

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ETN CAPITAL, LLC, d/b/a BEECH LANE,

Petitioner

v.

FBA OPERATING CO.,

Patent Owner

Case No. IPR2024-01445

US Patent No. 10,890,925

PETITION FOR *INTER PARTES* REVIEW

OF U.S. PATENT NO. 10,890,925

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PETITIONER’S EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,890,925 (the ‘925 Patent)
1002	Prosecution History of the App. No. 14/961,787 (parent application)
1003	Prosecution History of the ‘925 Patent (App. No. 15/619,261)
1004	Declaration of James Grimes
1005	U.S. Patent Pub. No. 2008/0142768 (“Thorpe”)
1006	U.S. Patent No. 7,305,772 (“Clark”)
1007	U.S. Patent Pub. No. 2016/0075311 (“Garceau”)
1008	U.S. Provisional App. No. 62/050,590
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1010	U.S. Patent No. 5,456,014 (“Wilson”)
1011	U.S. Patent No. 5,136,784 (“Marantz”)
1012	U.S. Patent No. 7,786,883 (“Davison, III”)
1013	U.S. Patent Pub. No. 2013/0338848 (“Park”)
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1015	Declaration of Vincent H. Lee
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LISTING OF CLAIMS

Claim 1	
[1.0]	A system for leveling a vehicle, the system comprising:
[1.1]	a sensor device secured to a vehicle to sense an inclination of the vehicle in both a pitch direction and a roll direction when the vehicle is parked on an uneven surface of the ground,
[1.2]	the sensor device comprising a printed circuit board that includes:
[1.2.1]	a digital accelerometer that permits calculation in both the pitch direction and roll direction,
[1.2.2]	and a processor to process data collected by the digital accelerator;
[1.3]	and a smart device in wireless communication with the sensor device, the smart device including a display screen;
[1.4]	wherein, based on the inclination of the vehicle as sensed by the sensor device, at least one of the sensor device and smart device is configured to determine adjustment pairs, each adjustment pair including a height adjustment amount and a corresponding adjustment direction needed to level a respective section of the vehicle by movement of the respective section of the vehicle with respect to the uneven surface of the ground by the height adjustment amount in the corresponding adjustment direction;
[1.5]	wherein the display device of the smart device is configured to display at least one image representative of the vehicle and showing the respective sections of the vehicle
[1.6]	and to simultaneously display the height adjustment amount and corresponding adjustment direction of each adjustment pair adjacent to each respective section of the vehicle shown in the at least one image;
[1.7]	and wherein the smart device is further configured to update the display screen, substantially in real time, as one or more of the height adjustment amounts are changed.
Claim 2	
[2.0]	The system according to claim 1, wherein the smart device and the sensor device communicate with each other through a wireless connection and the smart device is configured to receive a serial number of the sensor device so that the smart device communicates with the particular sensor device.
Claim 3	

[3.0]	The system according to claim 1, wherein the adjustment indicators show the adjustments in height to at least one part of a frame of the vehicle located at or near at least one of four wheels of the vehicle.
Claim 4	
[4.0]	The system according to claim 3, wherein the smart device is configured to calculate a first adjustment in height to level the vehicle in the pitch direction and a second adjustment in height to level the vehicle in the roll direction, and wherein the smart device is further configured to calculate the adjustments in height to the at least one part of the frame of the vehicle by adding the first adjustment with the second adjustment.
Claim 5	
[5.0]	The system according to claim 4, wherein:
[5.1]	the at least one part of the frame includes a first part located at or near a front driver-side wheel, a second part located at or near a back driver-side wheel, a third part located at or near a front passenger-side wheel, and a fourth part located at or near a back passenger-side wheel;
[5.2]	an adjustment in height, if any, to the first part includes combining a rearward pitch adjustment of the first adjustment with a right roll adjustment of the second adjustment;
[5.3]	an adjustment in height, if any, to the second part includes combining a forward pitch adjustment of the first adjustment with the right roll adjustment of the second adjustment;
[5.4]	an adjustment in height, if any, to the third part includes combining the rearward pitch adjustment of the first adjustment with a left roll adjustment of the second adjustment;
[5.5]	and an adjustment in height, if any, to the fourth part includes combining the forward pitch adjustment of the first adjustment with the left roll adjustment of the second adjustment.
Claim 6	
[6.0]	The system according to claim 1, wherein the smart device is further configured to display on the display screen near-real-time height adjustments remaining that are needed to level the vehicle when the vehicle is in the process of being leveled.
Claim 7	
[7.0]	The system according to claim 1, further comprising a temperature calibration lookup table, wherein the smart device is configured to

