

EXHIBIT 1076



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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
62/088,115	12/05/2014		130	LEO-2-P		

CONFIRMATION NO. 3874

44728

J. BENNETT MULLINAX, LLC
P. O. BOX 26029
GREENVILLE, SC 29616-1029

FILING RECEIPT



OC000000072445418

Date Mailed: 12/19/2014

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. 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**

Inventor(s)

Charles A. Leonard, Hickory, NC;

Applicant(s)

Charles A. Leonard, Hickory, NC;

Power of Attorney:

David Sigmon--52224

If Required, Foreign Filing License Granted: 12/17/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 62/088,115**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM
PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET – Page 1 of 2

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. _____

INVENTOR(S)		
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Charles A.	Leonard	Hickory, NC

Additional inventors are being named on the _____ separately numbered sheets attached hereto.

TITLE OF THE INVENTION (500 characters max):

 VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM
 PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES

Direct all correspondence to: **CORRESPONDENCE ADDRESS**

☒ The address corresponding to Customer Number: 44728

OR

☐ Firm or Individual Name

Address _____

City	State	Zip
Country	Telephone	Email

ENCLOSED APPLICATION PARTS (check all that apply)

☒ Application Data Sheet. See 37 CFR 1.76	☐ CD(s), Number of CDs _____
☒ Drawing(s) Number of Sheets <u>10</u>	☒ Other (specify) <u>Appendix to the Specification</u>
☒ Specification (e.g. description of the invention) Number of Pages <u>22</u>	

Fees Due: Filing Fee of \$250 (\$125 for small entity). If the specification and drawings exceed 100 sheets of paper, an application size fee is also due, which 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).

METHOD OF PAYMENT OF THE FILING FEE AND APPLICATION SIZE FEE FOR THIS PROVISIONAL APPLICATION FOR PATENT

☐ Applicant claims small entity status. See 37 CFR 1.27.	130.00 TOTAL FEE AMOUNT (\$)
☒ A check or money order made payable to the <i>Director of the United States Patent and Trademark Office</i> is enclosed to cover the filing fee and application size fee (if applicable).	
☐ Payment by credit card. Form PTO-2038 is attached.	
☒ The Director is hereby authorized to charge the filing fee and application size fee (if applicable) or credit any overpayment to Deposit Account Number: <u>50-3172</u>	

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. 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 10 hours 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.

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PROVISIONAL APPLICATION COVER SHEET

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PTO/SB/16 (09-11)

Approved for use through 05/31/2015. OMB 0651-0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.



No.



Yes, the name of the U.S. Government agency and the Government contract number are: _____

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SIGNATURE David M. Sigmon Date December 05, 2014

TYPED or PRINTED NAME David M. Sigmon REGISTRATION NO. 52,224
(if appropriate)

TELEPHONE 864-987-9696 Docket Number: LEO-2-P

ETN1076

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	LEO-2-P
		Application Number	
Title of Invention	VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor 1					Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
Mr.	Charles	A.	Leonard			
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service						
City	Hickory	State/Province	NC	Country of Residence	US	
Mailing Address of Inventor:						
Address 1		3702 Pinecrest Drive NE				
Address 2						
City	Hickory	State/Province	NC			
Postal Code	28601	Country	US			
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.						
Add						

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).		
☐ An Address is being provided for the correspondence Information of this application.		
Customer Number	44728	
Email Address	docketing@mullinaxpatent.com	Add Email Remove Email

Application Information:

Title of the Invention	VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES		
Attorney Docket Number	LEO-2-P	Small Entity Status Claimed	☒
Application Type	Provisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	10	Suggested Figure for Publication (if any)	ETN1076

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	LEO-2-P
		Application Number	
Title of Invention	VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES		

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application has not and will not be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.			
Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	44728		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.			
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).			
Remove			
Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Priority Claimed
			☐ Yes ☐ No
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	LEO-2-P
	Application Number	
Title of Invention	VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES	

Authorization to Permit Access:

☐ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

☒ Assignee ☐ Legal Representative under 35 U.S.C. 117

☐ Person to whom the inventor is obligated to assign. ☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Assignee is an Organization check here. ☐

Prefix	Given Name	Middle Name	Family Name	Suffix

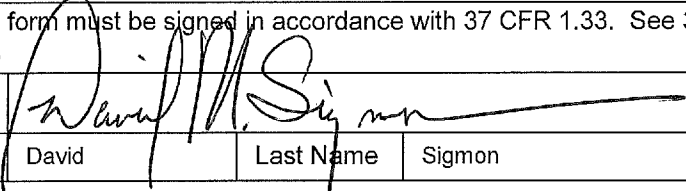
ETN1076

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	LEO-2-P
		Application Number	
Title of Invention	VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES		

Mailing Address Information:			
Address 1			
Address 2			
City		State/Province	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications					
Signature			Date (YYYY-MM-DD)	2014-12-05	
First Name	David	Last Name	Sigmon	Registration Number	52224
Additional Signature may be generated within this form by selecting the Add button.					

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

DESCRIPTION

VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES

TECHNICAL FIELD

The present subject matter relates to leveling systems and processes for leveling vehicles, such as recreational vehicles. The present subject matter also relates to computer program products for leveling vehicles, such as recreational vehicles, using smart devices.

BACKGROUND

Whether in a storage or use state, a recreational vehicle (RV) should be leveled for both practical and technical reasons. Practical reasons include a level floor, proper door swings, stove and sink use, as well as many others. Technical reasons include proper operation of the ammonia based refrigerator, level holding tanks for proper level detection by electronic means and for the proper operation of the plumbing and various other systems. Some higher end Class A RV's have onboard leveling systems that utilize digital sensors and hydraulic jacks, but most do not have any native leveling capability beyond the raising and lowering of the front of the RV using manual or electric jacks. Level indicators are generally bubble levels attached to both the side and front or rear of the RV. In addition, there are many other vehicles and trailers that require a level position to operate properly such as food vending trucks, mobile medical trailers, transport trailers and in some cases heavy equipment although there are many others.

The described device provides leveling indication for the 2 main axes of the RV (side-to-side and front-to-back). For the purposes of describing both the typical and proposed leveling method, pitch will be defined as the angle of the RV from front to back and roll will be defined as the angle of the RV from side to side.

The typical RV leveling method is described. Once the RV has been moved into the desired location and orientation for use, the driver must exit the RV or tow vehicle to inspect the current level condition of the RV by using the bubble levels attached to the RV. The first step is to level the roll of the RV. Typically this is done by driving or towing the appropriate RV wheels onto a board, block or other object to raise one side of the RV closer to level. Since the bubble levels being used do not give any exact information regarding the amount the RV is out of level, it is an educated guess at best to determine just how high the appropriate wheels must be raised. Typically, this is a trial and error system requiring the driver to make multiple attempts at raising the appropriate wheels the necessary amount to achieve a level position. Each attempt requires the driver to get back into the vehicle to move the wheels off of the previously placed object being used to raise wheels, exit the vehicle to add or take away from the height of the object being used to raise the wheels, enter the vehicle again to drive or tow the wheels back onto the object being used to raise the wheels and finally exiting the vehicle again to check the new roll orientation relative to level. It is not uncommon for this process to be repeated several times to achieve a level roll orientation. If bubble levels are being used to determine a level orientation, it is common knowledge that a bubble between the lines on a bubble level has an error range of 2-3 degrees. This can be a significant error amount as it relates to RV's and can cause doors, plumbing and

other objects and systems within the RV not to operate properly. Once the roll orientation is level, the pitch orientation leveling operation must be completed. Typically, the bubble level mounted to the side of the RV will be used in this process. In the case of a towable RV, this process generally involves using the jack(s) on the front of the RV to raise or lower the front of the RV until a level position is achieved. Since the upward travel of the jack(s) is limited, it is sometimes required to place blocks or some other object under the jack to enable the jack(s) to raise the front of the RV high enough to achieve a level position. Placing blocks or other objects under the jack(s) requires the RV to be reattached to the tow vehicle, the jack(s) raised, blocks or objects placed under the jack(s), the jack(s) lowered onto the blocks or objects and then released from the tow vehicle. In the case of a driveable RV, the same iterative process used to level the roll of the RV is necessary to level the pitch of the RV. This process may require many attempts as in the case of leveling the roll of the RV.

As such, a need exists for a system for easily and inexpensively leveling a recreational vehicle that does require not many attempts to achieve a level balance of the recreational vehicle in both the pitch and the roll directions.

SUMMARY

The present subject matter provides leveling vehicles, such as recreational vehicles, and related systems and processes.

The present subject matter also relates to computer program products for leveling vehicles, such as recreational vehicles, using smart devices. The subject matter described herein may be implemented in software, in combination with hardware and/or firmware. For example, the subject matter described herein may be implemented in

software executed by a hardware-enabled processor. In one exemplary implementation, the subject matter described herein of using leveling information for leveling a vehicle, such as a recreational vehicle, may be implemented using a non-transitory computer readable medium having stored thereon executable instructions that when executed by the processor of a computer control the processor to perform steps. Exemplary non-transitory computer readable media suitable for implementing the subject matter described herein include chip memory devices or disk memory devices accessible by a processor, programmable logic devices, and application specific integrated circuits. In addition, a computer readable medium that implements the subject matter described herein may be located on a single computing platform or may be distributed across plural computing platforms. Further, it should be noted that the systems and methods utilize and can comprise recreational vehicle leveling systems, devices and their components and functionality described herein. These recreational vehicle leveling systems and devices constitute special purpose devices that improve the technological field of providing guidance for and/or mechanisms for leveling recreational vehicles.

While one or more objects of the presently disclosed subject matter having been stated hereinabove, and which is achieved in whole or in part by the presently disclosed subject matter, other objects will become evident as the description proceeds when taken in connection with the accompanying drawings as best described hereinbelow.

BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure of the present subject matter including the best mode thereof to one of ordinary skill in the art is set forth more particularly in the remainder of the disclosures and the specification, including reference to the accompanying figures, in which:

Figure 1 illustrates a schematic side view of an embodiment of a recreational vehicle that includes an embodiment of leveling system according to the present subject matter;

Figure 2 illustrates a schematic front view of an embodiment of a recreational vehicle that includes an embodiment of leveling system according to Figure 1;

Figure 3 illustrates a screen shot of an embodiment of a software application on a smart device for use in an embodiment of the leveling system according to the present subject matter;

Figure 4 illustrates another screen shot of an embodiment of a software application on a smart device for use in an embodiment of the leveling system according to the present subject matter;

Figure 5 illustrates an additional screen shot of an embodiment of a software application on a smart device for use in an embodiment of the leveling system according to the present subject matter;

Figure 6 illustrates a further screen shot of an embodiment of a software application on a smart device for use in an embodiment of the leveling system according to the present subject matter;

Figure 7A illustrates a schematic front view of an embodiment of a recreational vehicle positioned at a desired location before leveling;

Figure 7B illustrates a schematic front view of the embodiment of the recreational vehicle according to Figure 7A positioned at a desired location after leveling in the roll direction according to the present subject matter;

Figure 8A illustrates a schematic side view of the embodiment of the recreational vehicle according to Figure 7A positioned at a desired location before leveling; and

Figure 8B illustrates a schematic side view of the embodiment of the recreational vehicle according to Figure 7A positioned at a desired location after leveling in the pitch direction according to the present subject matter.

Repeat use of reference characters in the present specification and drawings is intended to represent the same or analogous features or elements of the invention.

Other documentation and related information are provided herewith to further illustrate these and other aspects of the subject matter disclosed herein and to further provide disclosure that is enabling to one of ordinary skill in the art.

DETAILED DESCRIPTION

Reference now will be made to the embodiments of the present subject matter, one or more examples of which are set forth below. Each example is provided by way of an explanation of the present subject matter, not as a limitation. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present subject matter without departing from the scope or spirit of the present subject matter. For instance, features illustrated or described as one

embodiment can be used on another embodiment to yield still a further embodiment. Thus, it is intended that the present subject matter cover such modifications and variations as come within the scope of the appended claims and their equivalents. It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only, and is not intended as limiting the broader aspects of the present subject matter, which broader aspects are embodied in exemplary constructions.

Although the terms first, second, right, left, front, back, etc. may be used herein to describe various features, elements, components, regions, layers and/or sections, these features, elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one feature, element, component, region, layer or section from another feature, element, component, region, layer or section. Thus, a first feature, element, component, region, layer or section discussed below could be termed a second feature, element, component, region, layer or section without departing from the teachings of the disclosure herein.

Similarly, when a layer or coating is being described in the present disclosure as "on" or "over" another layer or substrate, it is to be understood that the layers can either be directly contacting each other or have another layer or feature between the layers, unless expressly stated to the contrary. Thus, these terms are simply describing the relative position of the layers to each other and do not necessarily mean "on top of" since the relative position above or below depends upon the orientation of the device to the viewer.

