(12) **United States Patent**
Anderson et al.

(10) **Patent No.:** US 11,821,781 B2
(45) **Date of Patent:** Nov. 21, 2023

(54) **APPARATUS AND METHOD FOR DETERMINING WEIGHT DISTRIBUTION**

(71) Applicant: **Progress Mfg. Inc.**, Provo, UT (US)

(72) Inventors: **Jed K. Anderson**, Lindon, UT (US); **David F. Lundgreen**, Spanish Fork, UT (US); **Jason R. Harper**, Spanish Fork, UT (US)

(73) Assignee: **Progress Mfg. LLC**, Provo, UT (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 463 days.

(21) Appl. No.: **16/933,767**

(22) Filed: **Jul. 20, 2020**

(65) **Prior Publication Data**

US 2022/0018703 A1 Jan. 20, 2022

(51) **Int. Cl.**
G01G 19/02 (2006.01)
G01G 19/40 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC *G01G 19/02* (2013.01); *B60D 1/58* (2013.01); *G01G 9/005* (2013.01); *G01G 19/40* (2013.01)

(58) **Field of Classification Search**
CPC G01G 19/02; G01G 19/40; G01G 9/005; G01G 19/08; B60D 1/58; B60D 1/247; B60D 1/248; B60D 1/62; G01M 1/12
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,691,792 A 9/1987 Shintani
5,610,372 A 3/1997 Phillips et al.
(Continued)

FOREIGN PATENT DOCUMENTS

CN 106840020 A 6/2017
DE 4204066 A1 8/1993
(Continued)

OTHER PUBLICATIONS

Amazon Listing "Better Weigh," accessed at https://www.amazon.com/CURT-51701-BetterWeigh-Smartphones-Distribution/dp/B081FTQCYN, dated May 20, 2020, 7 pages.
(Continued)

Primary Examiner — Eyob Hagos
(74) *Attorney, Agent, or Firm* — Morriss O'Bryant; COMPAGNI CANNON, PLLC

(57) **ABSTRACT**

A weight distribution measurement system includes a portable measuring device configured to measure a linear distance and store a plurality of measurements. The portable measuring device is also configured to measure a first distance between a first location on a vehicle supported by an axle of the vehicle and a second location, wherein the first distance is measured prior to loading the vehicle. The portable measuring device is also configured to measure a second distance between the first location and the second location, wherein the second distance is measured after loading a vehicle. And the portable measuring device can measure a third distance between the first location and the second location, wherein the third distance is measured after loading a vehicle and after a weight distribution mechanism has been engaged, and then calculate the percent weight distribution over the axles of the vehicle using the portable measuring device and display the percent weight distribution.

22 Claims, 8 Drawing Sheets
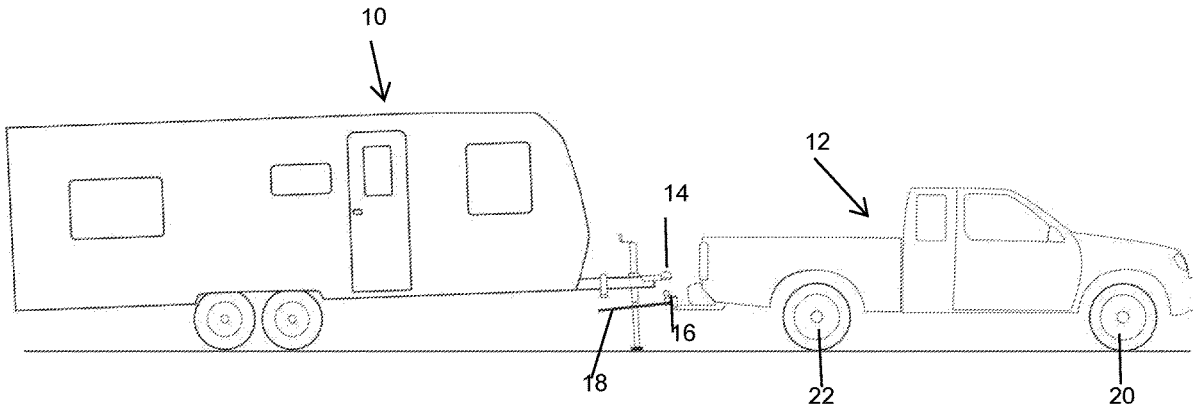
(51) **Int. Cl.**
  G01G 9/00   (2006.01)
  B60D 1/58   (2006.01)

(56)   **References Cited**

U.S. PATENT DOCUMENTS

6,203,045 B1 *	3/2001	Kyrtsos	B62D 53/0814
			280/438.1
6,921,100 B2	7/2005	Mantini et al.	
7,072,763 B2	7/2006	Saxon et al.	
7,818,140 B2	10/2010	Dreier et al.	
7,897,884 B2	3/2011	Harish	
8,115,609 B2	2/2012	Ketari	
9,085,203 B2 *	7/2015	Duppong	B60C 23/0408
9,290,185 B2	3/2016	Hall	
9,327,566 B2	5/2016	McAllister	
9,738,125 B1 *	8/2017	Brickley	B60D 1/62
9,816,813 B2	11/2017	Lettau et al.	
9,870,653 B1	1/2018	Fritz et al.	
10,126,755 B1	11/2018	Avi et al.	
10,377,196 B2	8/2019	Brickley et al.	
11,623,484 B2 *	4/2023	Hall	B60D 1/62
			280/402
11,724,554 B2 *	8/2023	Hall	B60D 1/247
			280/407
2003/0155164 A1 *	8/2003	Mantini	B60G 17/005
			180/209
2007/0296173 A1 *	12/2007	Regnell	B60G 17/0152
			280/124.1
2014/0156524 A1	6/2014	Ruud et al.	
2015/0053487 A1	2/2015	Cash	
2017/0314986 A1 *	11/2017	Dyal	B62D 53/061
2019/0258244 A1	8/2019	Kaiser	
2019/0391590 A1 *	12/2019	Niewiadomski	G01L 5/136
2020/0070357 A1 *	3/2020	Nakayama	B25J 13/085
2020/0262257 A1 *	8/2020	Köster	B60D 1/62
2021/0094370 A1 *	4/2021	McAllister	B60D 1/06

FOREIGN PATENT DOCUMENTS

DE	102018214885 A1 *	3/2020	
WO	WO9745279	12/1997	
WO	WO2015171825	11/2015	
WO	WO2016127058 A1	8/2016	

OTHER PUBLICATIONS

Ebay Listing "AppWeigh Bluetooth Onboard etc . . . ," accessed at https://www.ebay.com/i/333144142565?chn=ps&norover=1&mkevt= 1&mkrid=711-117182-37290-0&mkcid=2&itemid=333144142565 &targetid=883687 . . . , dated May 21, 2020, 3 pages.

Natda New Smartphone-Ready Vehicle/Trailer Scale with TowSence Technology, accessed at https://www.natda.org/news/new-smartphone-ready-vehicle-trailer-scale-with-towsense-technology/, dated May 20, 2020, 3 pages.

RV News "Curt Launches Bluetooth Mobile Towing Scale," accessed at https://www.rvnews.com/curt-launches-bluetooth-mobile-towing-scale/, dated May 20, 2020, 4 pages.

Safiery "Know Your Tow," accessed at https://www.safiery.com/towing-safety, dated May 21, 2020, 3 pages.

True Tow Technology, accessed at https://www.weigh-safe.com/product/true-tow-weight-distribution-hitch/, dated May 22, 2020, 6 pages.