	correct the height adjustment amounts based on current temperature readings and information from the temperature calibration lookup table.
Claim 8	
[8.0]	The system according to claim 1, wherein the vehicle includes four wheels, and wherein at least one of the sensor device and smart device is configured to determine, based on the height needed to level the vehicle in both the pitch direction and the roll direction, adjustments in height to at least one of four parts of a frame of the vehicle, the four parts of the frame located at or near the four wheels of the vehicle.
Claim 9	
[9.0]	The system according to claim 1, wherein the information sensed by the sensor device regarding the inclination of the vehicle in both the pitch direction and the roll direction is processed to determine an amount of adjustment in height to a rear section or front section of the vehicle needed to level the vehicle in the pitch direction and to determine an amount of adjustment in height to a first side section or a second side section of the vehicle needed to level the vehicle in the roll direction.
Claim 10	
[10.0]	A method for leveling a recreational vehicle, the method comprising:
[10.1]	sensing an inclination of the recreational vehicle in both a pitch direction and a roll direction when the recreational vehicle is parked on an uneven surface of the ground;
[10.2]	based on the sensed inclination of the recreational vehicle, determining adjustment pairs, each adjustment pair including a height adjustment amount and a corresponding adjustment direction needed to level a respective section of the recreational vehicle by movement of the respective section of the recreational vehicle with respect to the uneven surface of the ground by the height adjustment amount in the corresponding adjustment direction;
[10.3]	displaying at least one image, representative of the recreational vehicle and showing the respective sections of the recreational vehicle, on a display screen of a smart device;
[10.4]	simultaneously displaying the height adjustment amount and corresponding adjustment direction of each adjustment pair on the

	display screen adjacent to each respective section of the recreational vehicle in the at least one image;
[10.5]	and updating the display screen, essentially in real time, as the height adjustment amounts are changed.
Claim 11	
[11.0]	The method according to claim 10, wherein the step of sensing the inclination of the recreational vehicle in both a pitch direction and a roll direction is performed by a corresponding sensor device, and wherein the smart device and the corresponding sensor device communicate with each other through a wireless connection, the method further comprising storing a serial number of the corresponding sensor device in the smart device so that the smart device communicates with the corresponding sensor device.
Claim 12	
[12.0]	The method according to claim 10, further comprising:
[12.1]	calculating a first adjustment in height to level the vehicle in the pitch direction;
[12.2]	calculating a second adjustment in height to level the vehicle in the roll direction;
[12.3]	calculating any needed adjustment in height to a first part of the frame located at or near a front driver-side wheel by combining a rearward pitch adjustment of the first adjustment and a right roll adjustment of the second adjustment;
[12.4]	calculating any needed adjustment in height to a second part of the frame located at or near a rear driver-side wheel by combining a forward pitch adjustment of the first adjustment and the right roll adjustment of the second adjustment;
[12.5]	calculating any needed adjustment in height to a third part of the frame located at or near a front passenger-side wheel by combining the rearward pitch adjustment of the first adjustment and a left roll adjustment of the second adjustment;
[12.6]	and calculating any needed adjustment in height to a fourth part of the frame located at or near a rear passenger-side wheel by combining the forward pitch adjustment of the first adjustment and the left roll adjustment of the second adjustment.
Claim 13	
[13.0]	The method according to claim 10, further comprising the step of displaying on the display screen near-real-time height adjustments

	remaining that are needed to level the vehicle when the vehicle is in the process of being leveled.
Claim 14	
[14.0]	The method according to claim 10, further comprising the step of correcting the height adjustment amounts based on current temperature readings and information from a temperature calibration lookup table.
Claim 15	
[15.0]	A non-transitory computer readable medium comprising computer executable instructions that, when executed by a processor of a smart device, control the smart device to perform steps comprising:
[15.1]	receiving a pitch angle measurement and a roll angle measurement of a vehicle from a sensor device secured to the vehicle when the vehicle is parked on an uneven surface of the ground;
[15.2]	based on the pitch angle measurement and roll angle measurement, calculating adjustment pairs, each adjustment pair include a height adjustment amount and a corresponding adjustment direction needed to level the vehicle by movement of the respective section of the vehicle with respect to the uneven surface of the ground by the height adjustment amount in the corresponding adjustment direction;
[15.3]	and displaying, on a display screen of the smart device, at least one image representative of the vehicle and showing the respective sections of the recreational vehicle;
[15.4]	simultaneously displaying, on the display screen of the smart device, the height adjustment amount and corresponding adjustment direction of each adjustment pair adjacent to each respective section of the vehicle in the at least one image;
[15.5]	and updating the display screen of the smart device, essentially in real time, as the height needed to adjust the vehicle to level the vehicle changes.
Claim 16	
[16.0]	The non-transitory computer readable medium according to claim 15, wherein the step of displaying the adjustment in height comprises the step of displaying, on the display screen of the smart device, the needed adjustment in height of at least one portion of a frame of the vehicle at or near at least one wheel position of the vehicle.
Claim 17	

