et al. in view of US pg. Pub. (20070175107) to LeFebvre et al.

Regarding claims 6 and 7 where all the limitations of claim 1 is disclosed by Sakatani who does not specifically disclose the further limitation of “radio frequency identification (RFID)”

LeFebvre is directed to Railroad train monitoring system. LeFebvre disclosed a given address for an instrumented pad may additionally or alternatively be stored in an RFID (radio frequency identification) tag on or embedded into each pad 4 (see at least [0048]).

It would d have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sakatani by the teachings of LeFebvre, where Sakatani and LeFebvre are both directed to the same field of endeavor of railway car monitoring system and the modification of Sakatani by LeFebvre would resulted in the improving high speed performance, reducing unplanned service interruptions and the safety (see at least [0002]).

Regarding claims 16 and 17 where all the limitations of claim 11 is disclosed by Sakatani who does not specifically disclose the further limitation of “radio frequency identification (RFID)”

LeFebvre is directed to Railroad train monitoring system. LeFebvre disclosed a given address for an instrumented pad may additionally or alternatively be stored in an RFID (radio frequency identification) tag on or embedded into each pad 4 (see at least [0048]).

It would d have been obvious to one of ordinary skill in the art at the time the invention was made to modify Sakatani by the teachings of LeFebvre, where Sakatani and LeFebvre are both directed to the same field of endeavor of railway

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car monitoring system and the modification of Sakatani by LeFebvre would resulted in the improving high speed performance, reducing unplanned service interruptions and the safety (see at least [0002]).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RACHID BENDIDI whose telephone number is (571)272-4896. The examiner can normally be reached on M-F From 8:00 - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, khoi Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)? If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/RACHID BENDIDI/

Examiner, Art Unit 3664

/KHOI TRAN/

Supervisory Patent Examiner, Art Unit 3664

Notice of References Cited	Application/Control No. 13/105,293		Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.	
	Examiner RACHID BENDIDI		Art Unit 3664	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,034,711	04-2006	Sakatani et al.	340/686.1
*	B	US-7,561,035	07-2009	Sahashi et al.	340/442
*	C	US-7,705,743	04-2010	Barone et al.	340/682
*	D	US-5,201,834	04-1993	Grazioli et al.	246/169R
*	E	US-5,488,910	02-1996	Pees et al.	105/166
*	F	US-6,539,293	03-2003	Bachtiger et al.	701/20
*	G	US-2010/0078527	04-2010	Burkhart et al.	246/169.A
*	H	US-2008/0195265	08-2008	Searle et al.	701/19
*	I	US-2007/0152107	07-2007	LeFebvre et al.	246/169.00R
*	J	US-5,867,404	02-1999	Bryan, Michael A.	714/724
*	K	US-6,714,858	03-2004	Oblizajek et al.	701/124
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	15	("20040036621" "20070152107" "20080195265" "20090001226" "3718040" "4119284" "4812826" "5150618" "5356098" "5381700" "5438322" "5633628" "6535135" "7034711" "7184930").PN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2012/12/18 10:20
L2	2	("2008/0195265").URPN.	USPAT	ADJ	ON	2012/12/18 10:44
L3	7	("2007/0152107").URPN.	USPAT	ADJ	ON	2012/12/18 10:46
L4	7	("2007/0152107").URPN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2012/12/18 10:46
L5	2	("2008/0195265").URPN.	USPAT	ADJ	ON	2012/12/18 10:54
L6	166	"6672681" "5433111" "6435027" "5631426" "6471407" "6378373" "5022267" "5381692" "6474832"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 10:57
L7	109	l6 and monitor\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 10:57
L8	45	l7 and wireless	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 10:58
L9	10	l8 and railway	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 10:59
L11	2	("20070152107").PN.	US-PGPUB; USPAT; USOCR;	OR	OFF	2012/12/18 14:18

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
L12	0	(70/344711).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/12/18 14:56
L13	2	("7034711").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/12/18 14:56
L14	767	701/20,29 or 340/10.1,442,686.1 or 246/169a,169r.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:09
L15	260	l14 and railway	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:10
L16	66	l15 and sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:10
L20	2	l14 and (magnet\$5 near (coupl\$2 or attach\$2))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:12
L23	30748	("magnetically coupled")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:18
L24	180	l23 and railway	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:19
L25	50	l24 and sensor	US-PGPUB;	OR	ON	2012/12/18

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			15:19
L26	194	sensor near ("magnetically coupled")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:45
L28	1	l26 and railroad	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:46
L29	59	l26 and (car or vehicle)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/18 15:49
S1	2	("20110282540").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2012/12/12 18:13
S2	324	((david near armitage)or(gregory near kushnir)or(mark near mason)or(theodore near johnson)).inv.	US-PGPUB; USPAT	ADJ	ON	2012/12/12 18:20
S3	324	((david near armitage)or(gregory near kushnir)or(mark near mason)or(theodore near johnson)).inv.	US-PGPUB; USPAT	OR	ON	2012/12/12 18:21
S4	3	S3 and railway	US-PGPUB; USPAT	OR	ON	2012/12/12 18:21
S5	83	S3 and monitor\$3	US-PGPUB; USPAT	OR	ON	2012/12/12 18:22
S6	60	S3 and monitoring	US-PGPUB; USPAT	OR	ON	2012/12/12 18:23
S7	0	(CARTASITE).asnm.	US-PGPUB; USPAT	OR	ON	2012/12/12 18:24
S8	0	CARTASITE.asnm.	US-PGPUB; USPAT	OR	ON	2012/12/12 18:25
S9	0	(CARTASITE near inc).asnm.	US-PGPUB; USPAT	OR	ON	2012/12/12 18:26
S10	0	(CARTASITE near inc).asnm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2012/12/12 18:26