Weight Distribution Hitch Features and Benefits, accessed at https://www.weigh-safe.com/towing-safety/weight-distribution-hitch-features-and-benefits/, dated May 21, 2020, 8 pages.

Worktruck "BetterWeigh Mobile Towing Scale Measures in Real-Time", accessed at https://www.worktruckonline.com/350432/betterweigh-mobile-towing-scale-measures-in-real-time, dated May 20, 2020, 2 pages.
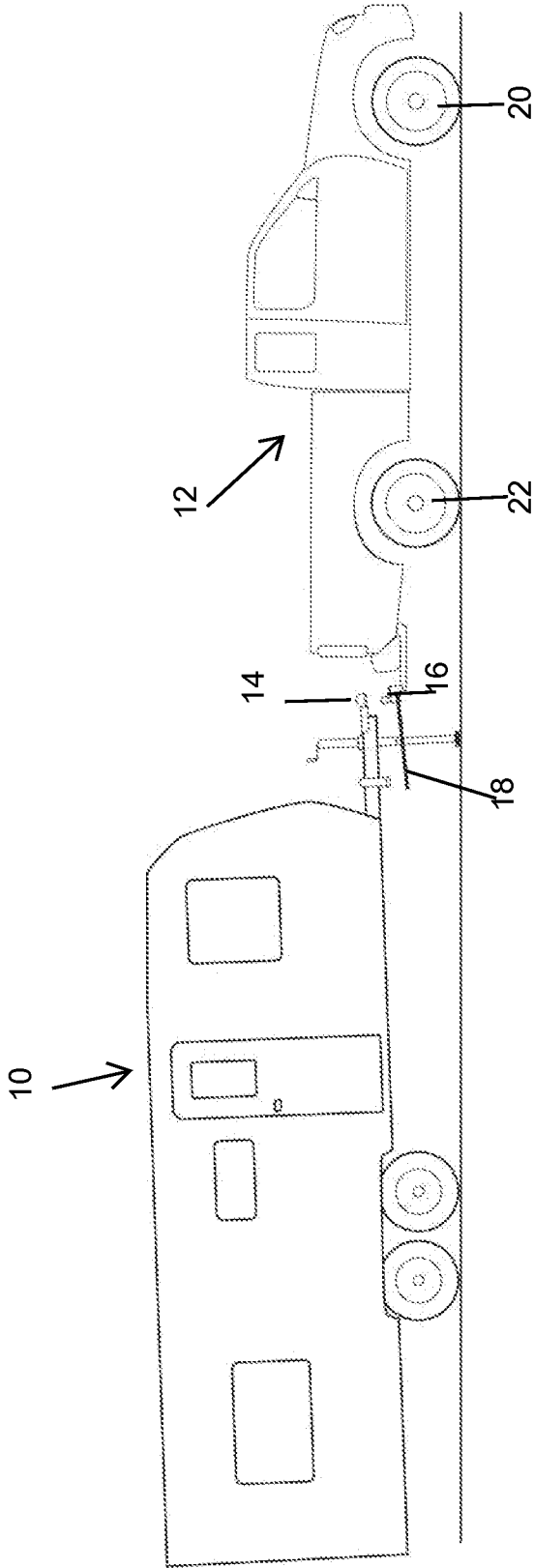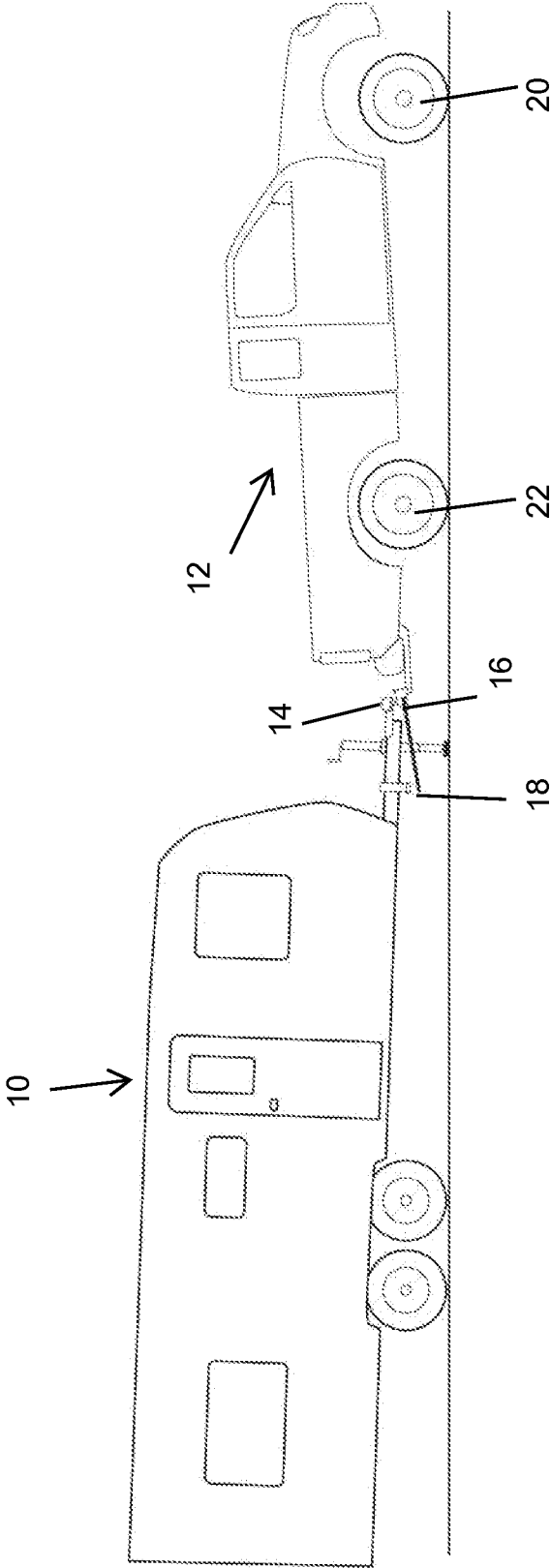