[17.0]	The non-transitory computer readable medium according to claim 15, wherein the computer executable instructions, when executed, further control the smart device to:
[17.1]	calculate a first adjustment in height to level the vehicle in the pitch direction and a second adjustment in height to level the vehicle in the roll direction;
[17.2]	and calculate adjustments in height to each of at least one part of a frame of the vehicle by combining the first adjustment with the second adjustment.
Claim 18	
[18.0]	The non-transitory computer readable medium according to claim 17, wherein the at least one part of the frame includes a first part located at or near a front driver-side wheel, a second part located at or near a back driver-side wheel, a third part located at or near a front passenger-side wheel, and a fourth part located at or near a back passenger-side wheel, and wherein the computer executable instructions, when executed, further control the smart device to:
[18.1]	calculate any needed adjustment in height to the first part by combining a rearward pitch adjustment of the first adjustment with a right roll adjustment of the second adjustment;
[18.2]	calculate any needed adjustment in height to the second part by combining a forward pitch adjustment of the first adjustment with the right roll adjustment of the second adjustment;
[18.3]	calculate any needed adjustment in height to the third part by combining the rearward pitch adjustment of the first adjustment with a left roll adjustment of the second adjustment;
[18.3]	and calculate any needed adjustment in height to the fourth part by combining the forward pitch adjustment of the first adjustment with the left roll adjustment of the second adjustment.
Claim 19	
[19.0]	The non-transitory computer readable medium according to claim 15, wherein the computer executable instructions, when executed, further control the smart device to display, in near real time, height adjustments that are remaining for leveling the vehicle during a vehicle leveling process.
Claim 20	
[20.0]	20. The non-transitory computer readable medium according to claim 15, wherein the computer executable instructions, when executed,

	further control the smart device to correct the adjustments in height based on current temperature readings and information from a temperature calibration lookup table.
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I. Mandatory Notices (37 C.F.R. § 42.8(a)(1))

A. Real Party-in-Interest (37 C.F.R. § 42.8(b)(1))

Petitioner ETN CAPITAL, LLC d/b/a BEECH LANE is the real party in interest under 37 C.F.R. § 42.8(b)(1).

B. Related Matters (37 C.F.R. § 42.8(b)(2))

A decision in this matter could affect or be affected by:

FBA Operating Co. v. ETN Capital, LLC d/b/a Beech Lane, U.S. District Court for the Eastern District of North Carolina, case no. 5-23-cv-505 (E.4.N.3.);

FBA Operating Co. v. ETN Capital, LLC d/b/a Beech Lane, 2024-02070 (Fed. Cir.)(dismissed August 30, 2024);

FBA Operating Co. v. RNG International, Inc. d/b/a Renology, U.S. District Court for the Central District of California, case no. 5:24-cv-00797-SSS-SHK.

C. Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Lead Counsel	Back-up Counsel
David E. Bennett (Reg. No. 32,194) Coats & Bennett, PLLC 1400 Crescent Green Dr, Ste 300 Tel: 919-854-1844 Fax:919-719-4885 Email:dbennett@coatsandbennett.com	David D. Kalish (Reg. No. 42,706) Coats & Bennett, PLLC 1400 Crescent Green Dr, Ste 300 Tel: 919-854-1844 Fax:919-719-4885 Email: dkalish@coatsandbennett.com

D. Service Information

Petitioner consents to service by email at dbennett@coatsandbennett.com, dkalish@coatsandbennett.com, and kfox@coatsandbennett.com.

II. Payment of Fees (37 C.F.R. § 42.103)

Petitioner hereto pays the fees set forth in 37 C.F.R. § 42.15(a) via EFT account. Petitioner authorizes the U.S. Patent and Trademark Office to charge any deficiencies, or credit any overpayment, related to this fee to Deposit Account No. 18-1167.

III. Requirements for IPR (37 C.F.R. § 42.104)

A. Grounds for Standing (37 C.F.R. § 42.104(a))

Petitioner certifies that the patent for which review is sought is available for *inter partes* review, and further certifies that Petitioner is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this petition.

B. Claims Challenged (37 C.F.R. § 42.104(b)(1))

Petitioner petitions for *inter partes* review of claims 1-20.

C. Specific Statutory Grounds (37 C.F.R. § 42.104(b)(2))

Petitioner requests IPR of the claims of the '925 Patent on the grounds set forth in the table shown below. Accompanying explanation and support are provided in the Declaration of James Grimes. ETN1004

Ground	References	Claims	Statute
1	Thorpe + Clark + Garceau	1 -3, 6, 8-11, 13, 15, 16, and 19	35 U.S.C. 103
2	Thorpe + TealLevel + Garceau	1-6, 8-13, and 15-19	35 U.S.C. 103
3	Thorpe + Clark + Garceau + common knowledge	7, 14, and 20	35 U.S.C. 103
4	Thorpe + TealLevel + Garceau + common knowledge	7, 14, and 20	35 U.S.C. 103
5	Garceau + TealLevel	10-13 and 15-19	35 U.S.C. 103
6	Garceau + TealLevel Common knowledge	1-9, 14, and 20	35 U.S.C. 103

The '925 Patent claims priority to a provisional application filed on December 5, 2014, which is the earliest effective filing date ("Critical Date"). Each of the prior art references predates the Critical Date.