			DERWENT; IBM_TDB			
S11	12073	701/29 or 340/10.1.ccls.	US-PGPUB; USPAT	ADJ	ON	2012/12/17 11:00
S12	188	S11 and railway	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:01
S13	104	S12 and sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:01
S14	53	S13 and monitor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:01
S15	35	S11 and ("railway car")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:05
S16	23735	("railway car")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:10
S17	539	S16 and monitor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:11
S18	287	S17 and sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:11
S19	11	S18 and undercarriage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:11

S20	159	S16 and undercarriage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:31
S21	1103	"I20" and sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:31
S22	2754	"I10" and sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:31
S23	191	"I10" with sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:32
S24	78	S23 and monitor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:33
S25	13	("railway car") near undercarriage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 11:35
S26	3	"20100078527"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 12:05
S27	8	("20040173033" "20060176162" "20080156944" "5203089" "6008731" "6087950" "6539293" "7081824").PN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2012/12/17 12:09
S28	3	("6539293").URPN.	USPAT	ADJ	ON	2012/12/17 12:42
S29	44146	(railway near (car or vehicle))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	2012/12/17 12:53

			IBM_TDB			
S30	6	S29 and (dynamic near monitor\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 12:54
S31	19	S29 and (vibration near monitor\$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:02
S32	2	S29 and ((vibration near monitor\$3) and undercarriage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:43
S33	3	railway and ((vibration near monitor\$3) and undercarriage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:44
S34	100	("4480480").URPN.	USPAT	ADJ	ON	2012/12/17 13:49
S35	7	S34 and railway	USPAT	ADJ	ON	2012/12/17 13:49
S36	0	S34 and undercarriage	USPAT	ADJ	ON	2012/12/17 13:50
S37	0	S34 and undercarriage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:50
S38	100	("4480480").URPN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:50
S39	7	S34 and railway	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:50
S40	0	S34 and undercarriage	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2012/12/17 13:51

			JPO; DERWENT; IBM_TDB			
S41	298	S29 and undercarriage	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:54
S42	2	S41 and (monitor near vibration)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:55
S43	36	S41 and vibration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 13:55
S44	3	"20030030565"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2012/12/17 14:29
S45	20	("7034711").URPN.	USPAT	ADJ	ON	2012/12/17 18:04
S46	2	S45 and railway	USPAT	ADJ	ON	2012/12/17 18:05

12/ 18/ 2012 3:58:49 PM
C:\ Users\rbendidi\ Documents\ EAST\ Workspaces\ Case_13105293.wsp

Search Notes 	Application/Control No. 13105293	Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.
	Examiner RACHID BENDIDI	Art Unit 3664

SEARCHED			
Class	Subclass	Date	Examiner
701	20	12/18/2012	RB
340	10.1, 442, 686.1	12/18/2012	RB

SEARCH NOTES		
Search Notes	Date	Examiner
Search in class and subclasses in 701 and 340 consulted with the primary Mr. Bhavesh Amin	12/17/2012	RB

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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BIB DATA SHEET

CONFIRMATION NO. 2960

SERIAL NUMBER 13/105,293	FILING or 371(c) DATE 05/11/2011 RULE	CLASS 701	GROUP ART UNIT 3664	ATTORNEY DOCKET NO. 479.0002
APPLICANTS David L. Armitage, Golden, CO; Gregory Froim Kushnir, Denver, CO; Mark Alvin Mason, Thornton, CO; Theodore Cutler Johnson JR., Frisco, CO;				
** CONTINUING DATA ***** This appln claims benefit of 61/333,428 05/11/2010				
** FOREIGN APPLICATIONS *****				
** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 05/20/2011				
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and Acknowledged <u>/RACHID BENDIDI/</u> Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY CO	SHEETS DRAWINGS 6	TOTAL CLAIMS 20
INDEPENDENT CLAIMS 2				
ADDRESS Setter Roche LLP P.O. Box 780 Erie, CO 80516 UNITED STATES				
TITLE DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE				
FILING FEE RECEIVED 462	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit	

<i>Index of Claims</i> 	Application/Control No. 13105293	Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.
	Examiner RACHID BENDIDI	Art Unit 3664

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	12/17/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: David L. Armitage

Confirmation No.: 2960

Application No.: 13/105,293

Art Unit: 3664

Filed: 05/11/2011

Examiner: Rachid Bendidi

For: DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

Mail Stop: Amendment

Commissioner for Patents

P. O. Box 1450

Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE

In response to the Office Action dated 12/31/2012, please enter the present amendments and consider the following remarks.

In the Claims:

1. (CURRENTLY AMENDED) A mobile railway car monitoring system, comprising:
a plurality of sensor nodes coupled to an undercarriage portion of a railway car;
a control node coupled to the railway car;

wherein each of the plurality of sensor nodes is configured to monitor the undercarriage portion of the railway car when in motion and transmit information about the undercarriage portion to the control node; and

wherein the control node is configured to receive the information about the undercarriage portion, process the information by at least monitoring for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes to determine a fault condition for the undercarriage portion, and wirelessly report the fault condition to a collection system.
2. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to wirelessly transmit the information about the undercarriage portion to the control node.
3. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is magnetically coupled to the undercarriage portion of the railway car.
4. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein the control node is configured to process the information received from each of the plurality of sensor nodes over a period of time to determine a dynamic threshold for reporting the fault condition.
5. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein the control node is configured to wirelessly report the fault condition over a wireless network.

6. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to transfer the information about the undercarriage portion over a radio frequency identification (RFID) interface.
7. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein the control node is configured to wirelessly receive the information from each of the plurality of sensor nodes over a radio frequency identification (RFID) interface.
8. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein each of the plurality of sensor nodes is configured to monitor vibration of the undercarriage portion of the railway car to determine vibration information, and wherein the information comprises the vibration information.
9. (CANCELED)
10. (ORIGINAL) The mobile railway car monitoring system of claim 1, wherein the undercarriage portion comprises a population of wheels, and wherein the fault condition for the undercarriage portion comprises a deviation in the information for at least one wheel of the population of wheels from the information for the population of wheels.