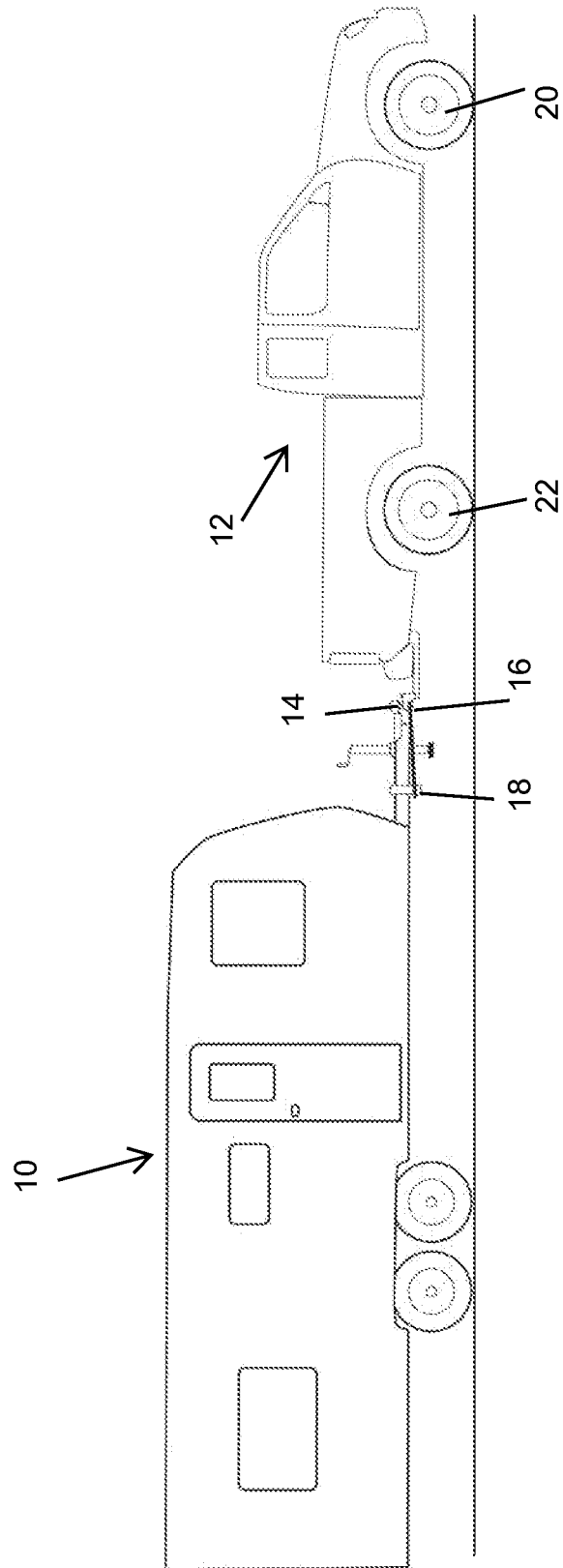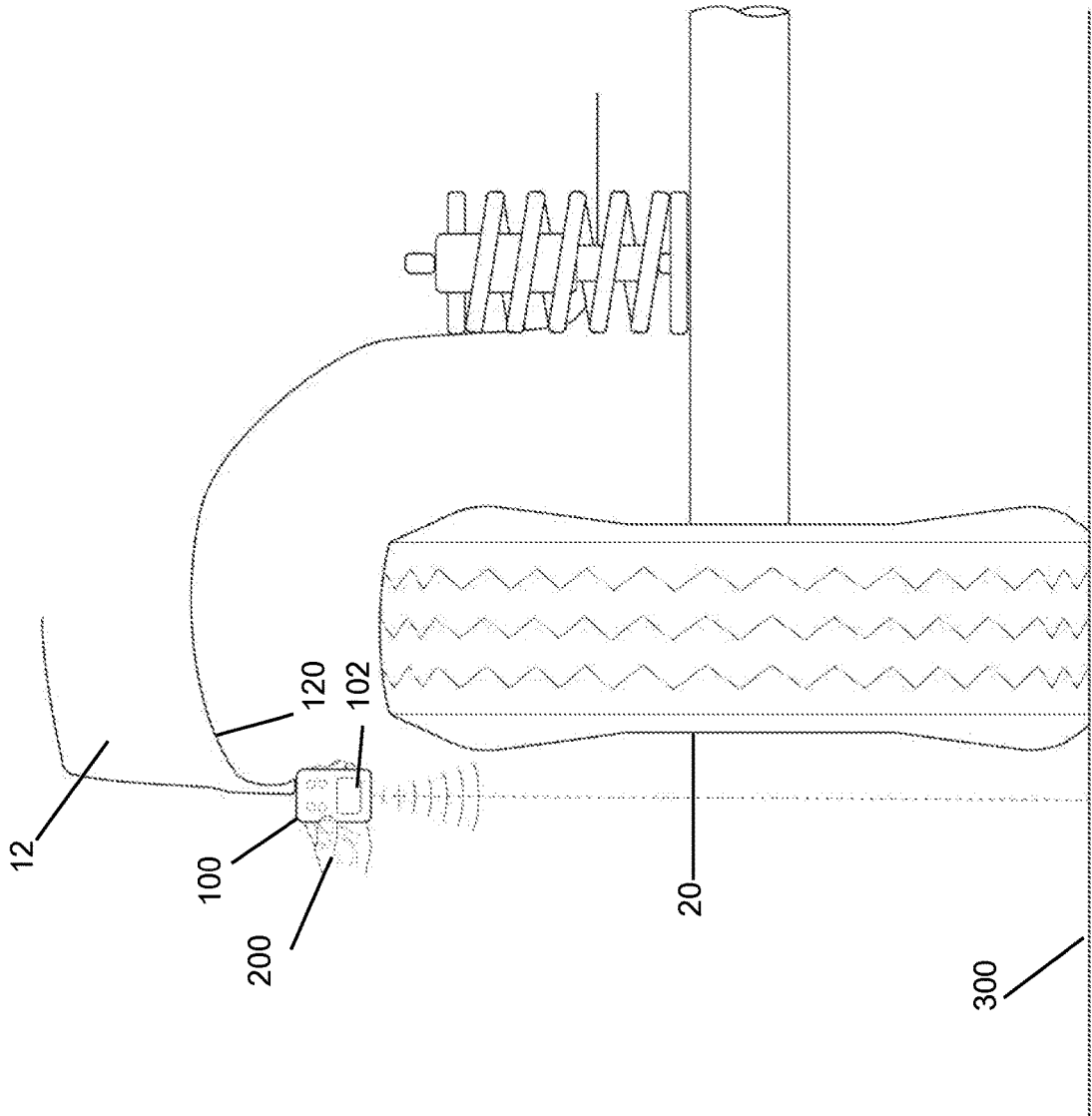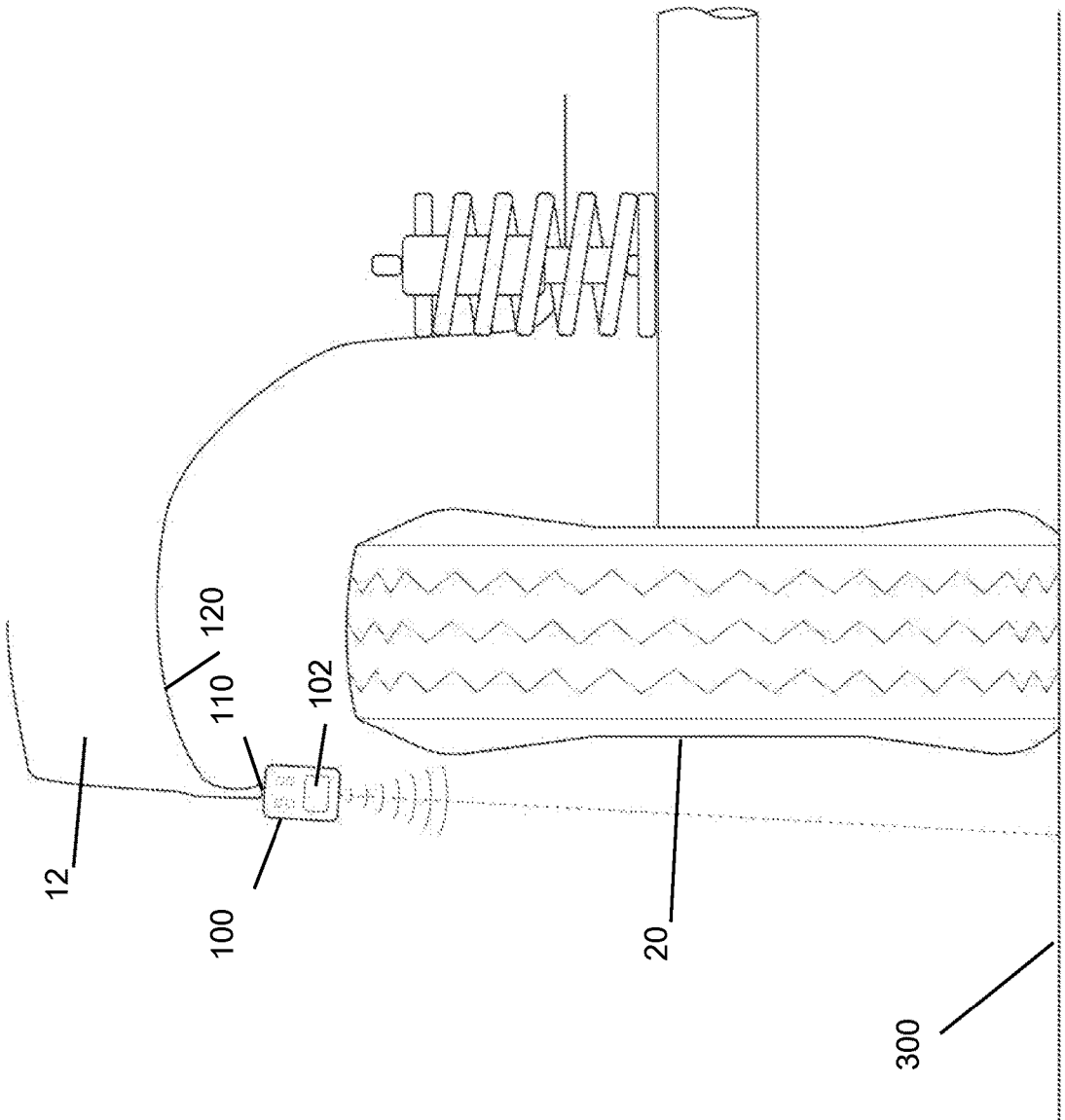
* cited by examiner
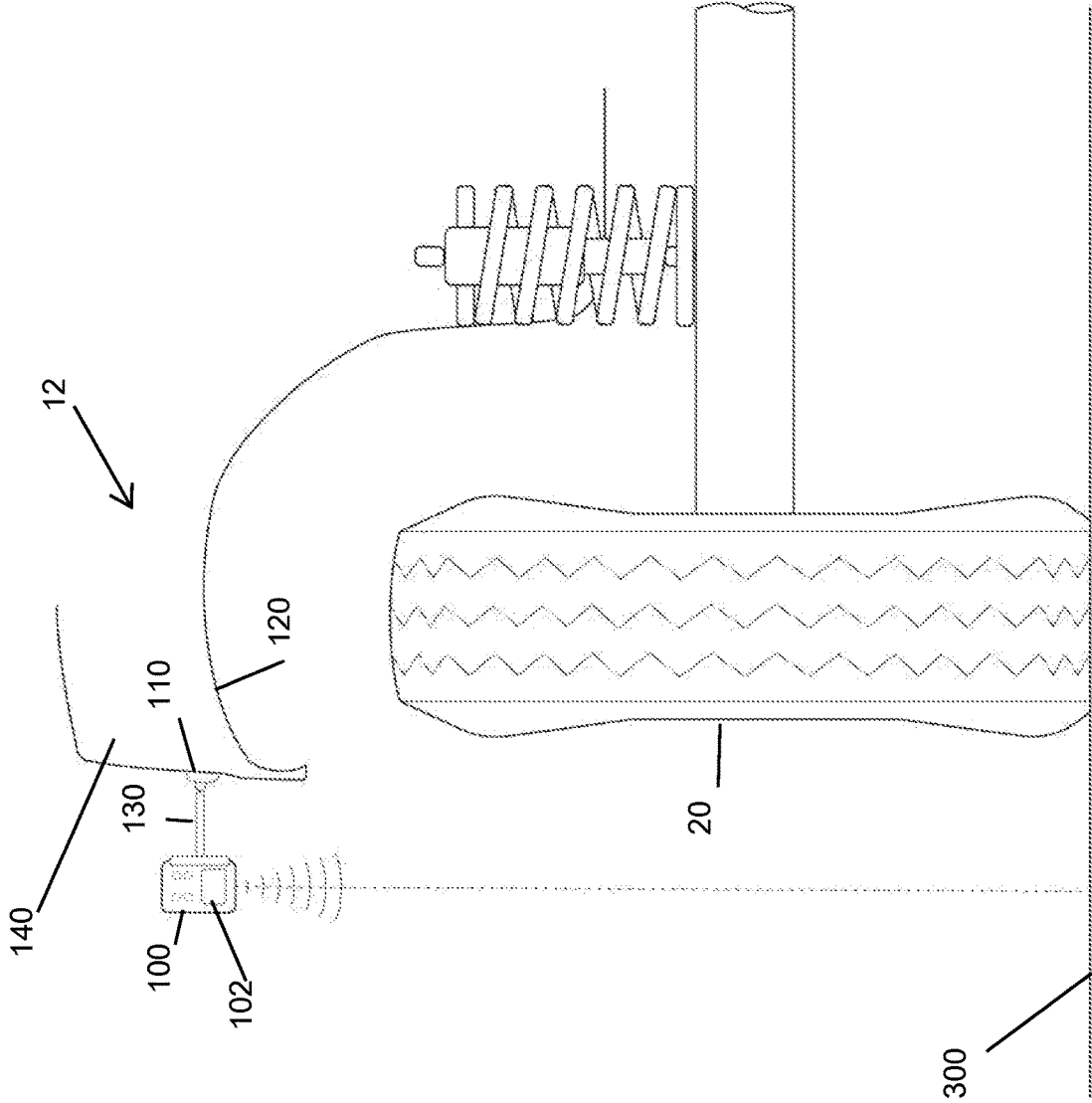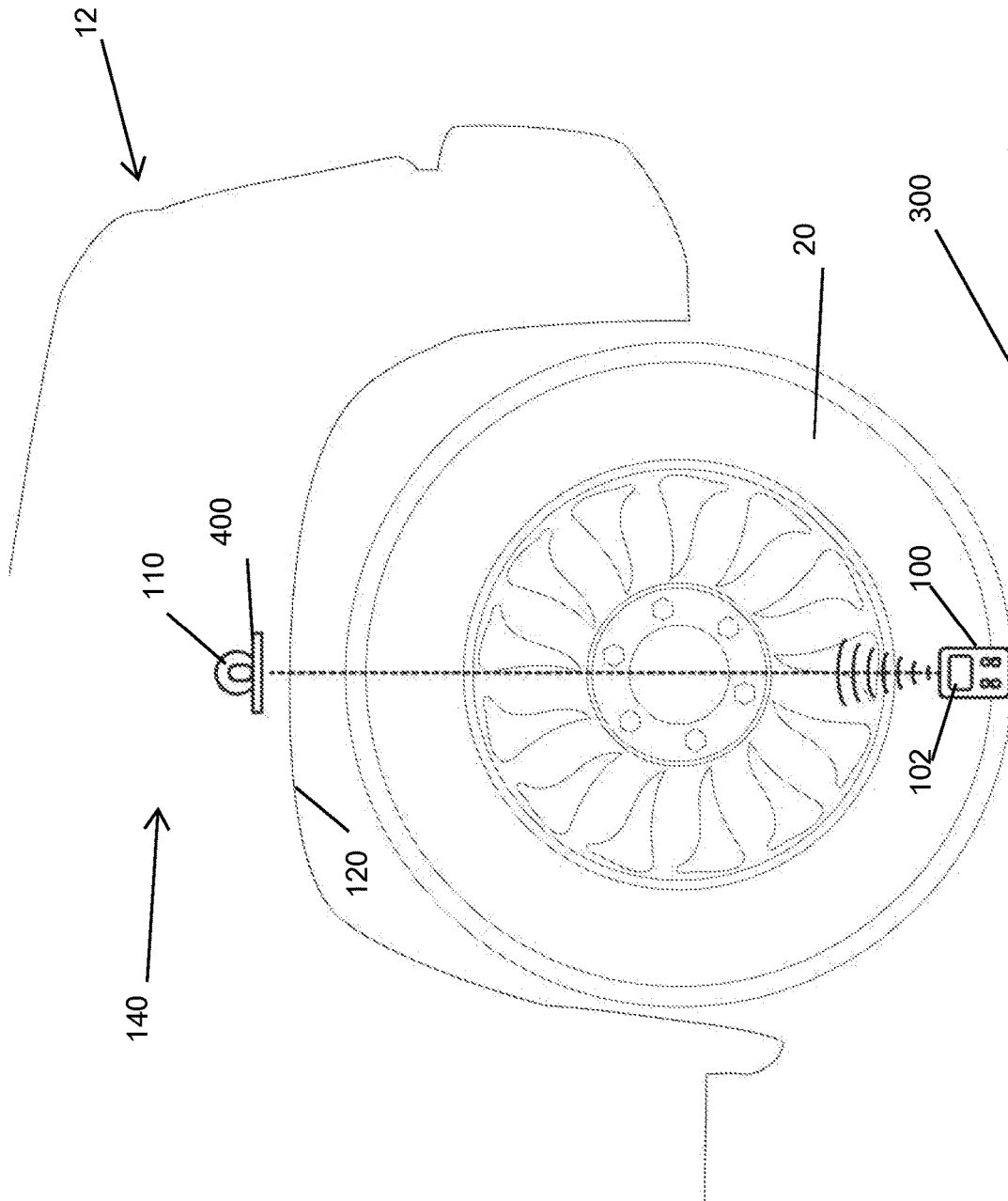
FIG. 1