Embodiments of the subject matter of the disclosure are described herein with reference to schematic illustrations of embodiments that may be idealized. As such, variations from the shapes and/or positions of features, elements or components within the illustrations as a result of, for example but not limited to, user preferences, manufacturing techniques and/or tolerances are expected. Shapes, sizes and/or positions of features, elements or components illustrated in the figures may also be magnified, minimized, exaggerated, shifted or simplified to facilitate explanation of the subject matter disclosed herein. Thus, the features, elements or components illustrated in the figures are schematic in nature and their shapes and/or positions are not intended to illustrate the precise configuration of the subject matter and are not intended to limit the scope of the subject matter disclosed herein.

It is to be understood that the ranges and limits mentioned herein include all ranges located within the prescribed limits (i.e., subranges). For instance, a range from about 100 to about 200 also includes ranges from 110 to 150, 170 to 190, 153 to 162, and 145.3 to 149.6. Further, a limit of up to about 7 also includes a limit of up to about 5, up to 3, and up to about 4.5, as well as ranges within the limit, such as from about 1 to about 5, and from about 3.2 to about 6.5 as examples.

“Smart device,” or “mobile smart device,” as used herein means any mobile electronic device configured with imaging and/or computing capabilities that can process image and sensor data. Such smart devices can include, but are not limited to, at least one of a mobile smartphone, a personal digital assistant (PDA), a computing tablet, a personal media player, or any like mobile electronic device configured with imaging and/or computing capabilities. In some embodiments, the smart device may be

provisioned with a hardware-based processor that is configured to execute software programs or applications.

“Recreational vehicle leveling device,” and “RV leveling device” as used herein means a smart device that include at least one of a gyroscope, a digital compass, a tilt sensor, a digital accelerometer or some other digital angle measurement device or sensor therein that includes a software application that permits the smart device to measure and asset angles of inclination and/or orientation of a recreational vehicle to permit the pitch and roll of the recreational vehicle to be adjusted to level the recreational vehicle.

“Mobile smart device software application” as used herein means specific software applications for and used on a mobile smart device that can be in the form of a non-transitory computer readable medium comprising computer executable instructions embodied in a computer readable medium that when executed by a processor of a computer control of the smart device, the smart device can perform specific steps.

“Software” or “Software application” as used herein means software applications for and used on a computer, which can include, but is not limited to a mobile smart device, that can be in the form of a non-transitory computer readable medium comprising computer executable instructions embodied in a computer readable medium that when executed by a processor of a computer control of the computer, the computer can perform specific steps.

The leveling system, method, device, and/or computer program product embodiments described herein refer mainly to recreation vehicles. There are many other vehicles and trailers that require a level position to operate properly such as food

vending trucks, mobile medical trailers, transport trailers and in some cases heavy equipment although there are many others. It should be understood that that leveling system, method, device, and/or computer program product embodiments described herein can be used in conjunction with these other vehicles and/or trailers.

As stated above, the devices, systems, methods and computer program products relate to leveling an RV relative to the two main axes of the RV (side-to-side and front-to-back). As used herein to describe the proposed leveling method and shown in Figures 1 and 2, pitch is defined as the angle of the RV from front to back and roll will be defined as the angle of the RV from side to side. As shown in Figure 1, when adjusting the pitch, an embodiment of an RV **10** can be adjusted in pitch rotational directions **P** depend on the inclination of the RV from front-to-back. For example, if the RV **10** is inclined forward so that a rear section **12** is above a front section **14** proximal to a jack **26** of the RV **10**, then the pitch of RV **10** can be adjusted in the direction of arrow point **P₁**. If the RV **10** is inclined backward so that the front section **14** is above the rear section **12**, then the pitch can be adjusted in the direction of arrow point **P₂**. Similarly, as shown in Figure 2, when adjusting the roll, the RV **10** can be adjusted in roll rotational directions **R** depend on the inclination of the RV from side-to-side. For example, if the RV **10** is inclined forward so that a first side section **16** of the RV **10** is above a second side section **18** of the RV **10**, then the roll of RV **10** can be adjusted in the direction of arrow point **R₁**. If the RV **10** is inclined backward so that the second side section **14** is above the first side section **16**, then the pitch can be adjusted in the direction of arrow point **R₂**.

To accomplish the adjustments so that upon parking the RV **10**, the RV **10** be leveled in both the pitch and roll directions, a leveling system **20** can be provided that provides measurements to determine the amount of adjustment needed in both the pitch and roll directions. For example, the leveling system **20** can comprise sensor device **22** (shown schematically as a box) can be secured to the RV **10** to sense the inclination and/or orientation of the RV **10** in both the pitch and roll directions. Additionally the leveling system **20** can also comprise a smart device **24** that can be in communication with the sensor device **22**. For example, the smart device **24** can have a specific software application thereon that allows information received from the sensor device **22** about the inclination and/or orientation of the RV **10** to be processed to provide measurements to a user and to determine the amount of adjustments needed to the RV **10**. The smart device **24** and the sensor device can communicate with each other in a variety of ways. For example, in some embodiments, the sensor device **22** and smart device **24** can communicate through a wired connection. In some embodiments, as shown in Figures 1 and 2, the sensor device **22** and smart device **24** can communicate through wireless communications, such as Bluetooth.

As noted above, the sensor device **22** of the RV leveling system **20** is shown schematically, and while it is shown on the exterior front section of the RV **10**, it is noted that the sensor device can be located at a variety of locations and positions of the RV **10**. For example, the sensor device **22** can be on the rear, sides or at a central location of the RV **10**. Additionally, the sensor device **22** can be on the exterior, interior or inside the framework of the RV **10**. The sensor device **22** can comprise a printed circuit board ("PCB") that can include various digital sensors including digital accelerometers, digital

gyroscopes and other sensors required for accomplishing the desired functionality of the RV leveling system. The PCB can also include the components for Bluetooth or other wireless communication. The PCB can be battery powered or use other means of power such as AC or DC connections. The sensor device **22** can also comprise a housing or enclosure in which the PCB can be mounted for protection from damage and the environment.

In some embodiments, the smart device **24** can have a compatible wireless communication capability such as Bluetooth or other wireless communication protocol to obtain and/or share information from the PCB of the sensor device **22**. The smart device **24** can comprise software that is capable of communicating with the PCB of the sensor device **22**, storing information obtained from the PCB of the sensor device **22**, manipulating the information obtained from the PCB of the sensor device **22** and/or user input related to the inclination and/or orientation of the RV **10**, and displaying of information obtained from the PCB of the sensor device **22** and user input as well as information generated from the information obtained from the PCB of the sensor device **22** and/or the user input related to the inclination and/or orientation of the RV **10**. In the some embodiments, the smart device **24** can be a smartphone capable of storing and executing software applications.

Figures 3-6 illustrate embodiments of graphical user interface screens of an embodiment of a software application that can be used on the smart device **24**. Figure 3 illustrates a screen **28** of an entry or beginning screen through which a user can enter the software application. As shown in Figure 4, the software application can have the ability to accept user input relating to the RV **10**. For example, the software application

can prompt the user to enter information such as the measurements of the RV **10**, such as the length and the width of the RV **10**, that can be used to correctly calibrate the amount of adjustment needed in the pitch and roll directions. For example, as shown in Figure 4, the software application as shown in a screen **30** can be provide an entry cell **32** for entry of a width of the RV **10** as measured from the outside of a first wheel, or tire, on a first side of the RV **10** to the outside of a second wheel, or tire, on a second side of the RV **10** along an axle of the RV **10**. The screen **30** can also be provide an entry cell **34** for entry of a length of the RV **10** as measured from a center point of the axle(s) between the wheels to the jack **26** at the front of the RV **10**. The software application can store this information for use in calculating displayed information at the time of entry or at a later time. In some embodiments, the software application can save the entered information for recall at a later time as needed. In some embodiments, the software application can individually save information on multiple RV's that can be recalled at a later time as needed.

To begin, an initial level position can be determined for the RV to help determine any inconsistencies inherent in the leveling system, such as inconsistencies due to the installation or placement of the sensor device on the RV that may cause the sensor readings to be slightly off. The smart device **24** can be used in to determine the initial level position using the accelerometer, gyroscope and/or GPS functions therein through a portion of the software application, or a different software application, as shown in Figure 6 and described in more detail below. A typical digital or spirit level can also be used to achieve this initial level position. The smart device **24** can then capture, i.e., save and store the current pitch and roll angle measurements from the sensor device

22. These measurements will be used as offsets from the initial level position when displaying angles or calculating and displaying adjustment values necessary to move the RV back to the initial level position. Thus, the software application can determine if the measurements from sensor device **22** are slightly off when the RV is at the initial level position and then take those inconsistencies into consideration when taking measurement readings in the future.

In particular, the software application on the smart device **24** can have a calibration function as represented by a calibrate button **36** in the screen **30** for the initial set up of the software application. The calibrate button **36** can be used to obtain the current sensor readings in the roll and pitch directions from the sensor device **22** when the smart device **24** indicates that the vehicle is in an initial level position. This calibration can be done to compensate for any imperfections in the sensor readings that may derive from the installation and/or placement of the sensor device **22** on the vehicle **10**. Once this calibration function is completed, it does not necessarily need to be performed again. Additionally, in some embodiments as shown in Figure 4, the software application can have a conversion function as represented by the “inches” and “mm” buttons **38A**, **38B** in the screen **30**. These buttons **38A**, **38B** can be used to set and/or change the metrics system used to measure, calibrate, and compute. For example, as shown, the system used for measurements can be set and/or changed between U.S. Customary System (“inches”) and the Metric System (“mm”).

Once the calibration has been performed, the software application can be used determine the change in roll and the change in pitch needed for the given RV **10** based on measurements from the sensor device **22** at any given location. In some

embodiments, a user can activate the software application to initiate the measurements to determine the change in roll and pitch by simply opening the software application on the smart device **24** when connected to a wire communication with the sensor device **22** or within range of the sensor device **22** for a wireless communication connection, depending on how communication is setup between the smart device **24** and the sensor device **22**. In some embodiments, the software application can display an interface on a display screen, such as a button, once the software application is opened that can be activated to initiate this determination, or calculation, function.

Once the determination/calculation function is initiated and the change in roll and pitch calculated by software application, the determined change in roll and pitch can then be displayed as shown in a screen shot **40** in Figure 5. For example, a roll display **42** can be given as shown in Figure 5. Similarly, a pitch display **44** can be provided. The roll display **42** can provide, for example, the current angle from level for the roll directions measured in degrees and the amount of elevation change in inches or millimeters needed on a given side to level the RV in the roll direction. Similarly, the pitch display **44** can, for example, provide the current angle from level for the pitch directions measured in degrees and the amount of elevation change in inches or millimeters needed on either the front or the back to level the RV in the pitch direction. More particularly, for the change in pitch, the amount of elevation change can be affected by the moving of the jack **26** proximal the front section **14** up or down by the requisite distance displayed.

As shown in the screen **40** in Figure 5, the mobile smart device software application can also provide the ability to save a given pitch angle for the purpose of

returning to that position at a later time as illustrated by the "save hitch position" button **46** in screen **40**. To reuse the pitch angle that had been saved, a recall can be provided, such as recall button **48**. This functionality can be useful for travel trailers and fifth wheel RV's that must be detached from a tow vehicle when in use. The pitch angle saved when the tow vehicle is detached from the RV will be recalled for pitch angle positioning when reattaching the tow vehicle. This will simplify and increase the speed of reattaching the tow vehicle to the RV.

As mentioned above and described in more detail below, once the sensor device **22** has been properly mounted to the inside or outside of the RV **10**, the RV **10** can be leveled to an initial level position using the typical method described above or by placing the smart device **24** on the floor or some other horizontal surface of the RV and using a digital level software application, either separate from or integrated into the software application. Figure 6 shows a screen **50**, for example, of the software application that can be used to measure both the pitch and the roll angles using a pitch measuring line **52** and a roll measuring line **54** forming a crosshair **56**. The software application on the smart device **24** can show a display that operates in a similar manner to a spirit level so as to display movement of the pitch and roll angles toward a center bull's eye **60** as the smart device on the horizontal surface is moved toward a leveled position. The progress toward the bull's eye **60** can be measured by the position of the crosshair **56** relative to the area **58** surrounding the bull's eye **60** as the crosshair **56** approaches the demarcation line **62** as the horizontal surface is moved closer to the leveled position. In this manner, the smart device **24** can be used in this initial leveling to determine an initial level position. As mentioned above, a typical digital or spirit level could also be

used to achieve this initial level position. The smart device **24** can then capture, i.e., save and store the current pitch and roll angle measurements from the sensor device **22**. These measurements will be used as offsets from the initial level position when displaying angles or calculating and displaying adjustment values necessary to move the RV back to the initial level position.