11. (CURRENTLY AMENDED) A method of operating a mobile railway car monitoring system, the method comprising:

in each of a plurality of sensor nodes coupled to an undercarriage portion of a railway car, monitoring the undercarriage portion of the railway car when in motion and transmitting information about the undercarriage portion to a control node coupled to the railway car; and

in the control node, receiving the information about the undercarriage portion, processing the information by at least monitoring for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes to determine a fault condition for the undercarriage portion, and wirelessly reporting the fault condition to a collection system.

12. (ORIGINAL) The method of claim 11, wherein transmitting the information about the undercarriage portion to the control node comprises, in each of the plurality of sensor nodes, wirelessly transmitting the information about the undercarriage portion to the control node.

13. (ORIGINAL) The method of claim 11, wherein each of the plurality of sensor nodes is magnetically coupled to the undercarriage portion of the railway car.

14. (ORIGINAL) The method of claim 11, comprising:

in the control node, processing the information received from each of the plurality of sensor nodes over a period of time to determine a dynamic threshold for reporting the fault condition.

15. (ORIGINAL) The method of claim 11, wherein wirelessly reporting the fault condition to the collection system comprises wirelessly reporting the fault condition over a wireless network.

16. (ORIGINAL) The method of claim 11, wherein transmitting the information about the undercarriage portion to the control node comprises, in each of the plurality of sensor nodes, transferring the information about the undercarriage portion over a radio frequency identification (RFID) interface.

17. (ORIGINAL) The method of claim 11, wherein receiving the information about the undercarriage portion comprises, in the control node, wirelessly receiving the information from each of the plurality of sensor nodes over a radio frequency identification (RFID) interface.

18. (ORIGINAL) The method of claim 11, comprising:

in each of the plurality of sensor nodes, monitoring vibration of the undercarriage portion of the railway car to determine vibration information, wherein the information comprises the vibration information.

19. (CANCELED)

20. (ORIGINAL) The method of claim 11, wherein the undercarriage portion comprises a population of wheels, and wherein the fault condition for the undercarriage portion comprises a deviation in the information for at least one wheel of the population of wheels from the information for the population of wheels.

REMARKS

Claims 1-20 are pending and stand rejected. Claims 1 and 11 are amended herein. Claims 9 and 19 are canceled herein. The Applicant respectfully requests consideration of the following remarks and allowance of the claims.

35 U.S.C. § 102(b) Rejection of Claims 1, 2, 4, 5, 8-12, 14, 15, and 18-20

Claims 1, 2, 4, 5, 8-12, 14, 15, and 18-20 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Sakatani (U.S. Patent No. 7,034,711). The applicant respectfully traverses the rejections for at least the following reasons.

Claim 1 has been amended herein to recite limitations found in dependent claim 9, namely "wherein the control node is configured to receive the information about the undercarriage portion, process the information *by at least monitoring for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes* to determine a fault condition for the undercarriage portion...." Sakatani does not teach or suggest at least the above portion of claim 1.

Sakatani discusses railway cars and wireless sensors for the wheels of the railway car (Sakatani, Figure 1 and abstract). However, Sakatani fails to teach or suggest at least "process the information *by at least monitoring for patterns of deviation in the information from a population of sensors comprising each of the plurality of sensor nodes* to determine a fault condition for the undercarriage portion..." as recited in claim 1.

Specifically, Sakatani merely discusses *individual* sensors detecting fault conditions based on *predetermined thresholds*, such as reference value setting circuit 234 of Figure 23 of Sakatani, or reference voltage generating circuit 434 of Figure 28 of Sakatani. Further discussion of these *predetermined thresholds* can be found in column 10, lines 51-53; column 12, lines 63-65; and column 15, lines 45-50 of Sakatani. Thus, Sakatani merely discusses *conventional* threshold failure detection on a *single* sensor using a predetermined, or static, threshold which is *set in advance* (Sakatani, column 15, lines 45-50, and column 11, lines 15-29).

In contrast, claim 1 recites monitoring of *patterns of deviation* from a *population* of sensors. The patterns of deviation from a population of sensors recited in claim 1 are not taught or suggested by the predetermined thresholds of individual sensors discussed in Sakatani.

Moreover, Sakatani discusses each sensor *individually* processing data and only reporting *individual faults* to the management apparatus (Sakatani, column 32, lines 8-21, and column 11, lines 61-67).

Amended independent claim 11 recites similar limitations as independent claim 1, and a further discussion of claim 11 is omitted for brevity. Furthermore, dependent claims 2, 4, 5, 8-10, 12, 14, 15, and 18-20 depend from associated independent claims 1 and 11. The Applicant therefore refrains from a further discussion of the rejection of claims 2, 4, 5, 8-10, 12, 14, 15, and 18-20 for the sake of brevity.

Based on the above comments, claims 1, 2, 4, 5, 8-12, 14, 15, and 18-20 are allowable over the art of record and such indication by the Examiner is respectfully requested. Thus, the Applicant respectfully requests withdrawal of the 35 U.S.C. § 102(b) rejections of claims 1, 2, 4, 5, 8-12, 14, 15, and 18-20.

35 U.S.C. § 103(a) Rejections

Claims 3 and 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakatani in view of Oblizajek (U.S. Patent No. 6,714,858). Claims 6, 7, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Sakatani in view of LeFebvre (U.S. Patent Application Publication No. 2007/0175107). The applicant respectfully traverses the rejections for at least the following reasons.