FIG. 2

FIG. 3

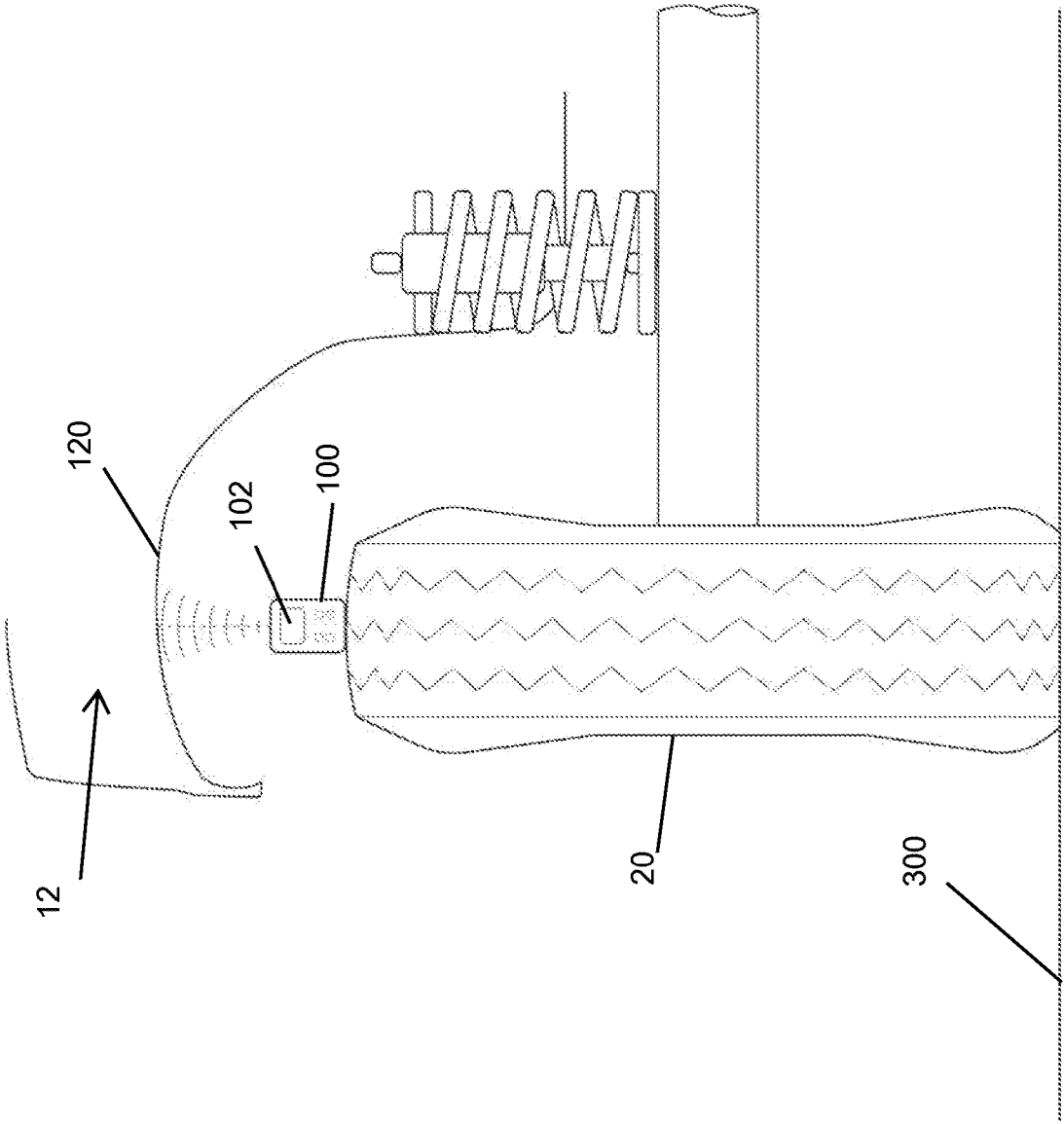FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

1

APPARATUS AND METHOD FOR DETERMINING WEIGHT DISTRIBUTION

CROSS-REFERENCE TO RELATED APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable.

BACKGROUND

1. The Field of the Present Disclosure.

The present disclosure relates generally to trailer weight distribution hitch systems, and more particularly, but not necessarily entirely, to trailer hitch systems for measuring the weight and resulting forces exerted by a trailer while using a weight distribution mechanism.

2. Description of Related Art.

It should be appreciated that the correct balance of a trailer load is necessary for safe towing. When towing a trailer, the tow vehicle often sags in the rear and raises in the front. The weight of the trailer on the rear of the tow vehicle can cause the rear tires and axle to carry a significant majority of the percent of the load of the trailer tongue, as known as tongue weight, and can also result in a transfer of some of the weight from the front of the tow vehicle itself, to the rear axle of the tow vehicle. This unbalanced loading can cause an unsafe driving situation.

Unbalanced loading can reduce steering and braking capabilities in the tow vehicle and in extreme situations it can cause accelerated wear to the mechanical components of the tow vehicle and trailer, and compromise the performance of the tow vehicle.