Once measurements are generated using the calibrate button **36** that relate to the initial level position of the RV, these measurements can be stored on the smart device **24**, or stored in a memory storage location on the PCB sensor device **22** and recalled to the smart device **24** at a desired time. The smart device **24** with the software application running can then be used to calculate and display angles relative to the initial level position and to calculate and display adjustment values necessary to move the RV to the initial level position when the RV is moved to a location for use. Performing the calibration function on the software application, the smart device **24** can wirelessly connect (or, in some embodiments, connect through a wired connection) to the sensor device **22** and request the current angle measurements for pitch and roll. These measurements can be stored on the smart device **24**, or stored in a memory storage location on the PCB sensor device **22** and recalled to the smart device **24** at a desired time, for use in calculating displayed information in the subsequent screens such as screen **40** shown in Figure 5 with the roll display **42** and the pitch display **44** as explained below. These stored measurements can be used as offsets from the initial level position based on the angle indications calculated from the various sensors of the sensor device **22**. This is required to establish the relationship between the position of

the mounted sensor device **22** and the initial level position in both pitch and roll as measured and/or captured by the smart device **24** as described above.

In subsequent displays **42**, **44** of the current angles relative to the initial level position on the software application on the smart device **24** as shown in the screen **40** in Figure 5, for example, these stored measurements will be added or subtracted from the actual, calculated sensor data from the PCB of the sensor device **22** to determine the actual angle relative to the initial level position accounting for the actual mounted orientation of the sensor device **22**. Once accurate angle measurements have been calculated and displayed in the screen **40** of the software application on the smart device **24**, additional calculations regarding the added height needed to achieve the initial level position of the RV can be performed and displayed, for example, in the respective roll display **42** and pitch display **44** or on a different screen in other embodiments. The appropriate side or direction of added or removed height can also be displayed using arrows and/or the calculated height required as shown for example in the respective roll display **42** and pitch display **44** of screen **40** of the described example embodiment of software application. These calculations are achieved by using the stored information about the length and width of the RV **10** and the calculated current angle relative to the initial level position of the RV and using trigonometric formulas to calculate the height and location for the height addition or reduction required to achieve a level position.

For example, as shown in Figure 7A and 8A, an RV **10** can be parked, or positioned, at a desired location. A leveling system **20** on RV **10** (as shown in Figures 1 and 2) can be previously used to determine an initial level position that provides a true

level measurement that has been stored on the smart device **24** of the leveling system **20**, or stored in a memory storage location on the PCB sensor device **22** and recalled to the smart device **24**, for later use. The RV **10** can have three or more structural supports, such as wheels **W_A**, **W_B** and jack **26** on a ground **G** at the desired location. As shown in Figure 7A, the RV **10** leans toward the first side **A** of RV **10** on first side section **16** at the desired location. Similarly, as shown in Figure 8A, the RV **10** leans toward the front **C** of RV **10** on the front section **14** at the desired location. Thus, the RV **10** is not leveled at the desired location based on the structural supports current position on the ground **G**.

The software application on the smart device **24** of the leveling system can be accessed to initiate the determination of the needed change in the roll and pitch directions to level the RV **10** at the desired location. The smart device **24** can communicate with the sensor device **22** of the leveling system **20** to obtain sensor data used to determine the current angle measurements for the roll and pitch directions off from true level, i.e., the initial level position stored in the smart device. The needed angle change, distance change, and/or direction of change for the roll and pitch directions can be displayed on the smart device **24** as shown in the roll display **42** and pitch display **44** in screen **40** of the software application (see Figure 5). As shown in Figure 7B, the first side **A** of RV **10** can then be raised the needed amount so that the first side **A** and a second side **B** of the RV **10** can be level with one another in the roll direction based on the information provided in the roll display **42** (see Figure 5). For example, a jack **70**, or other mechanism can be used to raise the first side **A** of RV **10**. Similarly, as shown in Figure 8B, the front side **C** of RV **10** can be raised the needed

amount so that the front side **C** and a rear side **D** of the **RV 10** can be level with one another in the pitch direction based on the information provided in the pitch display **44** (see Figure 5). For example, a jack **26** can raise the front side **C** of **RV 10** the needed amount.

As another example, the software application can calculate that an RV is 2 degrees out of level in the roll direction and height needing to be added to the left side of the RV. In this example, the stored width of the RV is 8 feet or 96 inches. Using a trigonometric function, the height needed to achieve a level position can be calculated as 3.3523 inches. Knowing exactly how much height is needed to reach a perfectly level position in both pitch and roll will simplify and reduce the amount of time required to level the RV. The proposed smartphone software application will dynamically and in near real time update and graphically display the current pitch and roll of the RV representations using a proportional algorithm.

Additionally, in some embodiments, the sensor device **22** can have sensors that are able to detect relative humidity, temperature and barometric pressure. For example, the PCB of the sensor device **22** may have sensors that are able to detect relative humidity, temperature and barometric pressure. The user may desire to mount the sensor device **22** on the exterior or interior of the RV depending on whether they are more interested in measuring the environmental conditions outside or inside the RV. This environmental information will also be wirelessly transmitted to the smart device **24** and displayed for the user.

These and other modifications and variations to the present subject matter may be practiced by those of ordinary skill in the art, without departing from the spirit and

scope of the present subject matter, which is more particularly set forth herein above. In addition, it should be understood the aspects of the various embodiments may be interchanged both in whole and in part. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to limit the present subject matter.

WHAT IS CLAIMED

1. Any and all vehicle leveling devices and related systems and processes as well as all computer program products for leveling vehicles, such as recreational vehicles, using smart devices as shown and/or described expressly or by implication in the information provided herewith, including but not limited to feature(s) that may be apparent and/or understood by those of skill in the art.

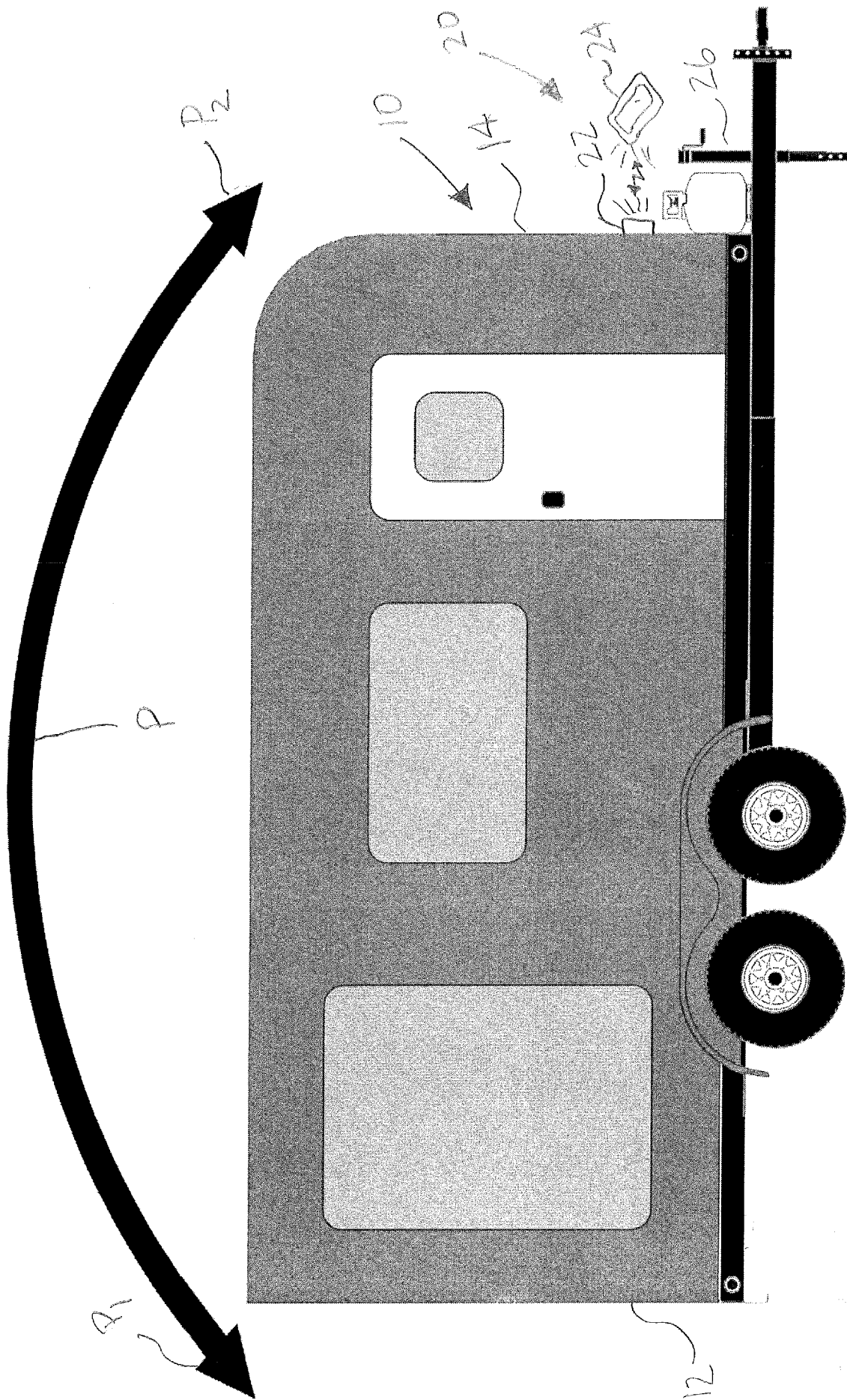


FIG. 1

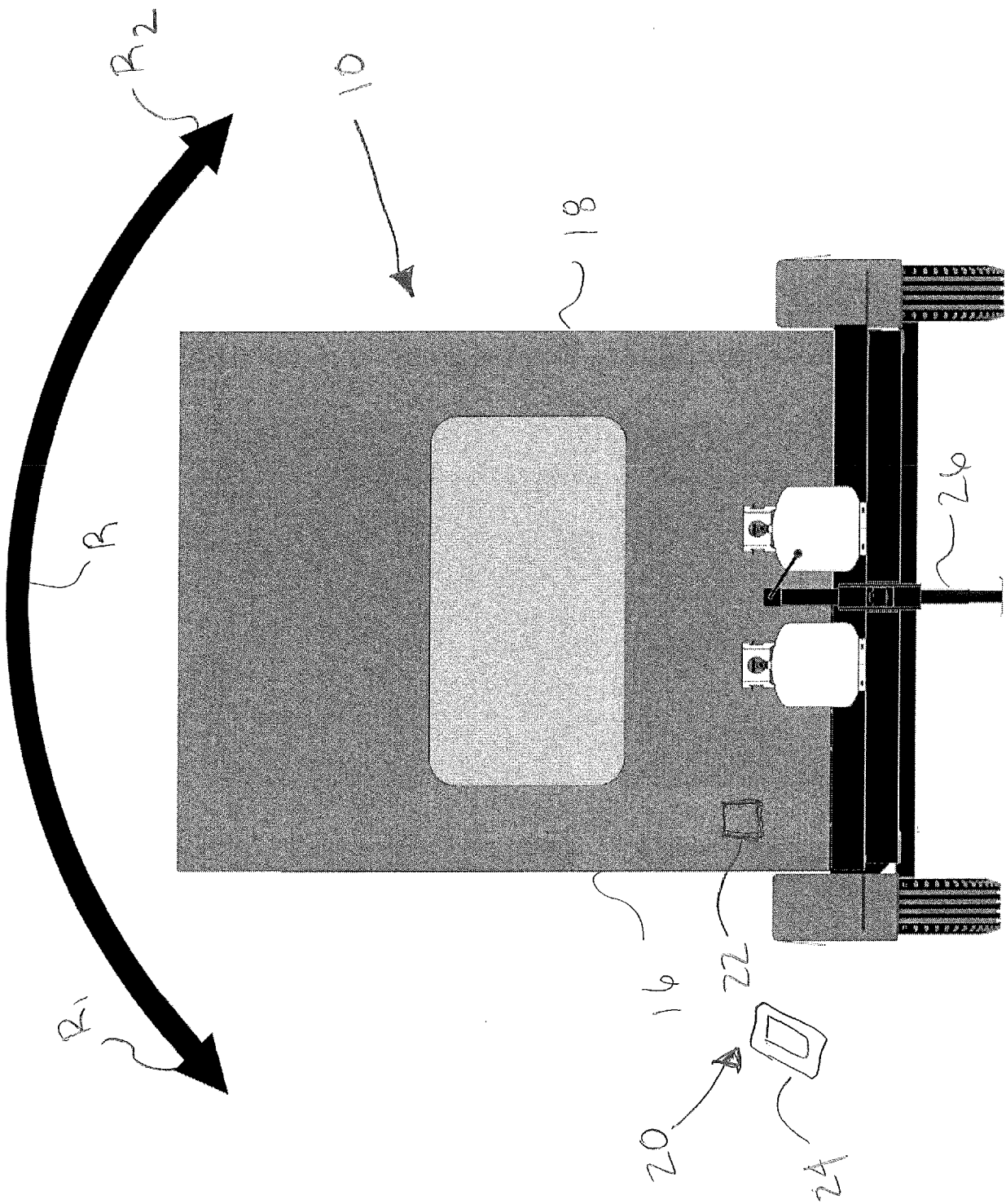
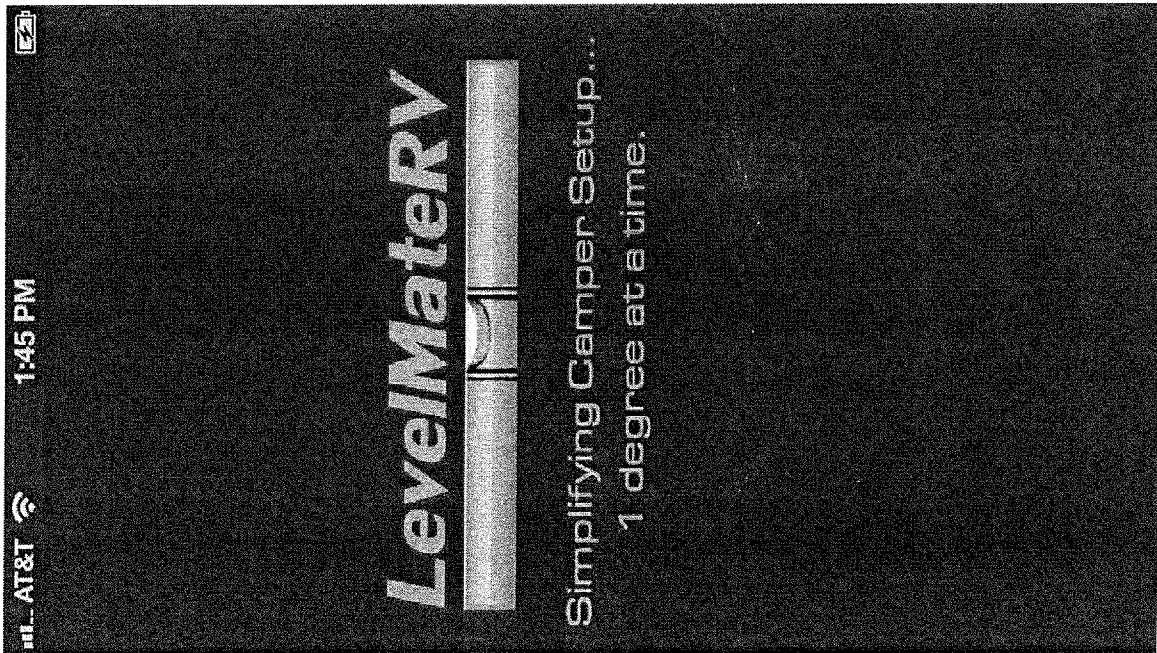