Dependent claims 3, 6, 7, 13, 16, and 17 depend from associated independent claims 1 and 11. The Applicant therefore refrains from a further discussion of the rejection of claims 3, 6, 7, 13, 16, and 17 for the sake of brevity, and the Applicant respectfully requests withdrawal of the 35 U.S.C. § 103(a) rejections of claims 3, 6, 7, 13, 16, and 17.

CONCLUSION

Based on the above remarks, the Applicant submits that the claims in their present form are allowable. The Applicant further submits that additional reasons in support of patentability exist, but such reasons are omitted in the interests of clarity and brevity. No estoppel is intended, and no estoppel should apply, to assertions in the recent Office Action that are not refuted herein by the Applicant. The Applicant respectfully requests allowance of the claims at the Examiner's earliest convenience.

The Applicant believes there are no fees due with respect to this filing. However, if the Office determines additional fees are necessary, the Office is hereby requested to contact the undersigned to arrange for payment of any applicable fees.

Respectfully submitted,

/David J. Bovitz/

SIGNATURE OF PRACTITIONER

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CUSTOMER NO. 76444

Setter Roche LLP

P.O. Box 780

Erie, CO 80516

Electronic Acknowledgement Receipt

EFS ID:	15348500
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	76444
Filer:	David J. Bovitz/Sarah McLaughlin
Filer Authorized By:	David J. Bovitz
Attorney Docket Number:	479.0002
Receipt Date:	25-MAR-2013
Filing Date:	11-MAY-2011
Time Stamp:	18:27:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	OAResponse.pdf	45841 4c1b4505440d19ab380e1b7f2b71236cedd 38572	no	8

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/105,293	Filing Date 05/11/2011	☐ To be Mailed
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ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO**APPLICATION AS FILED – PART I**

(Column 1)

(Column 2)

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	03/25/2013	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	* 18	Minus	** 20	= 0	X \$40 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X \$210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

(Column 1)

(Column 2)

(Column 3)

AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	Minus	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
						TOTAL ADD'L FEE

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/KIM P. DOZIER/

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76444 7590 06/10/2013
Setter Roche LLP
P.O. Box 780
Erie, CO 80516

EXAMINER

BENDIDI, RACHID

ART UNIT

PAPER NUMBER

3664

DATE MAILED: 06/10/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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13/105,293

05/11/2011

David L. Armitage

479.0002

2960

TITLE OF INVENTION: DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$300	\$0	\$1190	09/10/2013

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

76444 7590 06/10/2013
Setter Roche LLP
P.O. Box 780
Erie, CO 80516

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/105,293	05/11/2011	David L. Armitage	479.0002	2960

TITLE OF INVENTION: DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$300	\$0	\$1190	09/10/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BENDIDI, RACHID	3664	701-029000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



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.
13/105,293	05/11/2011	David L. Armitage	479.0002	2960
76444	7590	06/10/2013	EXAMINER	
Setter Roche LLP P.O. Box 780 Erie, CO 80516			BENDIDI, RACHID	
			ART UNIT	PAPER NUMBER
			3664	
DATE MAILED: 06/10/2013				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 173 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 173 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/105,293	Applicant(s) ARMITAGE ET AL.	
	Examiner RACHID BENDIDI	Art Unit 3664	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 03/25/2013.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 1-8, 10-18 and 20. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
Certified copies:
a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
* Certified copies not received: _____.

Interim copies:
a) ☐ All b) ☐ Some c) ☐ None of the: Interim copies of the priority documents have been received.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892) 2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____ 3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material 4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.	5. ☒ Examiner's Amendment/Comment 6. ☐ Examiner's Statement of Reasons for Allowance 7. ☐ Other _____.
---	--

/RACHID BENDIDI/
Examiner, Art Unit 3664

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Thomas Dougherty on 05/30/2013.

The application has been amended as follows:

Claim 11, line 6 replace --processing -- with "processing via processing circuitry"

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RACHID BENDIDI whose telephone number is (571)272-4896. The examiner can normally be reached on M-F From 8:00 - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, khoi Tran can be reached on 571-272-6919. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

Art Unit: 3664

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RACHID BENDIDI/

Examiner, Art Unit 3664

/KHOI TRAN/

Supervisory Patent Examiner, Art Unit 3664

Search Notes 	Application/Control No. 13105293	Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.
	Examiner RACHID BENDIDI	Art Unit 3664

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
701	20	12/18/2012	RB
340	10.1, 442, 686.1	12/18/2012	RB

SEARCH NOTES		
Search Notes	Date	Examiner
Search in class and subclasses in 701 and 340	12/17/2012	RB
Inventor search	12/17/2012	RB
Assignee search	12/17/2012	RB
Google search	12/17/2012	RB
EAST search see history	12/17/2012	RB
Interference search see history	5/30/2013	RB

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
ALL	ALL	5/30/2013	RB

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Issue Classification 	Application/Control No. 13105293	Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.
	Examiner RACHID BENDIDI	Art Unit 3664

CPC		
Symbol	Type	Version

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION										
CLASS			SUBCLASS			CLAIMED					NON-CLAIMED					
701			20			G	0	5	D	1 / 00 (2006.01.01)						
CROSS REFERENCE(S)						G	0	5	D	3 / 00 (2006.01.01)						
						G	0	6	F	7 / 00 (2006.01.01)						
						G	0	6	F	17 / 00 (2006.01.01)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)															
701	19															
340	10.1															

/RACHID BENDIDI/ Examiner.Art Unit 3664 (Assistant Examiner)	05/30/2013 (Date)	Total Claims Allowed: 18	
/KHOI TRAN/ Supervisory Patent Examiner.Art Unit 3664 (Primary Examiner)	06/02/2013 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure Figure 1

Issue Classification 	Application/Control No. 13105293	Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.
	Examiner RACHID BENDIDI	Art Unit 3664