To aid in mitigating this type of unbalanced loading, people often purchase hitches that transfer the trailer tongue weight from the rear axle of the tow vehicle back to the front axle of the tow vehicle. However, it can be difficult for a user to know if they have achieved correct weight distribution. Further, as trailers are constantly being loaded differently, a previously correct weight distribution setup may not remain optimal and need to be reevaluated and adjusted accordingly.

The prior art is characterized by several disadvantages that may be addressed by the present disclosure. The present disclosure minimizes, and in some aspects eliminates, the failures of the prior art, by utilizing the system and components described herein.

The features and advantages of the present disclosure will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by the practice of the present disclosure without undue experimentation. The features and advantages of the present disclosure may be realized and obtained by means of the instruments and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and advantages of the disclosure will become apparent from a consideration of the subsequent detailed description presented in connection with the accompanying drawings in which:

2

FIG. 1 is a side view of a tow vehicle and a trailer prior to loading the tow vehicle;

FIG. 2 is a side view of a tow vehicle and a trailer after the tow vehicle has been loaded with the trailer;

FIG. 3 is a side view of a tow vehicle and a trailer after the tow vehicle has been loaded with the trailer and after a weight distribution device has been engaged between the tow vehicle and the trailer;

FIG. 4 is front view of an embodiment of a disclosed portable measuring device held at a fixed position on the vehicle;

FIG. 5 is front view of another embodiment of a disclosed portable measuring device attached at a fixed position on the vehicle;

FIG. 6 is front view of a further embodiment of a disclosed portable measuring device positioned at fixed position on the vehicle;

FIG. 7 is side view of another embodiment of a disclosed portable measuring device positioned at fixed position off the vehicle; and

FIG. 8 is front view of another embodiment of a disclosed portable measuring device positioned at a fixed position on a ground supported surface, such as a tire.

DETAILED DESCRIPTION

For the purposes of promoting an understanding of the principles in accordance with the disclosure, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the disclosure is thereby intended. Any alterations and further modifications of the inventive features illustrated herein, and any additional applications of the principles of the disclosure as illustrated herein, which would normally occur to one skilled in the relevant art and having possession of this disclosure, are to be considered within the scope of the disclosure claimed.

In describing and claiming the present disclosure, the following terminology will be used in accordance with the definitions set out below. As used in this specification and the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. As used herein, the terms "comprising," "including," "having," "containing," "characterized by," and grammatical equivalents thereof are inclusive or open-ended terms that do not exclude additional, unrecited elements or method steps.

Applicant has discovered an improved system and method for determining weight distribution of a trailer after being loaded on a tow vehicle and after engaging a weight distribution mechanism.

The generally accepted safe and proper tongue weight is roughly 10 to 15 percent of the total loaded trailer weight. The load of a trailer should also be properly balanced to achieve a tongue weight within the safe and proper range. Applicant has discovered a system and method configured to measure the weight distribution of the trailer, which can greatly reduce unsafe towing by providing users an effective mechanism configured to measure tongue weight distribution and properly transferring or redistributing the load of the trailer across the tow vehicle and trailer axles.

FIG. 1-3 illustrates three basic load positions for accurately measuring and determining weight distribution of a load on a tow vehicle. Specifically, FIG. 1 illustrates a trailer **10** and a tow vehicle **12**. The trailer **10** includes a tongue **14** configured to receive a trailer hitch **16** attached to the tow

vehicle **12**. The trailer hitch **16** may also include a weight distribution mechanism **18** designed and configured to more evenly distribute the load of the trailer **10** over the axles of the tow vehicle **12**, as opposed to placing most of the load of the trailer's tongue weight on the rear axle of the tow vehicle **12**. FIG. **1** illustrates the trailer **10** and tow vehicle **12** before the trailer **10** is loaded onto the tow vehicle **12**. Also shown in FIG. **1** is that the tow vehicle **12** at a base line, meaning the chassis of the vehicle is substantially balanced between the front wheels **20**, or front axle, and the rear wheels **22**, or rear axle.

FIG. **2**, illustrates the trailer **10** and tow vehicle **12** after the trailer **10** is loaded onto the tow vehicle **12**, but before engagement of the weight distribution mechanism **18**. Also shown in FIG. **2** is the tow vehicle **12** in a loaded state, meaning the trailer hitch **16** and rear wheels **22** may be holding the substantial majority of the tongue weight of the trailer **10**, causing the chassis of the vehicle **12** to substantially tilt toward the rear of the vehicle **12**, causing the front of the vehicle **12** to raise up from the front wheels **20**, or front axle.

FIG. **3**, illustrates the trailer **10** and tow vehicle **12** after the trailer **10** is loaded onto the tow vehicle **12**, and after engagement of the weight distribution mechanism **18**. Also shown in FIG. **3** is when the weight distribution mechanism **18** is engaged, the weight of the trailer **10** is more evenly distributed over the axles of the chassis of the vehicle **12**, resulting in the front of the chassis of the vehicle **12** to be closer to level with respect to the front wheels **20** and rear wheels **22**.

As shown in FIGS. **4-8**, the disclosed weight distribution measurement system may include a portable measuring device **100**. The measuring device **100** may be electronic and configured to measure a linear distance between two objects or surfaces. The measuring device **100** may measure the linear distance by utilizing a laser, which may be visible, or infrared, ultrasonic waves, or any other known measuring implement. The measuring device **100** may also include an electronic memory capable of storing multiple measured distances. Additionally, the measuring device **100** may be configured to take a single or multiple measurements at a first location and load status and then average the measurements together to provide a more accurate final measurement for any given location and load status.

The measuring device **100** may also include an operating system capable of being programed to perform calculations utilizing the stored measured distances. The measuring device **100** may also include a visual display **102**, that may display measured distances or resultant calculations. Additionally, the measuring device may be configured to transmit or share data, such as measured distances and/or output calculations, via WiFi, RF, Bluetooth, hardwire or other known electronic transmission mechanism or device.

A disclosed method of measuring weight distribution may include using the portable measuring device **100** to measure and store a first measurement of the tow vehicle, which may be a baseline measurement of the front axle load of the unloaded tow vehicle **12**, such as two points or surfaces that may represent the height of a front end of the tow vehicle **12**.

After the tow vehicle **12** has been loaded with a trailer **10**, but before the weight distribution mechanism **18** is engaged, a second measurement may be taken and stored by the portable measuring device **100**. The second measurement is taken at substantially the same location and between the same two points or surfaces as the first measurement.

After the weight distribution mechanism **18** is engaged, a third measurement maybe be taken and stored by the por-

table measuring device **100**. The third measurement is taken at substantially the same location and between the same two points or surfaces as the first and second measurements.

The portable measuring device **100** may then calculate a percentage of the trailer **10** weight being distributed over the axles of the tow vehicle **12**, also known as percent weight distribution. The calculation for percent weight distribution (% WD) is: % WD=(Second measurement−Third measurement)/ (Second measurement−First measurement). In another embodiment, % WD=(Second measurement taken on a driver side of the vehicle+Second measurement taken on a passenger side of the vehicle−Third measurement taken on a driver side−Third measurement taken on a passenger side)/(Second measurement taken on a driver side of the vehicle+Second measurement taken on a passenger side of the vehicle−First measurement taken on a driver side of the vehicle−First measurement taken on a passenger side of the vehicle), which substantially equates to an average weight distribution of a driver and passenger side of the vehicle **12**.