Thorpe (ETN1005) is a published application published on June 19, 2008. Thorpe is prior art under 35 U.S.C. § 102(a)(1) and 35 U.S.C. § 102(a)(2) (AIA).

Clark (ETN1006) is a U.S. patent that issued on December 11, 2007. Clark qualifies as prior art under 35 U.S.C. § 102(a)(1) and 35 U.S.C. § 102(a)(2) (AIA).

Garceau (ETN1007) is a published application filed in the United States Patent Office on September 15, 2015 ("Garceau"). Garceau claims priority to a provisional application filed on September 15, 2014. The subject matter relied on in Garceau for this Petition was disclosed in the earlier-filed provisional application. ETN1008. Garceau qualifies as prior art under 35. U.S.C § 102(a)(2).

TealLevel is a software application developed for Palm devices by a software developer called TealPoint. The TealLevel application included a component for leveling an RV. ETN1015, ¶¶[4]. TealPoint applications were sold through the TealPoint website as well as through the Palm App Catalog. ETN1015, ¶¶[10, 12, 20-21]. The TealLevel User Manual (ETN1018) was published on or about January 9, 2010 and was publicly available on the TealPoint website. ETN1015, ¶¶[18-19]; ETN1014, ¶[6-7].

TealPoint was a well-known developer of applications for Palm devices. ETN1015, ¶¶[7, 24]. It received numerous industry awards for its software and was frequently the subject of unsolicited media attention in blogs and magazines catering to Palm users and developers. ETN1015, ¶¶[8, 24-25]. At the time the ‘925 Patent was filed, developers of RV leveling applications for smartphones would have looked for RV leveling applications distributed and sold by application developers for Palm, Apple, and Android devices and would have discovered TealPoint, the TealLevel application, and the TealPoint website. ETN1015, ¶¶[10-12, 20-24, 31]

Because the TealLevel User Manual was posted on a public website for a well-known application developer and could have been retrieved by anyone searching for RV leveling applications for a smart device, the TealLevel User Manual is a printed publication and qualifies as prior art under 35. U.S.C. §

102(a)(1) *Voter Verified, Inc. v. Premier Election Sols., Inc.*, 698 F.3d 1374, 1381 (Fed. Cir. 2012).

IV. Introduction

A. RV Leveling Systems-Background

Various systems and components within a recreational vehicle (RV), such as the plumbing system and appliances, do not function properly when the vehicle is not level. ETN1010, 1:17-22; ETN1012, 1:17-19; ETN1013, ¶[0007]. Further, the RV is more comfortable for users when it is properly leveled. ETN1010, 1:22; ETN1013, ¶[0007].

Some RVs are equipped with hydraulic or electric vehicle leveling systems that automatically level the RV when it is parked. ETN1013, ¶[0008]. Due to the expense of such systems, many RV owners opt to level the RVs manually using jacks or leveling blocks. ETN1010, 1:14-56; ETN1013, ¶[0008].

The manual leveling process is a trial-and-error process that involves iteratively determining the levelness of the vehicle and then adjusting the height of the vehicle at different ground contact points until the vehicle is level. Many devices exist for determining when a RV is out-of-level ranging from simple bubble levels to more sophisticated electronic sensors. These devices indicate when the vehicle is out-of-level and the direction or axis of the inclination, but do not calculate how much level correction is required at different ground contact

points. ETN1011; ETN1012. Consequently, the user is left to “guess” the amount of level correction required at each ground contact point and to make adjustments according to the user’s best guess. ETN1013, ¶[008]. In many cases, multiple readings of the levelness of the vehicle followed by level correction are required.

Vehicle leveling systems that take the guesswork out of the vehicle leveling process are also known. ETN1005 (Thorpe); ETN1010 (Wilson), ETN1013(Park) and TealLevel (ETN1018). These leveling systems sense the inclination of the vehicle using accelerometers or tilt sensors and calculate the amount of the height adjustment required at each ground contact point to level the vehicle. Thorpe and Park each disclose a leveling system including a sensor that mounts to the vehicle and a remote unit in wireless communication with the sensor unit that displays the height adjustment amounts to the user. Exhibits 1005, 1013. The remote units in Thorpe and Park display the height adjustment amounts one at a time using a character-based display. Wilson and TealLevel, in contrast, display the height adjustments for all ground contact points simultaneously.

TealLevel (ETN1018) and Clark (ETN1006) each disclose a graphical display for a vehicle leveling system that displays an image of the vehicle. The graphical display in Clark simultaneously displays pitch and roll indicators adjacent side and end views of the vehicle respectively. TealLevel displays the

amount that the three lowest wheels of a four-wheeled vehicle need to be raised to level the vehicle adjacent an image of the vehicle. ETN1018, p.3.