☐ Claims renumbered in the same order as presented by applicant															
☐ CPA															
☐ T.D.															
☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	18												
2	2	18	20												
3	3														
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15	16														
16	17														

/RACHID BENDIDI/ Examiner.Art Unit 3664	05/30/2013	Total Claims Allowed: 18	
(Assistant Examiner)	(Date)		
/KHOI TRAN/ Supervisory Patent Examiner.Art Unit 3664	06/02/2013	O.G. Print Claim(s) 1	O.G. Print Figure Figure 1
(Primary Examiner)	(Date)		

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	0	(railway near5 car) and((plurality or many)near5 sensor\$2) same undercarriage same (control near5 node) same (monitor near5 (undercarriage or undercar)) same (motion or mov\$3) same (transmit\$3 near5 information) same (recieve\$3) same (process\$3 near5 information) same (monitor\$3 near5 pattern\$1 near5 (deviation or error or anomaly or abnormality or difference or variation or change)) same (information or info or datapoint\$1) same (determine\$3 near5 (fault or flaw or error) near5 condition) same (wireless\$3 near5 report) same (collection near (system or computer or server)).clm.	US-PGPUB; USPAT; UPAD	AND	ON	2013/05/30 09:58
S78	0	(railway near5 car) and((plurality or many)near5 sensor\$2) same undercarriage same (control near5 node) same (monitor near5 (undercarriage or undercar)) same (motion or mov\$3) same (transmit\$3 near5 information) same (recieve\$3) same (process\$3 near5 information) same (monitor\$3 near5 pattern\$1 near5 (deviation or error or anomaly or abnormality or difference or variation or change)) same (information or info or datapoint\$1) same (determine\$3 near5 (fault or flaw or error) near5 condition) same (wireless\$3 near5 report) same (collection near (system or computer or server)).clm.	US-PGPUB; USPAT; UPAD	ADJ	ON	2013/05/29 17:47
S79	0	(railway near5 car) and((plurality or many)near5 sensor\$2) same undercarriage same (control near5 node) same (monitor near5 (undercarriage or undercar)) same (motion or mov\$3) same (transmit\$3 near5 information) same (recieve\$3) same (process\$3 near5 information) same (monitor\$3 near5 pattern\$1 near5 (deviation or error or anomaly or abnormality or difference or variation or change)) same (information or info or datapoint\$1) same (determine\$3 near5 (fault or flaw or error) near5 condition) same (wireless\$3 near5 report) same (collection near (system or computer or server)).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/05/29 17:48

5/ 30/ 2013 10:08:04 AM

C:\ Users\ rbendidi\ Documents\ EAST\ Workspaces\ Case_13105293.wsp

<i>Index of Claims</i> 	Application/Control No. 13105293	Applicant(s)/Patent Under Reexamination ARMITAGE ET AL.
	Examiner RACHID BENDIDI	Art Unit 3664

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant				☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM		DATE							
Final	Original	12/17/2012	05/30/2013						
1	1	✓	=						
2	2	✓	=						
3	3	✓	=						
4	4	✓	=						
5	5	✓	=						
6	6	✓	=						
7	7	✓	=						
8	8	✓	=						
	9	✓	-						
9	10	✓	=						
10	11	✓	-						
11	12	✓	=						
12	13	✓	=						
13	14	✓	=						
14	15	✓	=						
15	16	✓	=						
16	17	✓	=						
17	18	✓	=						
	19	✓	-						
18	20	✓	=						

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

76444 7590 06/10/2013
Setter Roche LLP
P.O. Box 780
Erie, CO 80516

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Sarah McLaughlin	(Depositor's name)
/Sarah McLaughlin/	(Signature)
September 10, 2013	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/105,293	05/11/2011	David L. Armitage	479.0002	2960

TITLE OF INVENTION: DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$890	\$300	\$0	\$1190	09/10/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BENDIDI, RACHID	3664	701-029000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Cartasite, Inc.

Denver, Colorado

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☒ Issue Fee

☒ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

☐ A check is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Thomas A. Dougherty/

Date 9/10/2013

Typed or printed name Thomas A. Dougherty

Registration No. 51,214

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Electronic Patent Application Fee Transmittal

Application Number:	13105293			
Filing Date:	11-May-2011			
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE			
First Named Inventor/Applicant Name:	David L. Armitage			
Filer:	Thomas A. Dougherty/Sarah McLaughlin			
Attorney Docket Number:	479.0002			
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	2501	1	890	890
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1190

Electronic Acknowledgement Receipt	
EFS ID:	16809635
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	76444
Filer:	Thomas A. Dougherty/Sarah McLaughlin
Filer Authorized By:	Thomas A. Dougherty
Attorney Docket Number:	479.0002
Receipt Date:	10-SEP-2013
Filing Date:	11-MAY-2011
Time Stamp:	13:18:06
Application Type:	Utility under 35 USC 111(a)

Payment information:				
Submitted with Payment	yes			
Payment Type	Credit Card			
Payment was successfully received in RAM	\$1190			
RAM confirmation Number	12694			
Deposit Account				
Authorized User				
File Listing:				
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part / Zip (if appl.)