While the first, second and third measurements (unloaded, loaded and weight distributed) are recited sequentially above, the measurements may be taken and stored in any desired order. For the most accurate and consistent measurements, both the trailer **10** and tow vehicle **12** should positioned and supported on a level ground surface.

After the portable measuring device **100** performs the percent weight distribution, the portable measuring device **100** may then display on the visual display **102** or communicate to an external device (such as a phone, computer, etc.) the percent weight distribution. The communication can be via Bluetooth, RF, WiFi, or wired connection. Alternatively, the portable measuring device **100** may also, or instead, calculate and display a factor or amount of weight being distributed.

Referring to FIG. **4**, the portable measuring device **100** may be held by a user **200** at a location on a front end of the tow vehicle **12**, for example, at an interior location on the wheel well **120**. The portable measuring device **100** can then be pointed toward the ground or ground surface **300**, to measure the distance between the location on the wheel well **120** and the ground, or at a target positioned on the ground, or at any surface supported by the ground surface **300** such that the position or location of such a surface does not change with the loading of the vehicle **12**, but remains constant. This measurement can then be taken by the portable measuring device **100** for the first, second, and third measurements (unloaded, loaded and weight distributed), to determine the percent weight distribution of the trailer **10** over the axles of the to vehicle **12**, using the method described above.

The location on the tow vehicle **12** where the portable measuring device is held to take the measurements, must be the same location for each of the three measurements (unloaded, loaded and weight distributed), but the location itself can vary and include the driver side wheel well, passenger side wheel well, front fender, front bumper, or any other desired location on the tow vehicle **12** that is connected above the chassis or axles of the tow vehicle **12**, because any location on substantially the front half of the tow vehicle will change position relative to the ground **300**, depending on the percent weight distribution.

Referring to FIG. **5**, in another disclosed embodiment, the portable measuring device **100** may be removably or permanently attached at a location on a front end of the tow vehicle **12**, for example, at an interior location on the wheel well **120**. The portable measuring device may include any desired attachment mechanism **110**, for example, a magnet,

suction cup, adhesive, or any other know attachment mechanism. The portable measuring device **100** can then be pointed toward the ground **300**, or at another desired location in contact with the ground **300**, or at any surface supported by the ground **300** such that the position or location of such a surface does not change with the loading of the vehicle **12**, but remains constant, to measure the distance between the location on the wheel well **120** and the ground **300**. This measurement can then be taken by the portable measuring device **100** for the first, second, and third measurements (unloaded, loaded and weight distributed), to determine the percent weight distribution of the trailer **10** over the axles of the tow vehicle **12**, using the method described above.

The location on the tow vehicle **12** where the portable measuring device is held to take the measurements, must be the same location for each of the three measurements (unloaded, loaded and weight distributed), but the location itself can vary and include the driver side wheel well, passenger side wheel well, front fender, or any other desired location on the tow vehicle **12** that is connected above the suspension or axles of the tow vehicle **12**, because any location on substantially the front half of the tow vehicle will change position relative to the ground **300**, depending on the percent weight distribution.

Referring to FIG. **6**, in another disclosed embodiment, the portable measuring device **100** may be removably attached at a location on a front end of the tow vehicle **12**, for example, at an exterior location **140** above the wheel well **120**. The portable measuring device **100** may include any desired attachment holder **130** which can hold and support the portable measuring device **100** and also include an attachment mechanism **110**, for example, a magnet, suction cup, adhesive, or any other know attach mechanism. The portable measuring device **100** can then be pointed toward the ground **300**, or other suitable surface, such as any surface supported by the ground **300** such that the position or location of such a surface does not change with the loading of the vehicle **12**, but remains constant, to measure the distance between the exterior location **140** and the ground **300**. This measurement can then be taken by the portable measuring device **100** for the first, second, and third measurements (unloaded, loaded and weight distributed), to determine the percent weight distribution of the trailer **10** over the axles of the to vehicle **12**, using the method described above.

The location on the tow vehicle **12** where the portable measuring device is held to take the measurements, must be the same location for each of the three measurements (unloaded, loaded and weight distributed), but the location itself can vary and include the driver side wheel well, passenger side wheel well, front fender, or any other desired location on the tow vehicle **12** that is connected above the suspension or axles of the tow vehicle **12**, because any location on substantially the front half of the tow vehicle will change position relative to the ground **300**, depending on the percent weight distribution.

Referring to FIG. **7**, in another disclosed embodiment, the portable measuring device **100** may be positioned on the ground **300** or on any surface supported by the ground **300** such that the position or location of such a surface does not change with the loading of the vehicle **12**, but remains constant, adjacent to the front wheel **20** and oriented to measure the distance between the ground **300** and a removable measuring surface **400** that can be removably attached at a location on a front end of the tow vehicle **12**, for example, at an exterior location **140** above the wheel well

120. The removeable measuring surface **400** may include any desired attachment mechanism **110**, for example, a magnet, suction cup, adhesive, or any other known attachment mechanism. The portable measuring device **100** can then be pointed toward the measuring surface **400**, or the vehicle **12** itself, to measure the distance between the location on the exterior location **140** and the ground **300** or any surface supported by the ground surface **300** such that the position or location of such a surface does not change with the loading of the vehicle **12**, but remains constant. This measurement can then be taken by the portable measuring device **100** for the first, second, and third measurements (unloaded, loaded and weight distributed), to determine the percent weight distribution of the trailer **10** over the axles of the to vehicle **12**, using the method described above.

The location where the portable measuring device **100** is held or positioned, to take the measurements, must be the same location for each of the three measurements (unloaded, loaded and weight distributed), but the location itself can vary and include the ground **300** or a surface supported by the ground **300**, at or around the driver side wheel well, the passenger side wheel well, front fender, or any other desired location on the tow vehicle **12** that is connected above the suspension or axles of the tow vehicle **12**, because any location on substantially the front half of the tow vehicle will change position relative to the ground **300**, depending on the percent weight distribution.

Referring to FIG. **8**, in another disclosed embodiment, the portable measuring device **100** may be positioned at a location on a top surface of the front wheel **20** of the tow vehicle **12**, or on any surface supported by the ground **300** such that the position or location of such a surface does not change with the loading of the vehicle **12**, but remains constant, and pointed in a direction toward an interior location on the wheel well **120**. The portable measuring device **100** can then be pointed toward the interior location on the wheel well **120** to measure the distance between the location on the wheel well **120** and the top surface of the wheel **20**. This measurement can then be taken by the portable measuring device **100** for the first, second, and third measurements (unloaded, loaded and weight distributed), to determine the percent weight distribution of the trailer **10** over the axles of the to vehicle **12**, using the method described above.

The location on the tow vehicle **12** where the portable measuring device is held to take the measurements, must be the same location for each of the three measurements (unloaded, loaded and weight distributed), but the location itself can vary and include the driver wheel, passenger side wheel, or any other desired location on the tow vehicle **12** that is connected to a member or element attached below the suspension or axles of the tow vehicle **12**, and the portable measuring device can then be pointed to a location above the chassis or axles of the tow vehicle **12** because any location on substantially the front half of the tow vehicle **12** will change position relative to the wheels, axles and chassis, depending on the percent weight distribution.

The term "measuring device," as used herein, shall each be construed broadly to cover any device, now known or later discovered, capable of measuring, or determining a linear distance.

In the foregoing Detailed Description, various features of the present disclosure are grouped together in a single embodiment for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed disclosure requires more features than are expressly recited in each claim. Rather, as

the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed embodiment. Thus, the following claims are hereby incorporated into this Detailed Description of the Disclosure by this reference, with each claim standing on its own as a separate embodiment of the present disclosure.