B. Summary Of The ‘925 Patent

The ‘925 Patent (ETN1001) is directed to a vehicle leveling system that purports to be an improvement of prior art RV leveling systems. The system includes a sensor device 22 that detects an inclination of the vehicle and a smart device (e.g., smartphone) 24 in communication with the sensor device. ETN1001, Figure 1. The smart device 24 includes a display 40 to display an image representative of the vehicle. ETN1001, 13:9-36; Figures 5A, B. The display simultaneously displays height adjustment amounts needed to level the RV. *Id.* Upon receiving sensor data from the sensor device 22, the smart device 24 calculates and displays “adjustment pairs” for leveling the vehicle. ETN1001, 8:39-55; 13:54-14:25. Each adjustment pair includes a height adjustment amount and a corresponding adjustment direction needed to level a section of the vehicle. *Id.*; Figures 5A&B.

Figure 5A, reproduced below, illustrates the graphical interface of the patented RV leveling system.

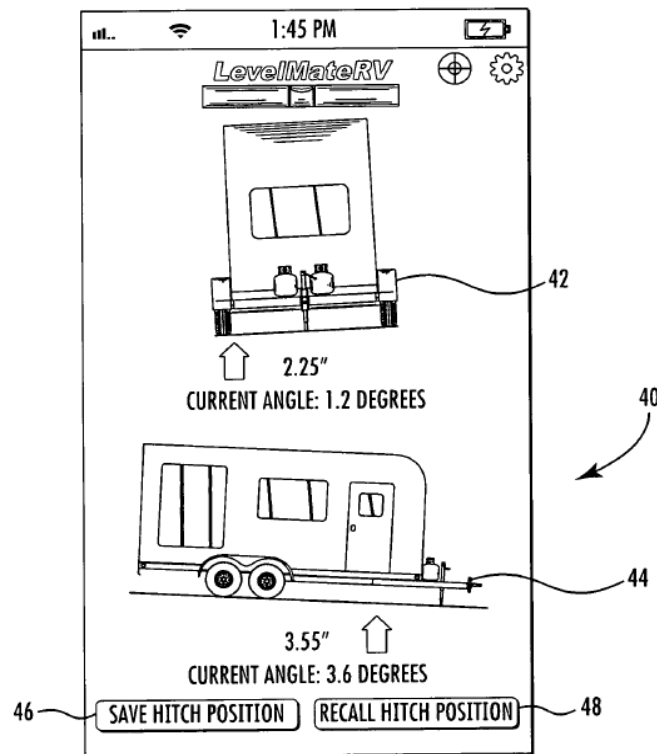


Figure 5A

C. Prosecution History of '925 Patent

The application resulting in the issuance of the '925 Patent is a continuation-in-part (ETN1003) of an earlier-filed utility application (ETN1002) ("parent application") and claims priority to two earlier-filed provisional applications. ETN1076; ETN1077. The original claims of the CIP application as filed recited sensor devices to sense inclination of the vehicle and a smart device to process the measurements received from the sensor device and "provide measurements to a user and to determine the amount of adjustments in height needed to at least one of the pitch direction or the roll direction to level the vehicle." ETN1002, p. 54 The

display limitation was added during prosecution of the '925 Patent by an amendment dated February 11, 2020 after several rejections and after filing an RCE. ETN1003, 388. This amendment required the smart device to “display at least one image representative of the vehicle on the display” and to “simultaneously display a plurality of adjustment indicators... each adjustment indicator showing an amount of adjustment in height needed at a respective section of the vehicle to level the vehicle in at least one of the pitch and roll direction.”

Following the February 11, 2020 amendment, the Examiner issued a final rejection of the claims as being obvious over Thorpe (ETN1005) in view of Luk (ETN1070) and further in view of Zhong (ETN1071) ETN1003, Final Rejection dated April 28, 2020. While Thorpe disclosed a vehicle leveling system with a sensor device and control unit that wirelessly communicates with the sensor device, it did not disclose the limitations related to the graphical display. The rejection relied on the teachings in Zhong (ETN1071) showing pitch and roll indicators for UAVS in flight. After the Examiner finally rejected the claims, the applicant further amended the claims in an after-final response to recite that the vehicle was parked on the ground and that the height adjustment amount was relative to the ground. ETN1003, 460-466. Applicant distinguished Zhong as being non-analogous art because the UAV was not parked on the ground and for failing to display adjustments in height with respect to the ground needed to level

the vehicle. ETN1003, 468-469. After receiving an Advisory Action, Application filed on RCE with further amendments placing the claims in the current form. ETN1003, 494-506. These amendments introduced the term “adjustment pairs” including both a height adjustment amount and adjustment direction. Applicant again argued that Zhong was non-analogous art and for failing to disclose adjustment pairs including a height adjustment amount and direction with respect to the ground needed to level the vehicle. ETN103, pp. 496-497. Following this amendment, the Examiner issued a Notice of Allowance.