1	Issue Fee Payment (PTO-85B)	IssueFeeTransmittal.pdf	127472 757168d811a5912991bf74f5c985db05324e1b78	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32027 0c7fd1b7adb567d2394db3372d2e86825a8b0cbc	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			159499		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/105,293	10/15/2013	8560151	479.0002	2960

76444 7590 09/25/2013
Setter Roche LLP
P.O. Box 780
Erie, CO 80516

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 173 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

David L. Armitage, Golden, CO;
Gregory Froim Kushnir, Denver, CO;
Mark Alvin Mason, Thornton, CO;
Theodore Cutler Johnson JR., Frisco, CO;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/105,293
Filing Date	05-11-2011
First Named Inventor	David L. Armitage
Title	Dynamic Monitoring of Mobile Railway Car Undercarriage
Art Unit	3664
Examiner Name	Rachid Bendidi
Attorney Docket Number	479.0002

SIGNATURE of Applicant or Patent Practitioner

Signature	/Thomas A. Dougherty/	Date (Optional)	
Name	Thomas A. Dougherty	Registration Number	51214
Title (if Applicant is a juristic entity)	Attorney of Record		
Applicant Name (if Applicant is a juristic entity)	Cartasite Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☒ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

- ☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:
- OR
- ☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☒ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

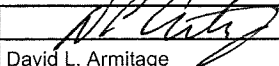
Firm or Individual Name				
Address				
City	State	Zip		
Country				
Telephone	Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	David L. Armitage		
Title	Chief Operating Officer		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☒ Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	18045223
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	76444
Filer:	Thomas A. Dougherty
Filer Authorized By:	
Attorney Docket Number:	479.0002
Receipt Date:	28-JAN-2014
Filing Date:	11-MAY-2011
Time Stamp:	15:58:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA-13105293.pdf	114732 aff4ae29066b67bb56d956d1a8c2a4e079acac88	no	2

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	

27104
FENNEMORE CRAIG, P.C.
1700 Lincoln Street
SUITE 2900
DENVER, CO 80203

CONFIRMATION NO. 2960
POA ACCEPTANCE LETTER



Date Mailed: 02/11/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/28/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/dtvernon/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	479.0002

76444
Setter Roche LLP
14694 Orchard Parkway
Building A, Suite 200
Westminster, CO 80020

CONFIRMATION NO. 2960
POWER OF ATTORNEY NOTICE



Date Mailed: 02/11/2014

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/28/2014.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/dtvernon/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**REQUEST FOR WITHDRAWAL
AS ATTORNEY OR AGENT AND
CHANGE OF
CORRESPONDENCE ADDRESS**

Application Number	13/105,293
Filing Date	May 11, 2011
First Named Inventor	David L. Armitage
Art Unit	3664
Examiner Name	BENDIDI, Richard
Practitioner Docket Number	CAR.0002 (036266.0004)

**To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450**

Please withdraw me as attorney or agent for the above-identified patent application, and

- ☐ all the practitioners of record;
- ☐ the practitioners (with registration numbers) of record listed on the attached paper(s); or
- ☒ the practitioners of record associated with Customer Number: 27104 and 27887

NOTE: The immediately preceding box should only be marked when the practitioners were appointed using the listed Customer Number.

The reason(s) for this request are those described in 37 CFR:

- | | | |
|---|---------------------------------------|--|
| ☐ 11.116(a)(1) | ☐ 11.116(a)(2) | ☒ 11.116(a)(3) |
| ☐ 11.116(b)(1) | ☐ 11.116(b)(2) | ☐ 11.116(b)(3) |
| ☐ 11.116(b)(4) | ☐ 11.116(b)(5) | ☐ 11.116(b)(6) |
| ☐ 11.116(b)(7) Please explain below: | | |

Certifications

Check each box below that is factually correct. WARNING: If a box is left unchecked, the request will likely not be approved.

- ☐ I/We have given reasonable notice to the client, prior to the expiration of the response period, that the practitioner(s) intend to withdraw from employment.
- ☒ I/We have delivered to the client or a duly authorized representative of the client all papers and property (including funds) to which the client is entitled.
- ☐ I/We have notified the client of any responses that may be due and the time frame within which the client must respond.

Please provide an explanation, if necessary:

Client transferred this application to registered practitioner Thomas A. Dougherty (PTO Reg. No. 51,214), who recently left the firm.

[Page 1 of 2]

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Complete the following section only when the correspondence address will change. Changes of address will only be accepted to an applicant.

Change the correspondence address and direct all future correspondence to:

A. ☐ The address of the applicant associated with Customer Number: _____

OR

B. ☐ Applicant

Address

City

State

Zip

Country

Telephone

Email

I am authorized to sign on behalf of myself and all withdrawing practitioners.

Signature **/Bruce E. Dahl/**

Name **Bruce E. Dahl**

Registration No. **33,670**

Address **1700 Lincoln Street, Suite 2900, Denver, CO 80203**

City **Denver**

State **CO**

Zip **80203**

Country **US**

Date **December 30, 2014**

Telephone No. **(303) 291-3200**

NOTE: Withdrawal is effective when approved rather than when received.

[Page 2 of 2]

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	21091101
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	27104
Filer:	Bruce E. Dahl/Tami Lawley
Filer Authorized By:	Bruce E. Dahl
Attorney Docket Number:	
Receipt Date:	30-DEC-2014
Filing Date:	11-MAY-2011
Time Stamp:	16:15:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition to withdraw attorney or agent (SB83)	aia008-CAR-0002_036266-0004.pdf	285979 f16eef871973a504fd615ab35a52628b8da008b	no	3

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA/82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/105,293
Filing Date	05-11-2011
First Named Inventor	David L. Armitage
Title	Dynamic Monitoring of Mobile Railway Car Undercarriage
Art Unit	3664
Examiner Name	Rachid Bendidi
Attorney Docket Number	36907-6 CAR.0002

SIGNATURE of Applicant or Patent Practitioner

Signature	/Thomas A. Dougherty/	Date (Optional)	5/5/15
Name	Thomas A. Dougherty	Registration Number	51214
Title (if Applicant is a juristic entity)	Attorney for Applicant		
Applicant Name (if Applicant is a juristic entity)	Cartasite, Inc.		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 3 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date
13/105,293	05-11-2011

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☒ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

128,446

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☒ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name	Thomas Dougherty for Lewis Brisbois Bisgaard & Smith LLP				
Address	1700 Lincoln Street, Suite 4000				
City	Denver	State	CO	Zip	80203
Country	United States of America				
Telephone	303-861-7760	Email	Thomas.Dougherty@lewisbrisbois.com		

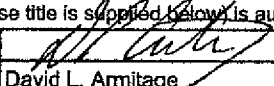
I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Cartasite, Inc.