FIG. 2



28

FIG. 3

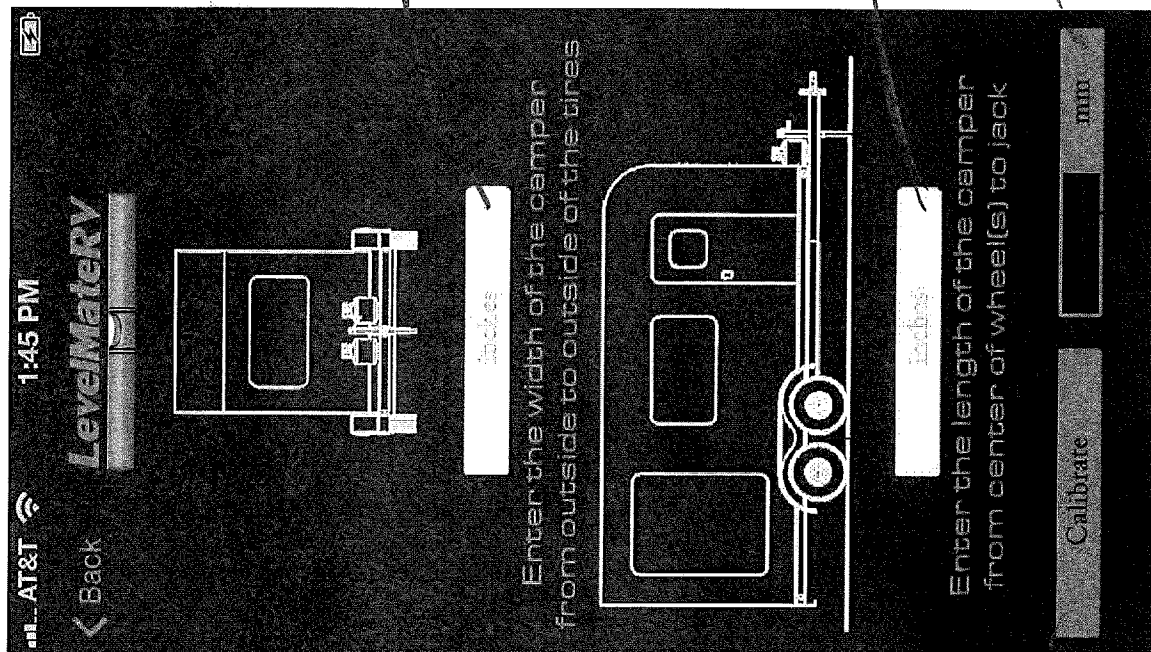
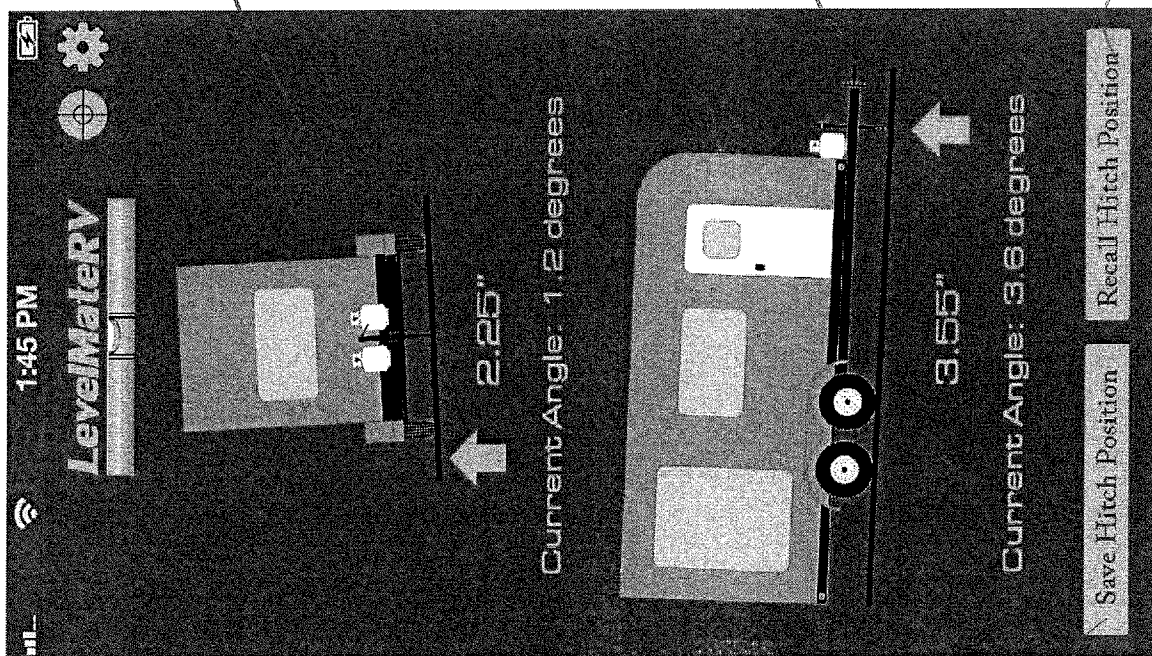