V. Claim Construction (37 C.F.R. § 42.104(b)(3))

Petitioner submits that the following terms/limitations in independent claims 1, 10, and 15 should be construed:

1. “adjustment pairs”
2. “simultaneously display[ing] the height adjustment amount and corresponding adjustment direction of each adjustment pair”
3. “smart device”

All claim terms should be construed according to the *Phillips* standard.

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir 2005); 37 C.F.R. § 42.1.

A. “adjustment pairs”

Independent claims 1, 10, and 15 all recite determining or calculating “adjustment pairs” in plural form. The claims therefore require the determination

of two or more adjustment pairs. *Apple Inc. v. MPH Technologies Oy*, 28 F.4th 254, 261 (Fed. Cir. 2022)(“In accordance with common English usage, we presume a plural term refers to two or more items.”); *Leggett & Platt, Inc. v. Hickory Springs Mfg. Co.*, 285 F.3d 1353, 1357 (Fed. Cir. 2002)

An adjustment pair as recited in the claims 1, 10, and 15 includes both a height adjustment amount and a corresponding adjustment direction. The height adjustment amount comprises a linear measurement (e.g., distance in inches) indicating the amount of adjustment needed to level a section of the vehicle. ETN1003, 496-497 (distinguishing height adjustment amount from pitch and roll angle)

B. “simultaneously display[ing] the height adjustment amount and corresponding adjustment direction of each adjustment pair”

The claim limitations requiring simultaneous display of the adjustment pairs were added during prosecution to differentiate the claims from Thorpe (ETN1005), which displayed the height adjustment amounts one at a time. The simultaneous display limitation includes three elements: a verb describing an act that is performed (“display”), a complex object describing the measurements displayed (“the height adjustment amount and corresponding adjustment direction of each adjustment pair”), and an adverb describing how the measurements are displayed (“simultaneously”). The measurements displayed in this case are the “the height

adjustment amount and corresponding adjustment direction of each adjustment pair.” The prepositional phrase “of each adjustment pair” modifies the compound noun in the object clause and indicates that all adjustment pairs are displayed. The adverb “simultaneously” means that the measurements defined by the complex object are displayed at the same time. Thus, the plain language of the claims requires that the height adjustment amount and corresponding adjustment direction of all adjustment pairs be displayed at the same time.

The interpretation of the simultaneous display limitation arrived at by analysis of the claim language is further supported by the specifications and prosecution history. The drawings illustrate simultaneous display of the adjustment pairs. Also, during prosecution, the patentee added the simultaneous display limitation to differentiate the claimed invention from Thorpe and argued that “Thorpe is only configured to display one leveling adjustment at a time, and therefore does not teach or suggest simultaneously displaying multiple adjustment indicators, as claimed.” ETN1003, 388

C. “Smart Device

A “smart device” comprises a device with computing or processing capabilities that can network with other devices to exchange information. ETN1004, ¶28; ETN1062-1064.

VI. Summary of Prior Art Relied Upon

A. Thorpe (ETN1005)

Thorpe discloses a vehicle leveling system for use with recreational vehicles. ETN1005, Abstract. The leveling system comprises a level unit 12 that is placed inside the recreational vehicle and a control unit 14 that wirelessly communicates with the level unit. *Id.*; ETN1005, ¶[0035, 0037]. Based on measurements received from the level unit 12, the control unit 14 calculates and displays a roll adjustment and pitch adjustment needed to level the vehicle.