- ☐ Inventor or Joint Inventor (title not required below)
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	David L. Armitage		
Title	Chief Operating Officer		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☒ Total of 3 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

POWER OF ATTORNEY BY APPLICANT

No more than ten (10) patent practitioners total may be appointed as set forth below by name and registration number. This page need not be submitted if appointing the Patent Practitioner(s) associated with a Customer Number (see form PTO/AIA/82B):

Name	Registration Number
Jon Hokanson	30069
Josephine Brosas	66679
Jonathan Kepko	70303
Thomas A. Dougherty	51214
Yangyang Li	70554

Electronic Acknowledgement Receipt

EFS ID:	22263428
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	27104
Filer:	Thomas A. Dougherty/Guila Ahern
Filer Authorized By:	Thomas A. Dougherty
Attorney Docket Number:	
Receipt Date:	05-MAY-2015
Filing Date:	11-MAY-2011
Time Stamp:	18:00:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	CAR0002PowerofAttorneybyAp plicant.pdf	94705 7d28994230f64b6ad154941892009367867 da54f	no	3

Warnings:

Information:

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	

27104
FENNEMORE CRAIG, P.C.
1700 Lincoln Street Suite 2400
DENVER, CO 80203

CONFIRMATION NO. 2960
MISCELLANEOUS NOTICE



Date Mailed: 05/11/2015

A communication which cannot be delivered in electronic form has been mailed to the applicant.



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 Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	

CONFIRMATION NO. 2960

27104
 FENNEMORE CRAIG, P.C.
 1700 Lincoln Street Suite 2400
 DENVER, CO 80203



OC000000075102772

Cc: THOMAS A. DOUGHERTY, P.C.
 5359 S. JAY DR.
 LITTLETON, CO 80123

Date Mailed: 05/11/2015

DENIAL OF REQUEST FOR POWER OF ATTORNEY

The request for Power of Attorney filed 05/05/2015 is acknowledged. However, the request cannot be granted at this time for the reason stated below.

- ☐ The Power of Attorney you provided did not comply with the new Power of Attorney rules that became effective on June 25, 2004. See 37 CFR 1.32.
- ☐ The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.
- ☒ The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73(c) has not been received.
- ☐ The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
- ☐ The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
- ☐ The signature(s) of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor(s).
- ☐ The person(s) appointed in the Power of Attorney is not registered to practice before the U.S. Patent and Trademark Office.
- ☐ Only one Customer Number can be designated for the Power of Attorney in an application. The Customer Number that was captured is the first Customer Number provided on the Power of Attorney document.
- ☐ A request under 37 CFR 1.48 to add an inventor was granted in this application, however, no power of attorney consistent with the power of attorney granted by the originally named inventive entity has been received. Thus, the addition of the inventor has resulted in the loss of power of attorney in the application. See 37 CFR 1.32(e).



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

- ☐ The power of attorney has not been accepted because the party who is giving power of attorney has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A patent owner who was not the applicant must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).
- ☐ The power of attorney from the inventors has not been accepted because it is a copy from a prior national application for which benefit is claimed and the continuing application names an inventor who was not named as an inventor in the prior application.
- ☐ The power of attorney from the inventors has not been accepted because the power of attorney must be signed by the applicant for patent. See 37 CFR 1.32(b)(4).
- ☐ Any request to correct or update the name of the applicant must include an application data sheet (ADS) in compliance with 37 CFR 1.76 specifying the correct or updated name of the applicant in the applicant information section. Any request to change the applicant after an original applicant has been specified under 37 CFR 1.46(b) must include a new ADS in compliance with 37 CFR 1.76 specifying the applicant in the applicant information section and comply with 37 CFR 3.71 and 3.73. See 37 CFR 1.46(c).

Any inquiries regarding this notice should be directed to the Application Assistance Unit at 571-272-4200.

A handwritten signature in black ink, appearing to be a stylized 'h' or 'k', is written above a horizontal line.

Application Assistance Unit
571-272-4200

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/105,293
Filing Date	2011-05-11
First Named Inventor	David L. Armitage
Title	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
Art Unit	3664
Examiner Name	Rachid Bendidi
Attorney Docket Number	453005USP

SIGNATURE of Applicant or Patent Practitioner

Signature	/Richard J. Holzer, Jr./	Date (Optional)	
Name	Richard J. Holzer, Jr.	Registration Number	42,668
Title (if Applicant is a juristic entity)	Attorney for Applicant		
Applicant Name (if Applicant is a juristic entity)	Cartasite, LLC		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐

*Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

16275

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR

Firm or
Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Cartasite, LLC



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

Name

David L. Armitage

Title

CEO

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of

forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Cartasite, LLC

Application No./Patent No.: 8560151 Filed/Issue Date: 2013-10-15

Titled: DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE

Cartasite, LLC, a Limited Liability Company
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;
2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or
3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

OR

B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: David L. Armitage, et al. To: Cartasite, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 026260, Frame 0661, or for which a copy thereof is attached.

2. From: Cartasite, Inc. To: Cartasite, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 029782, Frame 0732, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Richard J. Holzer, Jr./

5/18/2017

Signature

Date

Richard J. Holzer, Jr.