It is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present disclosure. Numerous modifications and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the present disclosure and the appended claims are intended to cover such modifications and arrangements. Thus, while the present disclosure has been shown in the drawings and described above with particularity and detail, it will be apparent to those of ordinary skill in the art that numerous modifications, including, but not limited to, variations in size, materials, shape, form, function and manner of operation, assembly and use may be made without departing from the principles and concepts set forth herein.

ADDITIONAL SPECIFICATION SUPPORT

1. A weight distribution measurement system, including:
a portable measuring device configured to measure a linear distance and store a plurality of measurements,
wherein the portable measuring device is configured to measure a first distance between a first location on a vehicle above an axle of the vehicle and a second location, wherein the first distance is measured prior to loading the vehicle;
wherein the portable measuring device is configured to measure a second distance between the first location and the second location, wherein the second distance is measured after loading a vehicle,
wherein the portable measuring device is configured to measure a third distance between the first location and the second location, wherein the third distance is measured after loading a vehicle and engagement of a weight distribution device,
wherein the portable measuring device is configured to calculate the percent weight distribution over the axles of the vehicle using the portable measuring device,
wherein the portable measuring device is configured to display the percent weight distribution.
2. The system of embodiment 1, wherein the measuring device includes an attachment mechanism configured to removably attach the measuring device to a vehicle.
3. The system of embodiment 2, wherein the attachment mechanism is a magnet.
4. The system of embodiment 2, wherein the attachment mechanism is a suction cup.
5. The system of embodiment 1, wherein the measuring device includes a laser measuring implement.
6. The system of embodiment 1, wherein the measuring device includes an infrared measuring implement.
7. The system of embodiment 1, wherein the measuring device includes an ultrasonic measuring implement.
8. The system of embodiment 1, wherein the measuring device includes a visual display configured to show the percent weight distribution.
9. The system of embodiment 1, wherein the measuring device is configured to electronically communicate with an electronic device.
10. A method of determining weight distribution, including:
providing a portable measuring device configured to measure a linear distance and store a plurality of measurements;

measuring a first distance between a first location on a vehicle and a second location, wherein the first distance is measured prior to loading the vehicle;
measuring a second distance between the first location and the second location, wherein the second distance is measured after loading a vehicle,
measuring a third distance between the first location and the second location, wherein the third distance is measured after loading a vehicle and engaging a weight distribution mechanism,
calculating the percent weight distribution over the axles of the vehicle using the portable measuring device,
displaying the percent weight distribution.
11. The method of embodiment 10, wherein the loading of the vehicle includes coupling a trailer to the vehicle.
12. The method of embodiment 10, wherein the first location is within a wheel well of the vehicle and the second location is a ground surface supporting the vehicle.
13. The method of embodiment 10, wherein the first location is on an exterior location of the vehicle and the second location is a ground surface supporting the vehicle.
14. The method of embodiment 10, wherein the first location on a top surface of a wheel of the vehicle and the second location is within a wheel well of the vehicle.
15. The method of embodiment 10, wherein the first location is on a ground surface supporting the vehicle and second location is a measuring surface attached to an exterior location of the vehicle.
16. The method of embodiment 10, wherein the measuring device includes a visual display configured to show the percent weight distribution.
17. The method of embodiment 10, wherein the measuring device sends data to an electronic device.
18. The method of embodiment 10, wherein the measuring device includes a laser measuring implement.
19. The method of embodiment 10, wherein the measuring device includes an infrared measuring implement.
20. The method of embodiment 10, wherein the measuring device includes an ultrasonic measuring implement.

What is claimed is:
1. A weight distribution measurement system, comprising:
a portable measuring device configured to measure a linear distance and store a plurality of measurements;
wherein the portable measuring device is configured to measure a first distance between a first location on a vehicle supported by an axle of the vehicle and a second location either on a ground surface supporting the vehicle or on a surface supported by the ground surface, wherein the first distance is measured prior to loading the vehicle;
wherein the portable measuring device is configured to measure a second distance between the first location and the second location, wherein the second distance is measured after loading a vehicle;
wherein the portable measuring device is configured to measure a third distance between the first location and the second location, wherein the third distance is measured after loading a vehicle and engagement of a weight distribution device;
wherein the portable measuring device is configured to use the first distance, the second distance, and the third distance to calculate the percent weight distribution over the axles of the vehicle using the portable measuring device; and
wherein the portable measuring device is configured to display the percent weight distribution.

2. The system of claim **1**, wherein the portable measuring device includes an attachment mechanism configured to removably attach the measuring device to a vehicle.

3. The system of claim **2**, wherein the attachment mechanism is a magnet.

4. The system of claim **2**, wherein the attachment mechanism is a suction cup.

5. The system of claim **1**, wherein the portable measuring device includes a laser measuring implement.

6. The system of claim **1**, wherein the portable measuring device includes an infrared measuring implement.

7. The system of claim **1**, wherein the portable measuring device includes an ultrasonic measuring implement.

8. The system of claim **1**, wherein the portable measuring device includes a visual display configured to show the percent weight distribution.

9. The system of claim **1**, wherein the portable measuring device is configured to electronically communicate with an electronic device.

10. The system of claim **1**, wherein the portable measuring device is configured to calculate the percent weight distribution over the axles of the vehicle using the portable measuring device by using the following formula: the percent weight distribution=(the second distance−the third distance)/(the second distance−the first distance).

11. A method of determining weight distribution, comprising:

providing a portable measuring device configured to measure a linear distance and store a plurality of measurements;

measuring a first distance between a first location on a vehicle supported by an axle of the vehicle and a second location either on a ground surface supporting the vehicle or on a surface supported by the ground surface, wherein the first distance is measured prior to loading the vehicle;

measuring a second distance between the first location and the second location, wherein the second distance is measured after loading a vehicle;

measuring a third distance between the first location and the second location, wherein the third distance is measured after loading a vehicle and engaging a weight distribution mechanism;

using the first distance, the second distance, and the third distance to calculate the percent weight distribution over the axles of the vehicle using the portable measuring device; and

displaying the percent weight distribution.

12. The method of claim **11**, wherein the loading of the vehicle includes coupling a trailer to the vehicle.

13. The method of claim **11**, wherein the first location is a wheel well of the vehicle.

14. The method of claim **11**, wherein the first location is on an exterior location of the vehicle and the second location is a ground surface supporting the vehicle.

15. The method of claim **11**, wherein the second location on a top surface of a wheel of the vehicle and the first location is within a wheel well of the vehicle.

16. The method of claim **11**, wherein the first location is a measuring surface attached to an exterior location of the vehicle.

17. The method of claim **11**, wherein the portable measuring device includes a visual display configured to show the percent weight distribution.

18. The method of claim **11**, wherein the portable measuring device sends data to an electronic device.

19. The method of claim **11**, wherein the portable measuring device includes a laser measuring implement.

20. The method of claim **11**, wherein the portable measuring device includes an infrared measuring implement.

21. The method of claim **11**, wherein the portable measuring device includes an ultrasonic measuring implement.

22. The method of claim **11**, wherein the using of the first distance, the second distance, and the third distance to calculate the percent weight distribution over the axles of the vehicle, further comprises using the following formula: the percent weight distribution=(the second distance−the third distance)/(the second distance−the first distance).

* * * * *