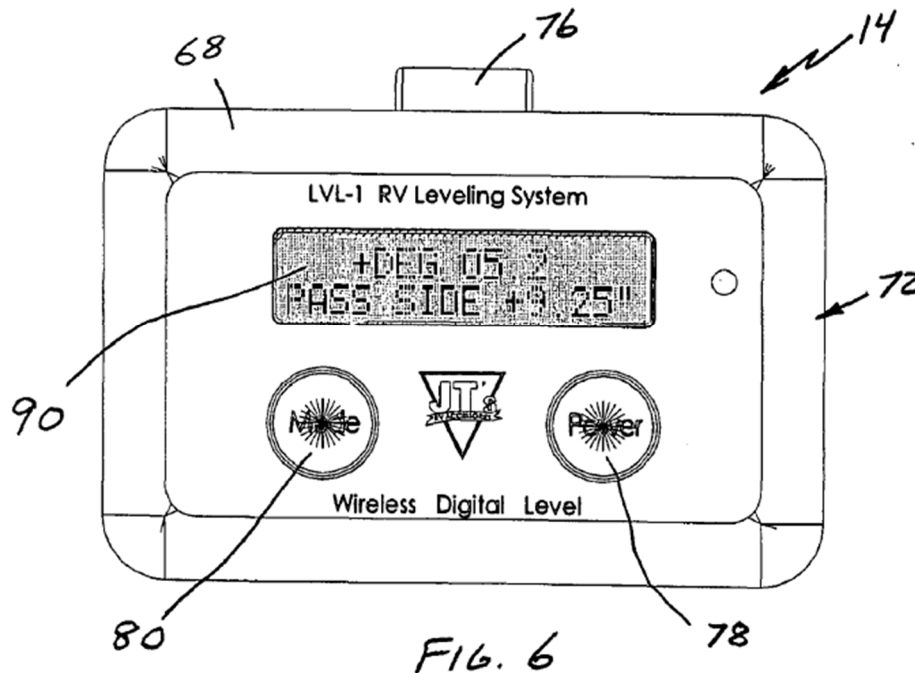


Figure 6 of Thorpe shows the roll adjustment needed to correct the roll of the vehicle. In this example, the display 90 shows the roll adjustment as “PASS SIDE +9.25””. The “+” sign indicates that the passenger side of the vehicle needs

to be raised (direction) and the measurement value (9.25") indicates the amount of the adjustment in inches (height adjustment amount).

The Figures in Thorpe do not show the pitch adjustment but the text of the applications explains that the pitch adjustment is displayed in the same manner and indicates whether the front or rear of the vehicle needs to be raised. ETN1005, ¶¶[0040, 0044]. The mode button 80 on the control unit 14 allows the user to toggle the display to show the roll adjustment and pitch adjustment one at a time.

B. Clark (ETN1006)

Clark discloses a vehicle leveling system comprising a clinometer mounted on the vehicle in communication with a computer. ETN1006, Abstract; Fig. 1. “The clinometer is configured to measure at least one inclination angle of the vehicle and send an electrical signal representing the at least one inclination angle to the computer.” ETN1006, Abstract. The clinometer 2 may be permanently or temporarily mounted on or attached anywhere on the vehicle 1 to monitor the levelness or orientation of the vehicle 1 with respect to a selected reference angle. ETN1006, 3:14-22. “The computer is configured to transform the signal back into the at least one inclination angle and present a graphical display.” ETN1006, Abstract. The graphical display comprises at least one representation of the vehicle which rotates in real-time as the at least one inclination angle changes.” *Id.*

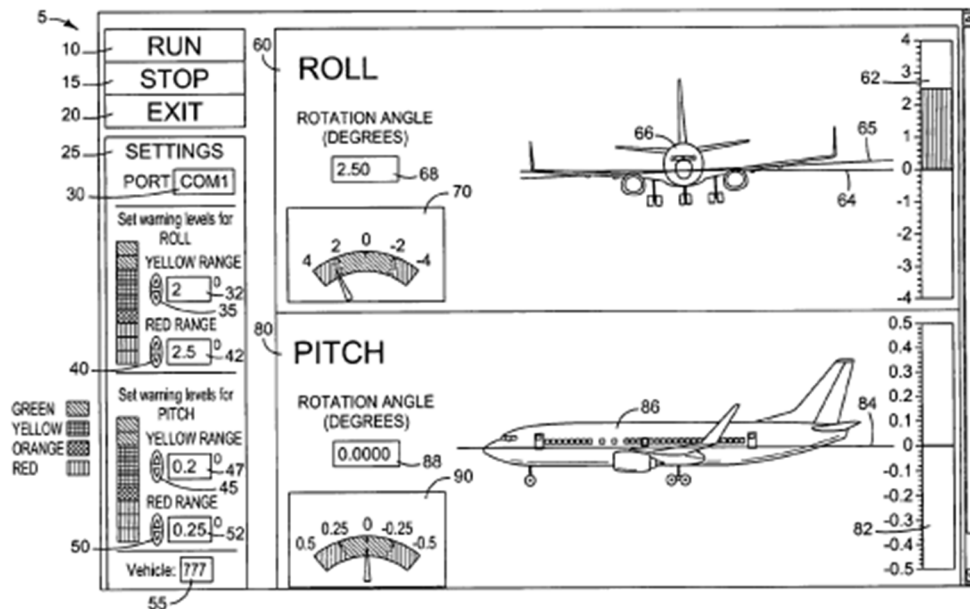
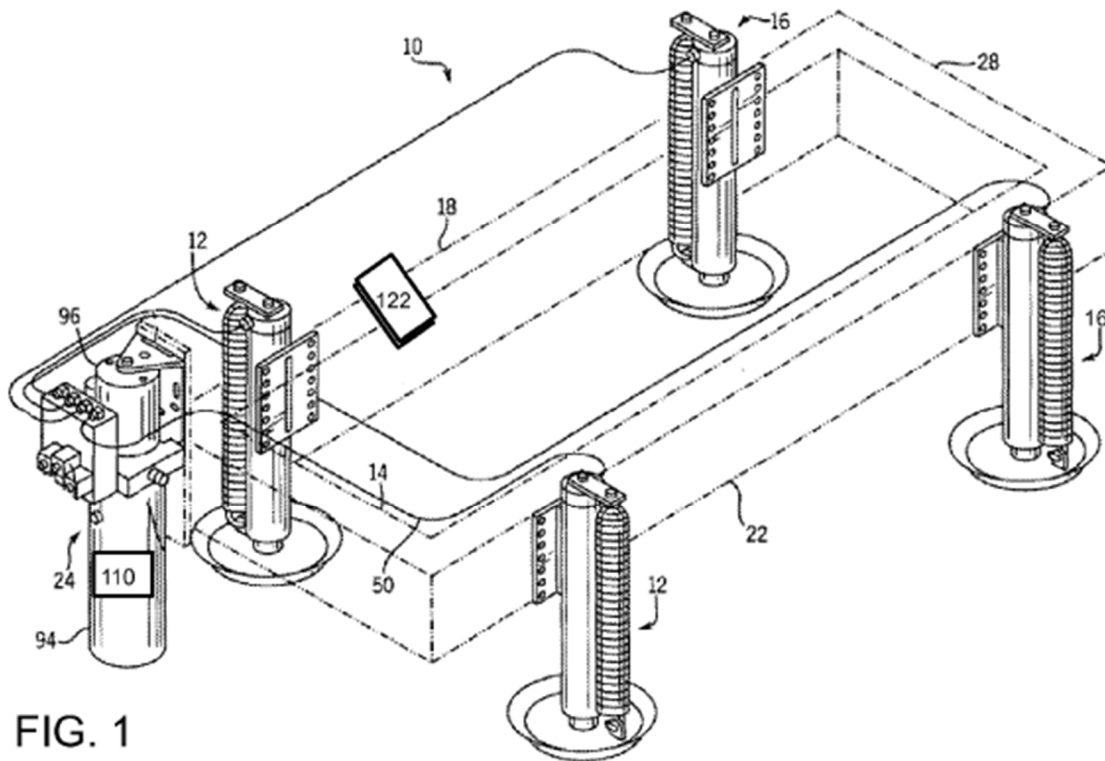