42,668

Printed or Typed Name

Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	30008225
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	27104
Filer:	Richard J. Holzer/Melanie Baum
Filer Authorized By:	Richard J. Holzer
Attorney Docket Number:	
Receipt Date:	07-AUG-2017
Filing Date:	11-MAY-2011
Time Stamp:	18:08:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA_453005USP.pdf	176889	no	2
			7843f32b97d7cf69b89fdc94a3d73611fb264d53		

Warnings:

The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing

Information:

2	Assignee showing of ownership per 37 CFR 3.73	Ownership-Statement_453005USP.pdf	426727	no	2
			c833b3c261e34534500d41ced82021c43130d677		

Warnings:

Information:

Total Files Size (in bytes):	603616
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New Applications Under 35 U.S.C. 111

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	453005USP

CONFIRMATION NO. 2960

POA ACCEPTANCE LETTER



16275
HolzerIPLaw, PC
dba Holzer Patel Drennan
216 16th Street
Suite 1350
Denver, CO 80202

Date Mailed: 08/15/2017

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/07/2017.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/rmohamed/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	

27104
FENNEMORE CRAIG, P.C.
1700 Lincoln Street Suite 2400
DENVER, CO 80203

CONFIRMATION NO. 2960 POWER OF ATTORNEY NOTICE



OC000000093424039

Date Mailed: 08/15/2017

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/07/2017.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/rmohamed/

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PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Patent Number	8,560,151
	Issue Date	2013-10-15
	First Named Inventor	David L. Armitage
	Title	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
	Attorney Docket No.	36907.06

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

128446

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

I am the:

☒ Applicant.

OR

☐ Patent owner.

Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

SIGNATURE of Applicant or Patent Owner.

Signature		Date	9.27.16
Name	Kyla Bassell	Telephone	
Title and Company	CEO, Cartasio, LLC		

NOTE: Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☐ A total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	34421018
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	16275
Filer:	Thomas A. Dougherty/Kimberly Taylor
Filer Authorized By:	Thomas A. Dougherty
Attorney Docket Number:	453005USP
Receipt Date:	28-NOV-2018
Filing Date:	11-MAY-2011
Time Stamp:	14:09:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	36907-6_POA.pdf	23666	no	1
			ed6c1b71c11d72890271b21839da0633b4 201657		

Warnings:

Information:	
Total Files Size (in bytes):	23666
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	



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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	453005USP

CONFIRMATION NO. 2960

POA ACCEPTANCE LETTER



16275
HolzerIPLaw, PC
dba Holzer Patel Drennan
216 16th Street
Suite 1350
Denver, CO 80202

Date Mailed: 12/04/2018

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 11/28/2018.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/dgela/

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13/105,293
Filing Date	May 11, 2011
First Named Inventor	DAVID L. ARMITAGE
Title	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
Art Unit	3664
Examiner Name	RACHID BENDIDI
Attorney Docket Number	GEOF01-00032

SIGNATURE of Applicant or Patent Practitioner

Signature	/Michael G. Rodriguez/	Date (Optional)	
Name	Michael G. Rodriguez	Registration Number	60,236
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number

Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)



I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:

23990

OR



I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:



The address associated with the above-mentioned Customer Number

OR



The address associated with Customer Number:

OR



Firm or Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Geoforce, Inc.



Inventor or Joint Inventor (title not required below)



Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)



Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)



Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature

Date (Optional)

Name

Kristie Blumenschein

Title

General Counsel, Geoforce, Inc.

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.



Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: **DAVID L. ARMITAGE**Application No./Patent No.: **13/105,293** Filed/Issue Date: **May 11, 2011**Titled: **DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE****GEOFORCE, INC.**, a **Delaware corporation**

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is ____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:
- David L. Armitage, Gregory Froim Kushnir,**
1. From: **Mark Alvin Mason, Theodore Cutler Johnson Jr.** To: **CARTASITE, INC.**
- The document was recorded in the United States Patent and Trademark Office at
- Reel **026260**, Frame **0661**, or for which a copy thereof is attached.
2. From: **CARTASITE, INC.** To: **CARTASITE, LLC**
- The document was recorded in the United States Patent and Trademark Office at
- Reel **029782**, Frame **0732**, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Page 142 of 147

Amsted Ex. 2005

IPR2023-00539

STATEMENT UNDER 37 CFR 3.73(c)3. From: CARTASITE, LLC To: GEOFORCE, INC.

The document was recorded in the United States Patent and Trademark Office at
 Reel 048551, Frame 0934, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).



As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael G. Rodriguez/
 Signature

2019-04-22
 Date

Michael G. Rodriguez
 Printed or Typed Name

60,236
 Title or Registration Number

[Page 2 of 2]

Electronic Acknowledgement Receipt

EFS ID:	35795622
Application Number:	13105293
International Application Number:	
Confirmation Number:	2960
Title of Invention:	DYNAMIC MONITORING OF MOBILE RAILWAY CAR UNDERCARRIAGE
First Named Inventor/Applicant Name:	David L. Armitage
Customer Number:	16275
Filer:	Michael George Rodriguez/Pamela Newton
Filer Authorized By:	Michael George Rodriguez
Attorney Docket Number:	453005USP
Receipt Date:	22-APR-2019
Filing Date:	11-MAY-2011
Time Stamp:	18:27:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
------------------------	----

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		GEOF01-00032-POA.pdf	277735	yes	4
			f8977072b6c540a5cb1eca53123e8dd2893 b7a56		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Power of Attorney	1	2
	Assignee showing of ownership per 37 CFR 3.73	3	4
Warnings:			
Information:			
Total Files Size (in bytes):		277735	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.			



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	GEOF01-00032

CONFIRMATION NO. 2960

POA ACCEPTANCE LETTER

23990
DOCKET CLERK
P.O. DRAWER 800889
DALLAS, TX 75380



Date Mailed: 04/25/2019

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/22/2019.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/vnguyen/



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/105,293	05/11/2011	David L. Armitage	453005USP

CONFIRMATION NO. 2960

POWER OF ATTORNEY NOTICE



16275
HolzerIPLaw, PC
dba Holzer Patel Drennan
216 16th Street
Suite 1350
Denver, CO 80202

Date Mailed: 04/25/2019

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/22/2019.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/vnguyen/