FIG. 4 38A



42

40

44

48

FIG. 5

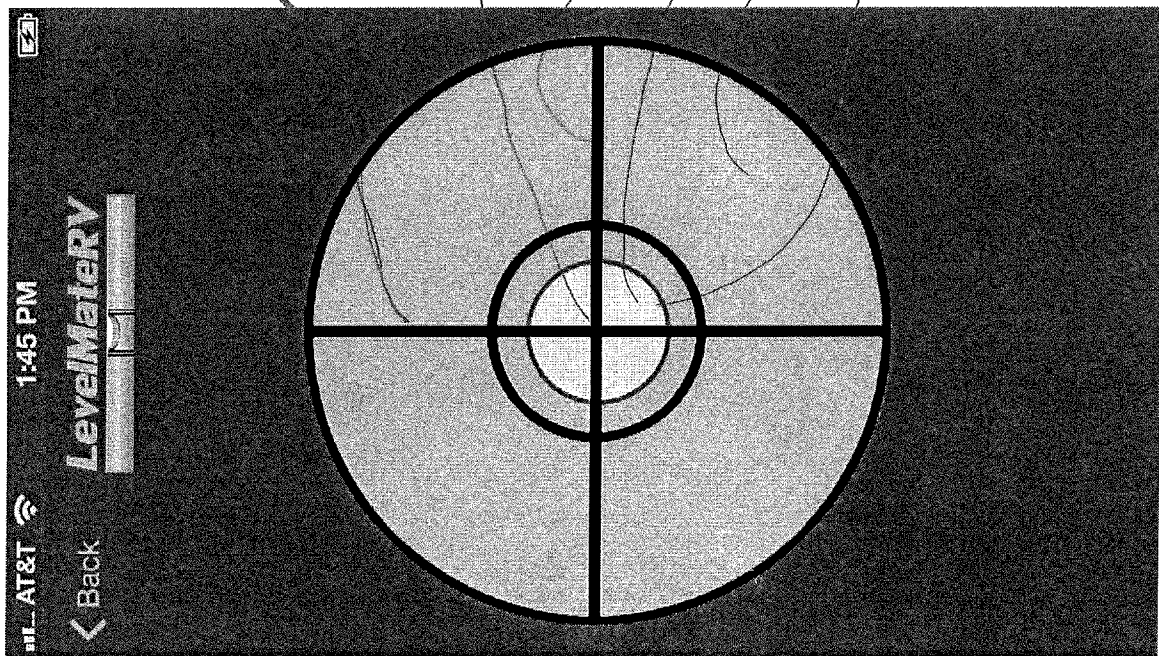


FIG. 6

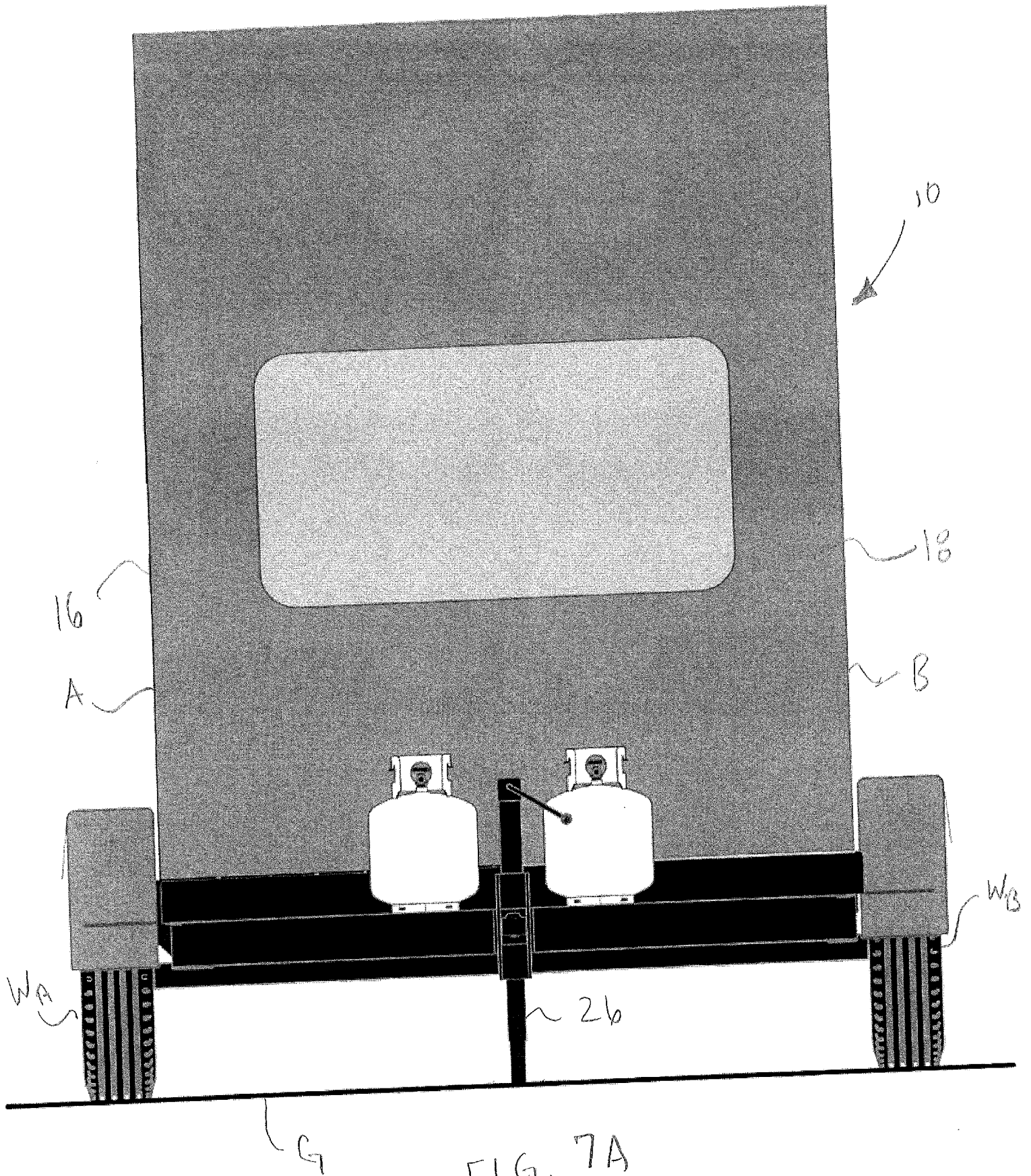


FIG. 7A

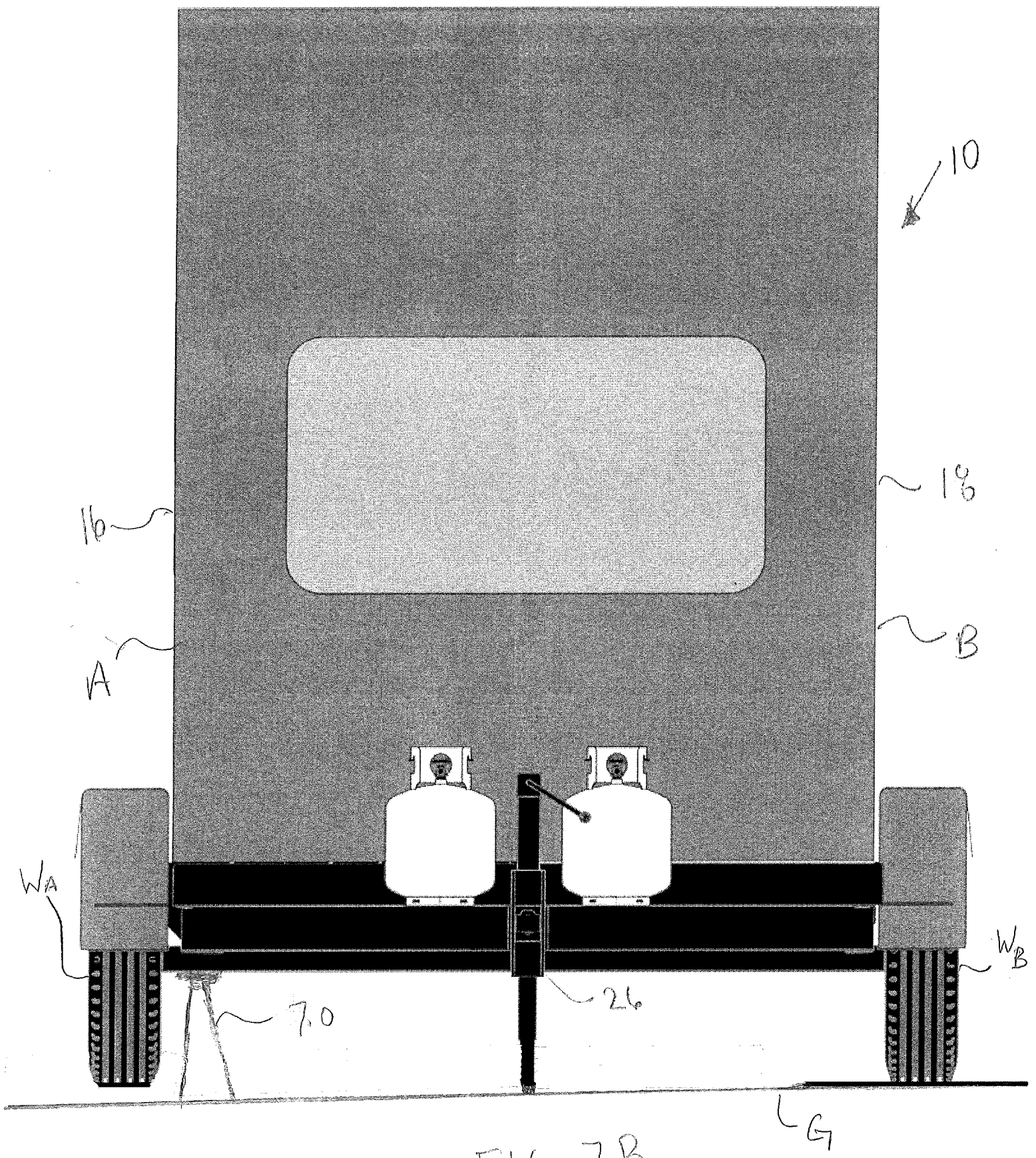


FIG. 7B

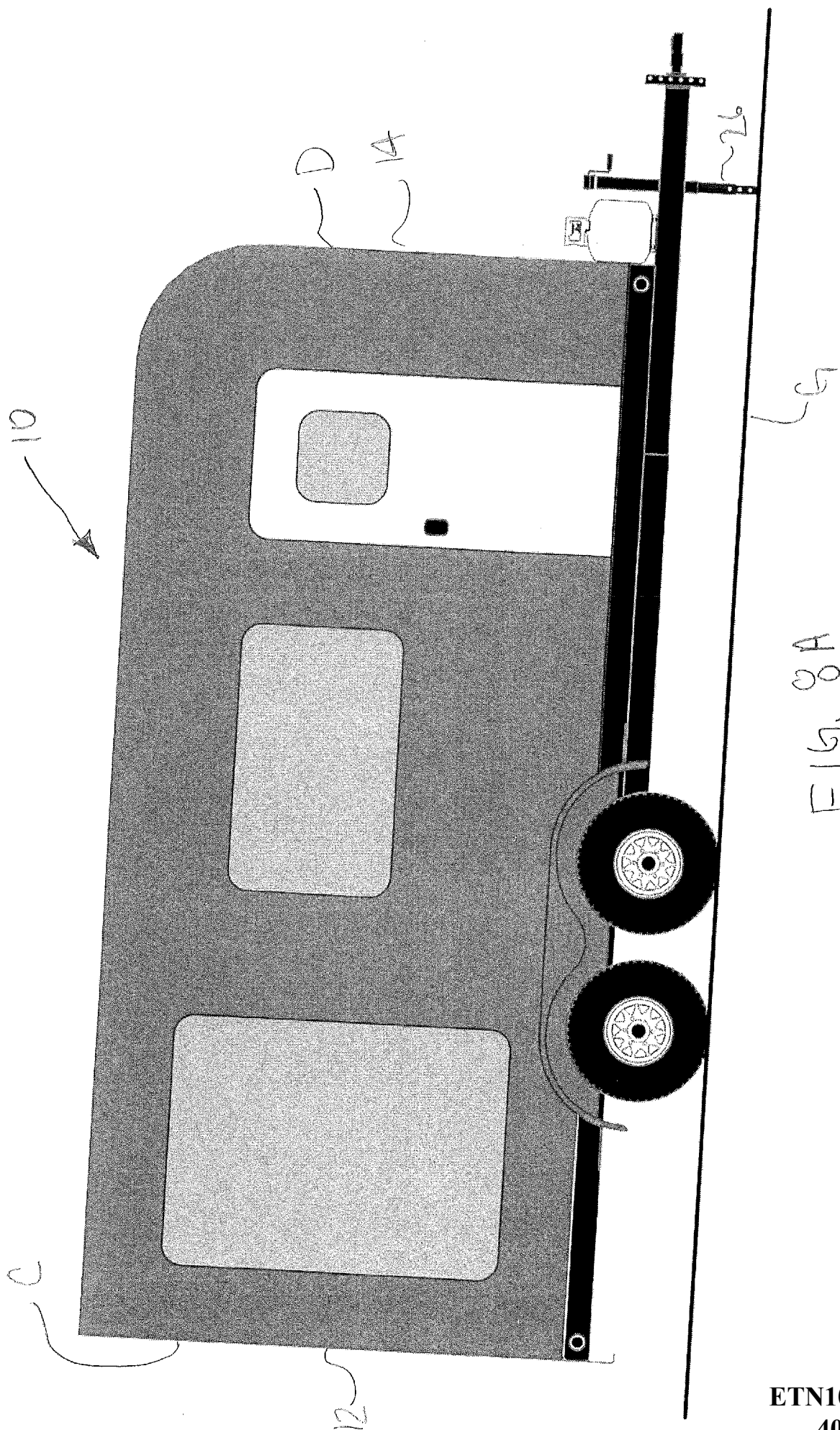
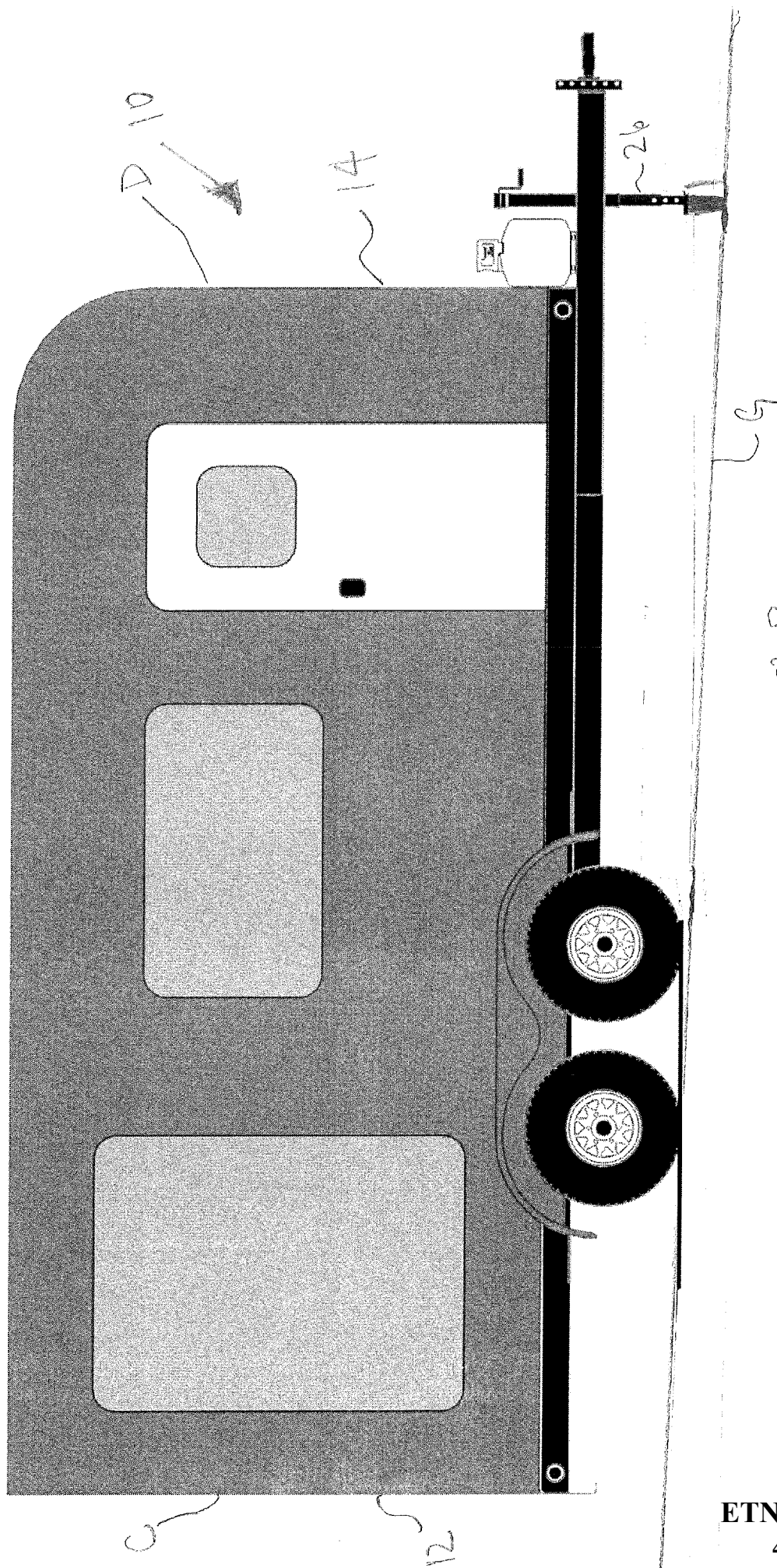


FIG. 8A



Background of the Invention

Whether in a storage or use state, RV's should be leveled for both practical and technical reasons. Practical reasons include a level floor, proper door swings, stove and sink use, as well as many others. Technical reasons include proper operation of the ammonia based refrigerator, level holding tanks for proper level detection by electronic means and for the proper operation of the plumbing and various other systems. Some higher end Class A RV's have onboard leveling systems that utilize digital sensors and hydraulic jacks, but most do not have any native leveling capability beyond the raising and lowering of the front of the RV using manual or electric jacks. Level indicators are generally bubble levels attached to both the side and front or rear of the RV. In addition, there are many other vehicles and trailers that require a level position to operate properly such as food vending trucks, mobile medical trailers, transport trailers and in some cases heavy equipment although there are many others.

The described device provides leveling indication for the 2 main axes of the RV (side-to-side and front-to-back). For the purposes of describing both the typical and proposed leveling method, pitch will be defined as the angle of the RV from front to back and roll will be defined as the angle of the RV from side to side.

The typical RV leveling method is described. Once the RV has been moved into the desired location and orientation for use, the driver must exit the RV or tow vehicle to inspect the current level condition of the RV by using the bubble levels attached to the RV. The first step is to level the roll of the RV. Typically this is done by driving or towing the appropriate RV wheels onto a board, block or other object to raise one side of the RV closer to level. Since the bubble levels being used do not give any exact information regarding the amount the RV is out of level, it is an educated guess at best to determine just how high the appropriate wheels must be raised. Typically this is a trial and error system requiring the driver to make multiple attempts at raising the appropriate wheels the necessary amount to achieve a level position. Each attempt requires the driver to get back into the vehicle to move the wheels off of the previously placed object being used to raise wheels, exit the vehicle to add or take away from the height of the object being used to raise the wheels, enter the vehicle again to drive or tow the wheels back onto the object being used to raise the wheels and finally exiting the vehicle again to check the new roll orientation relative to level. It is not uncommon for this process to be repeated several times to achieve a level roll orientation. If bubble levels are being used to determine a level orientation, it is common knowledge that a bubble between the lines on a bubble level has an error range of 2-3 degrees. This can be a significant error amount as it relates to RV's and can cause doors, plumbing and other objects and systems within the RV not to operate properly. Once the roll orientation is level, the pitch orientation leveling operation must be completed. Typically, the bubble level mounted to the side of the RV will be used in this process. In the case of a towable RV, this process generally involves using the jack(s) on the front of the RV to raise or lower the front of the RV until a level position is achieved. Since the upward travel of the jack(s) is limited, it is sometimes required to place blocks or some other object under the jack to enable the jack(s) to raise the front of the RV high enough to achieve a level position. Placing blocks or other objects under the jack(s) requires the RV to be reattached to the tow

vehicle, the jack(s) raised, blocks or objects placed under the jack(s), the jack(s) lowered onto the blocks or objects and then released from the tow vehicle. In the case of a driveable RV, the same iterative process used to level the roll of the RV is necessary to level the pitch of the RV. This process may require many attempts as in the case of leveling the roll of the RV.

Summary of the Invention

The described invention utilizes a PCB that includes various digital sensors including digital accelerometers, digital gyroscopes and other sensors required for accomplishing the desired functionality of the invention. The PCB also includes the necessary components for Bluetooth or other wireless communication. The PCB may be battery powered or use other means of power such as AC or DC. The PCB may be mounted in an enclosure for protection from damage and the environment. A personal communication device, personal media device or the like is also a component of the invention and has a compatible wireless communication capability such as Bluetooth or other wireless communication protocol. The personal communication device, personal media device or the like also contains software that is capable of communication with the PCB, storage of information, display of information and user input. In the preferred embodiment, the device would be a smartphone capable of storing and executing software apps.

The software app of the preferred embodiment has the ability to accept user input for the length and the width of the RV. The software app will store this information for use in calculating displayed information. The software app will also have a calibration function for initial setup of the system. Once the PCB has been properly mounted to the inside or outside of the RV, the RV must be leveled using the typical method described above or by placing the smartphone on the floor or some other horizontal surface of the RV and using a digital level app, either separate from or integrated into the software app described as a component of the invention. The smartphone app will display both the pitch and roll angles and may be used in this initial leveling. A typical digital or spirit level could also be used to achieve this initial level position. Once the RV is level the smartphone with the software app running can be used to perform the calibration function for the proposed leveling system. Performing the calibration function on the software app will wirelessly connect to the PCB and request the current angle measurements for pitch and roll. These measurements will be stored on the smartphone for use in calculating displayed information in the subsequent use of the invention. These stored measurements will be used as offsets from true level based on the angle indications calculated from the various sensors of the PCB. This is required to establish the relationship between the position of the mounted PCB and true level in both pitch and roll. In subsequent display of current angles relative to level on the smartphone app, these stored measurements will be added or subtracted from the actual, calculated PCB sensor data to determine the actual angle relative to level accounting for the actual mounted orientation of the PCB. Once accurate angle measurements have been calculated and displayed on the smartphone app, additional calculations regarding the added height needed to achieve level can be performed and displayed. The appropriate side or direction of added or removed height can also be displayed on the app using arrows and/or the calculated height required. This is achieved by using the stored information about

the length and width of the RV and the calculated current angle relative to level and using trigonometric formulas to calculate the height and location for the height addition or reduction required to achieve a level position. For example, the smartphone app has calculated that the RV is 2 degrees out of level in the roll direction and height needing to be added to the left side of the RV. In this example, the stored width of the RV is 8 feet or 96 inches. Using a trigonometric function, the height needed to achieve a level position can be calculated as 3.3523 inches. Knowing exactly how much height is needed to reach a perfectly level position in both pitch and roll will simplify and reduce the amount of time required to level the RV. The proposed smartphone app will dynamically and in near realtime update and graphically display the current pitch and roll of the RV representations using a proportional algorithm.

The smartphone software app will also have functionality to save a given pitch angle for the purpose of returning to that position at a later time. This functionality will be useful for travel trailers and fifth wheel RV's that must be detached from the tow vehicle when in use. The pitch angle saved when the tow vehicle is detached from the RV will be recalled for pitch angle positioning when reattaching the tow vehicle. This will simplify and increase the speed of reattaching the tow vehicle to the RV.

Additionally, the PCB may have sensors that are able to detect relative humidity, temperature and barometric pressure. The user may desire to mount the PCB on the exterior or interior of the RV depending on whether they are more interested in measuring the environmental conditions outside or inside the RV. This environmental information will also be wirelessly transmitted to the smartphone and displayed for the user.



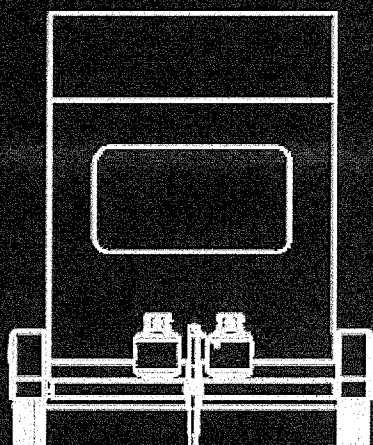
LevelMateRV



Simplifying Camper Setup...
1 degree at a time.

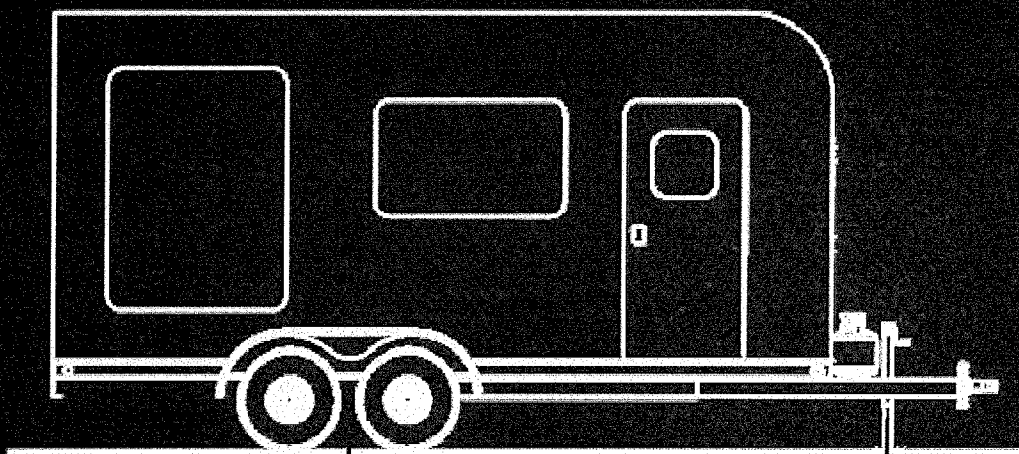
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LevelMateRV



inches

Enter the width of the camper from outside to outside of the tires



inches

Enter the length of the camper from center of wheel(s) to jack

Calibrate

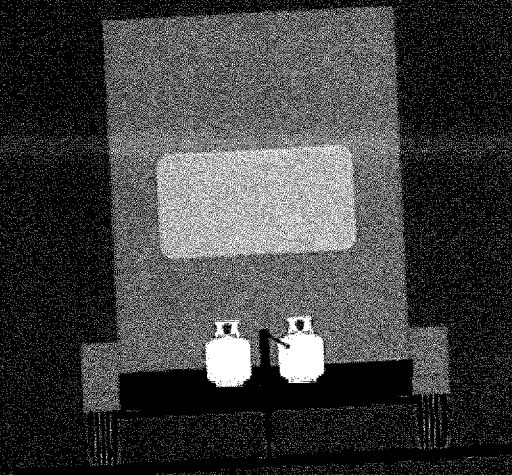
mm



1:45 PM



LevelMateRV



2.25"

Current Angle: 1.2 degrees



3.55"



Current Angle: 3.6 degrees

Save Hitch Position

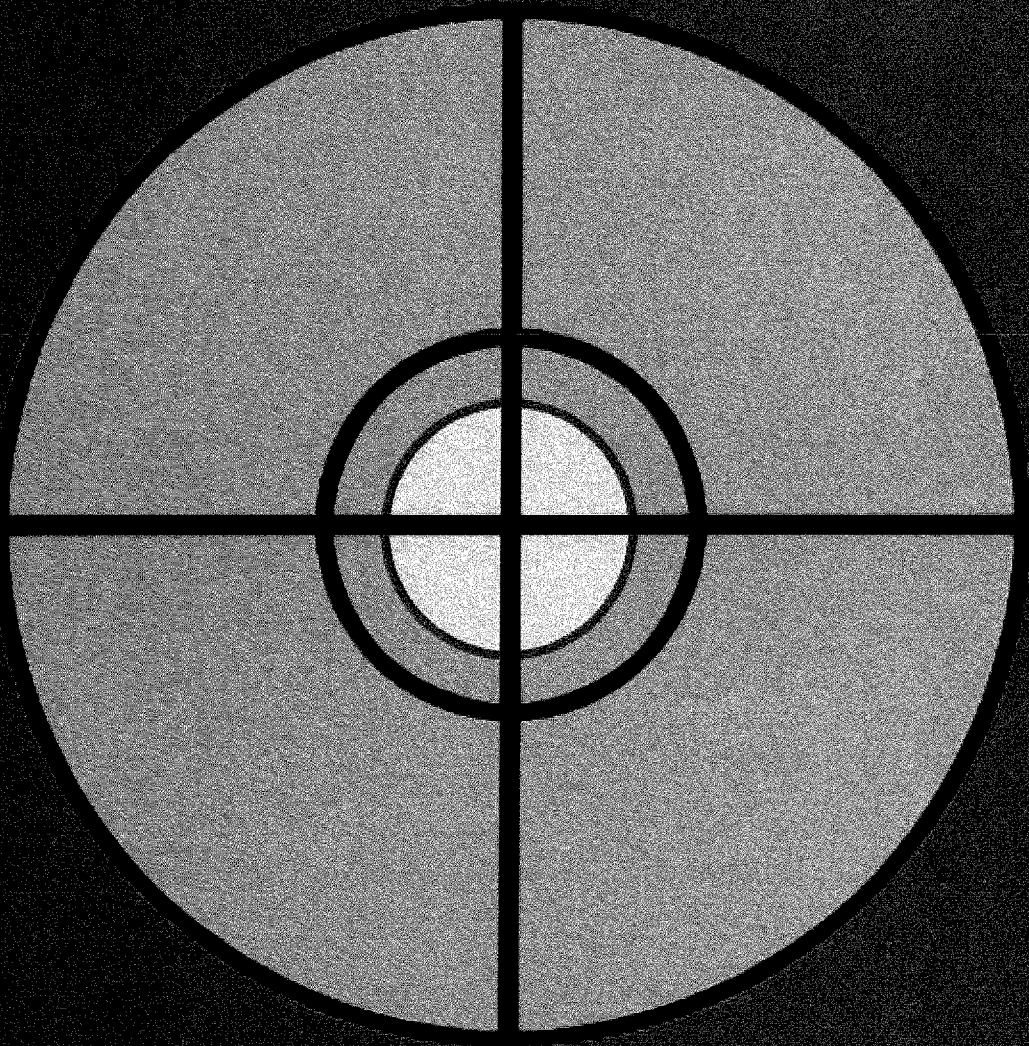
Recall Hitch Position

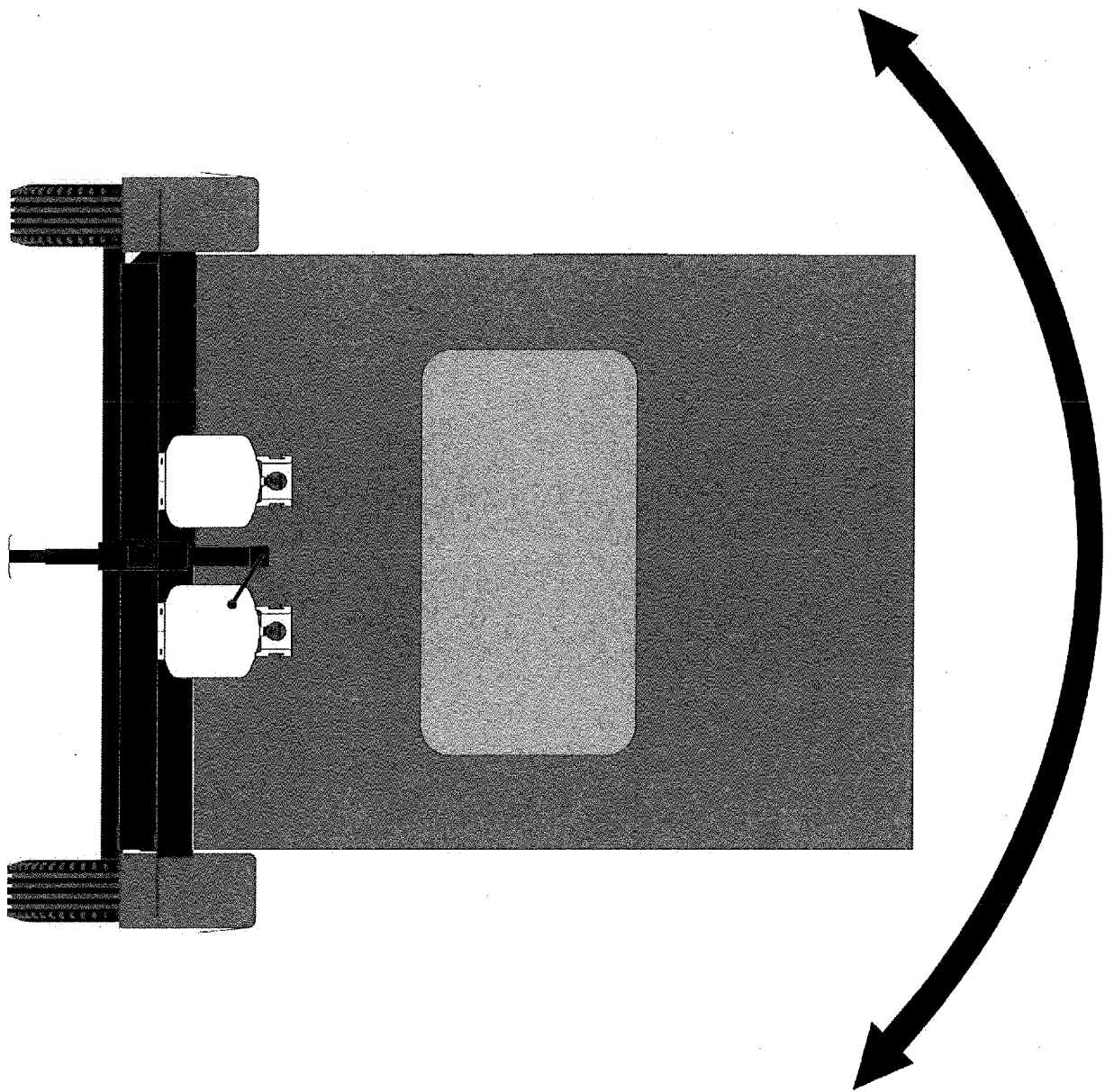
ET 1076

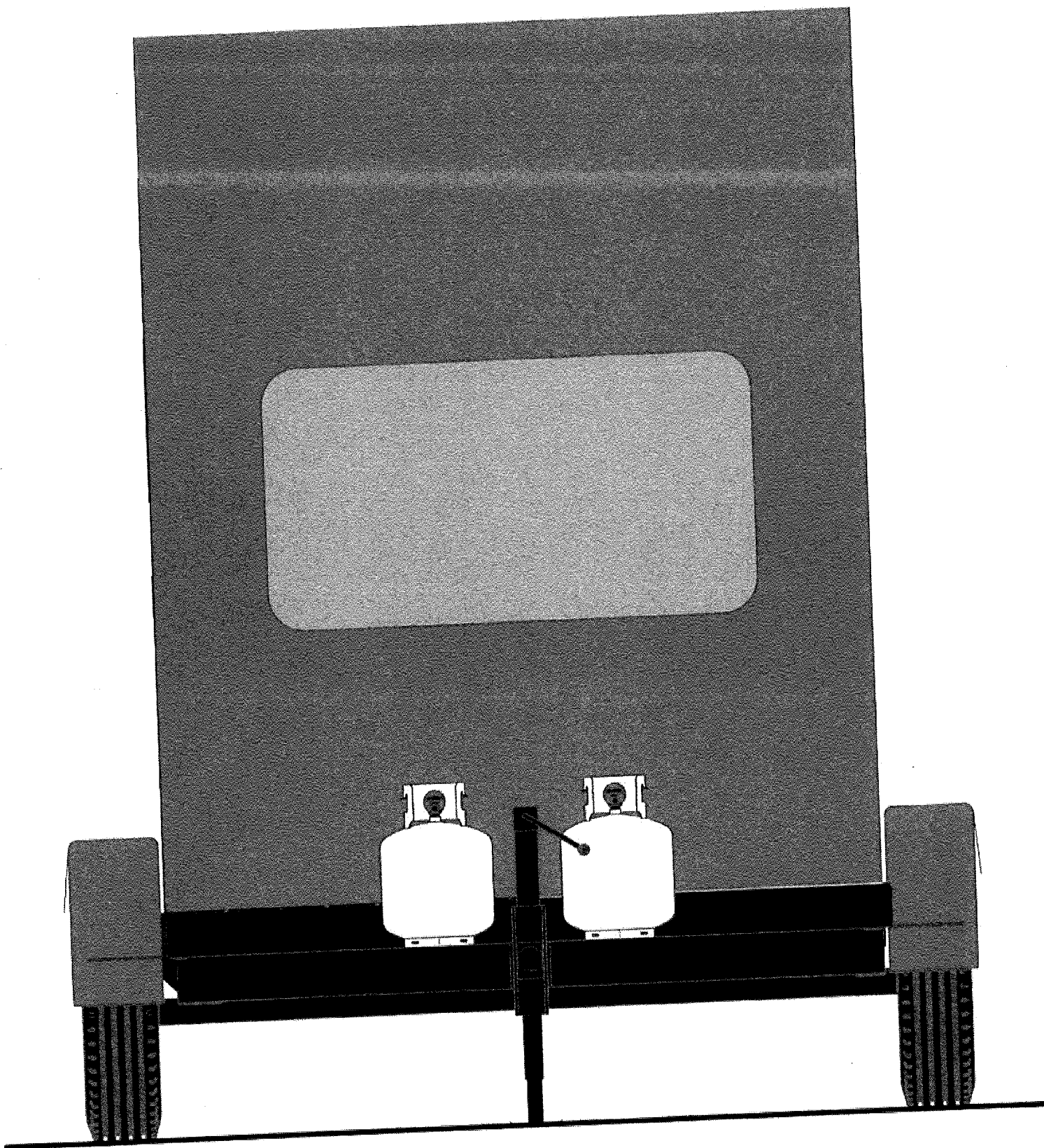
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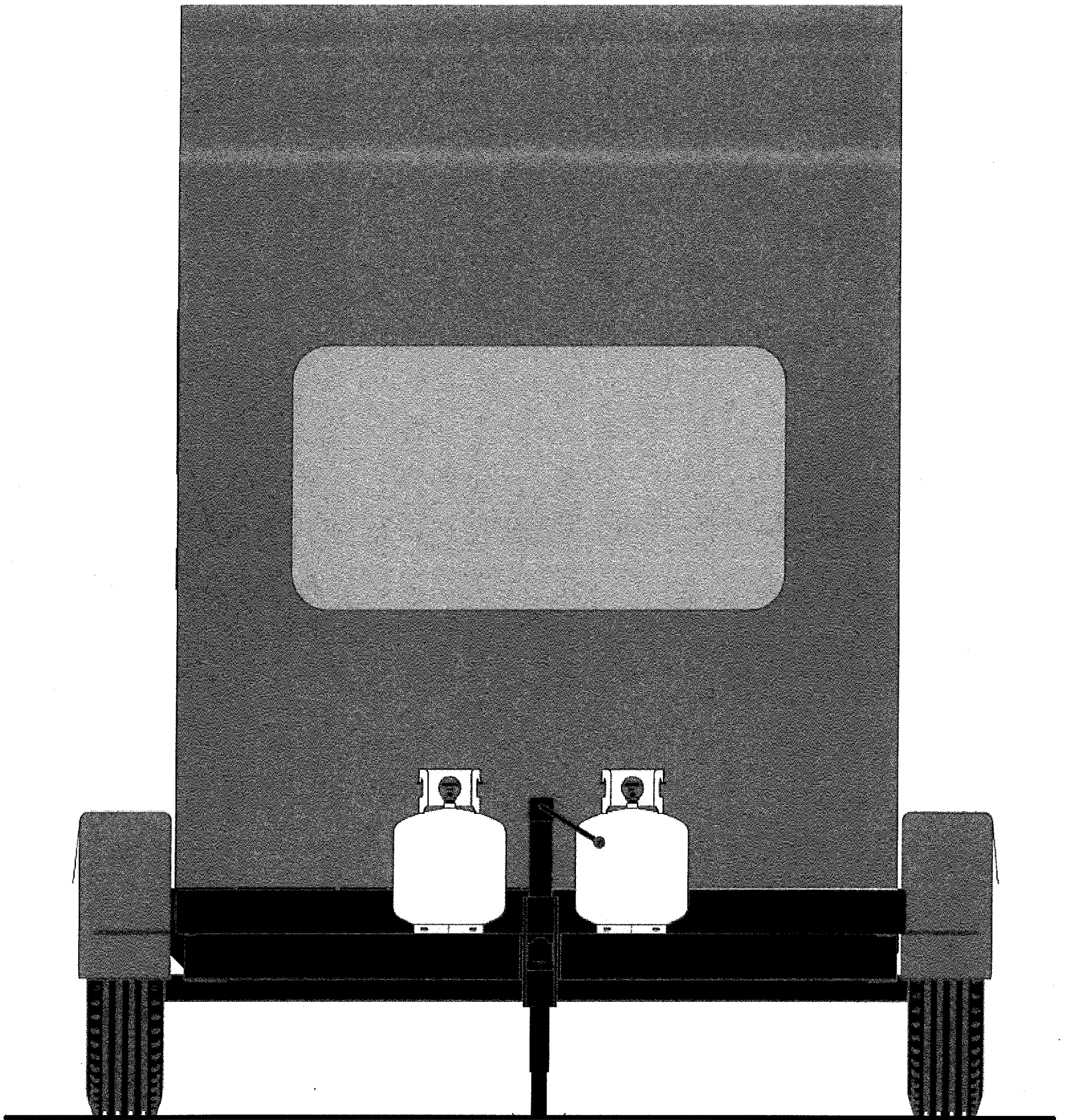
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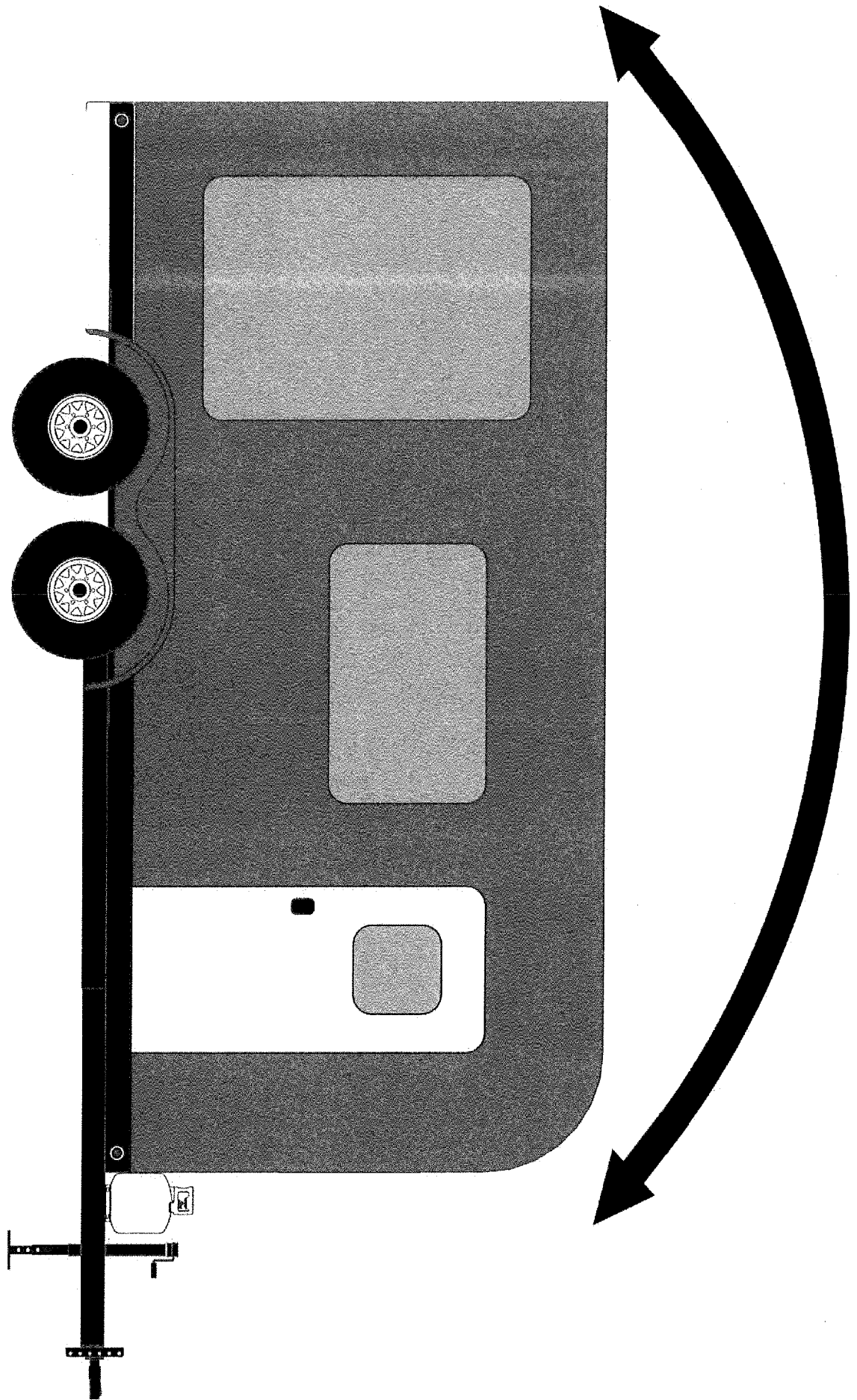
LevelMateRV



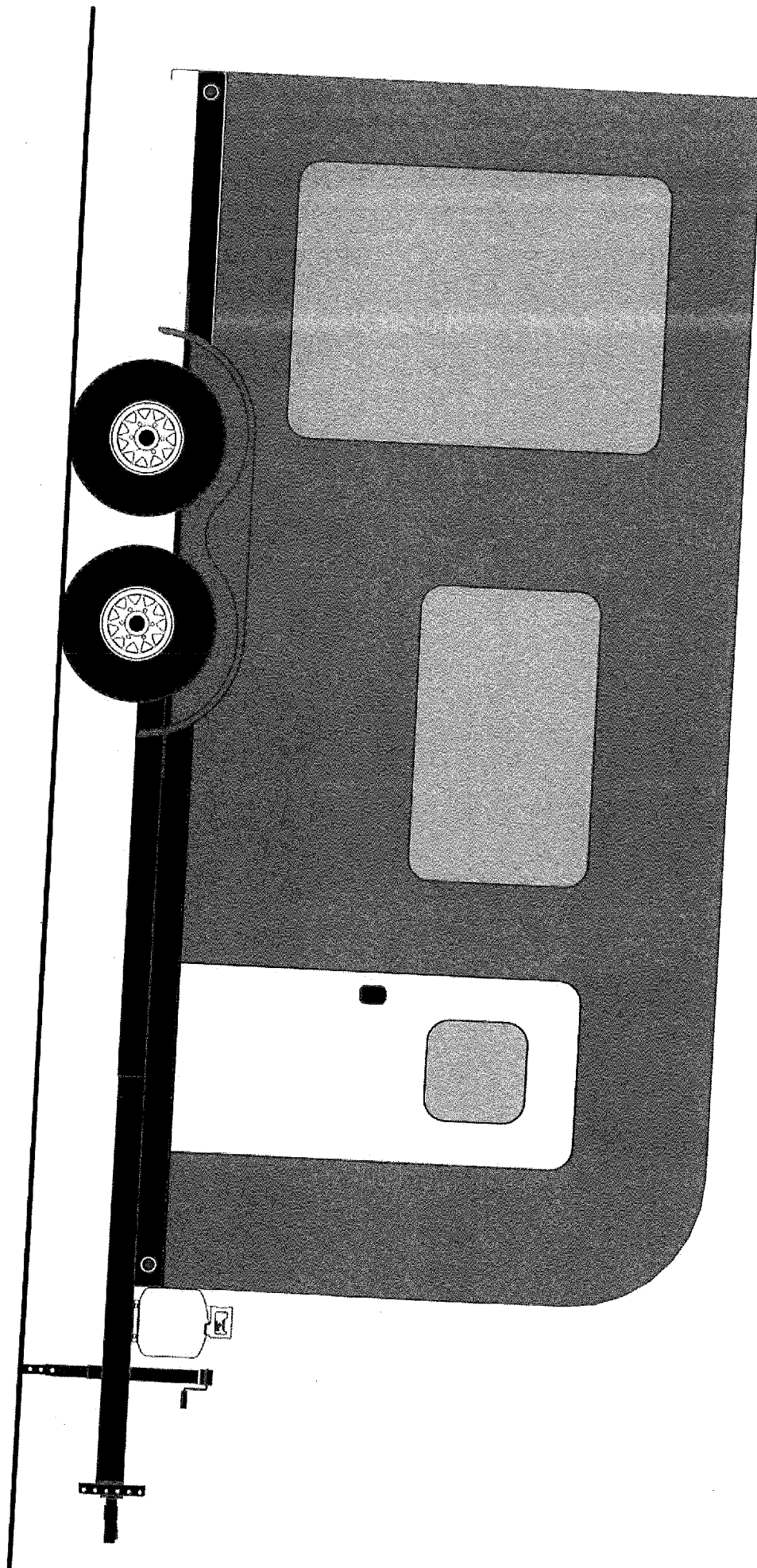


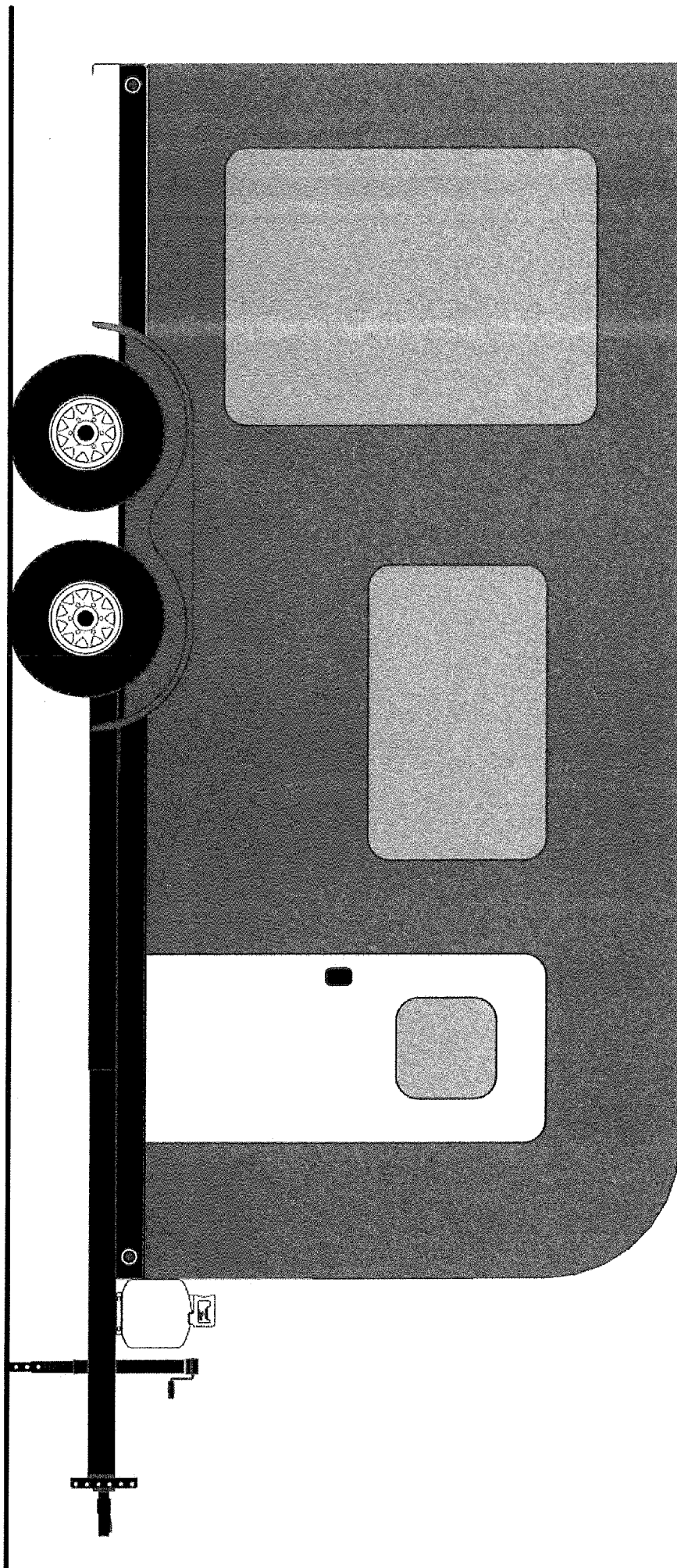




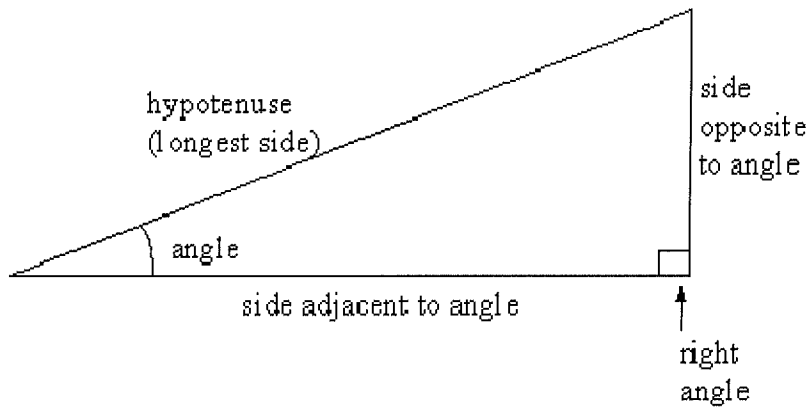


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$$\text{tangent}(\text{angle}) = \frac{\text{length of opposite side}}{\text{length of adjacent side}}$$



Electronic Patent Application Fee Transmittal

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Filing Date:

Title of Invention:

VEHICLE LEVELING SYSTEMS, DEVICES AND METHODS AND COMPUTER PROGRAM PRODUCTS FOR LEVELING VEHICLES USING SMART DEVICES

First Named Inventor/Applicant Name:

Charles A. Leonard

Filer:

John Bennett Mullinax/David Sigmon

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	Multipart Description/PDF files in .zip description				
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	Claims		28	28	
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