FIG. 4

Figure 4, shown above, simultaneously displays roll and pitch measurements on the top and bottom halves of the display screen respectively. The displayed measurements include both the direction and amount in degrees of both the roll and pitch of the vehicle.

C. Garceau (ETN1007)

Garceau discloses “[a] leveling assembly and method for analyzing the attitude of a platform or structure such as a motor vehicle” ETN1007, ¶[0012]. “A control system actuates leveling jacks attached to or in contact with the platform or structure using feedback from a multi axis digital sensor.” *Id.* The leveling system is specially designed for leveling a recreational vehicle. ETN1007, ¶[0017]. Figure 1 of Garceau is reproduced below.

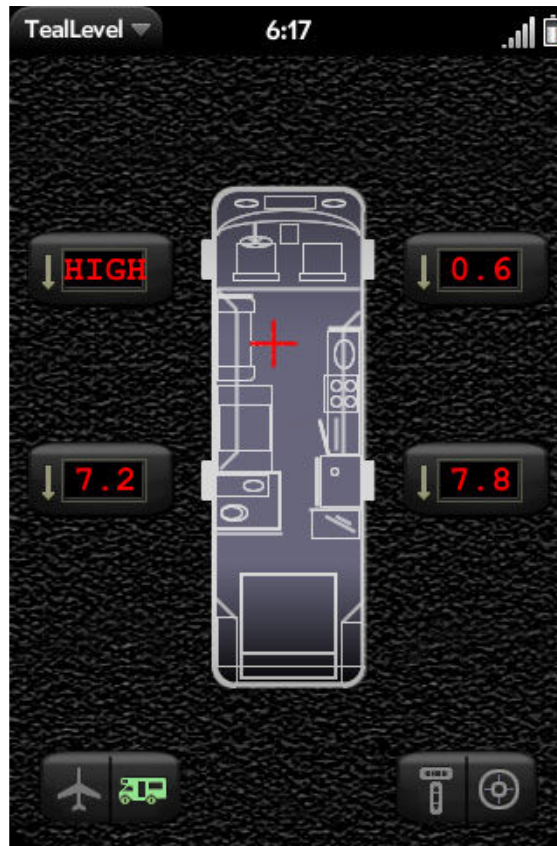


The leveling system in Garceau “includes a multi-axis digital sensor 122, which may be mounted to the vehicle in any satisfactory location.” ETN1007, ¶[0037]. “The multi-axis digital sensor is configured to provide digital signals to the controller representing, for example, the degree of longitudinal pitch and lateral roll of a vehicle to which the multi-axis digital sensor is connected.” ETN1007, ¶[0030]. “Using data from the gyroscope and accelerometer, the attitude (e.g., pitch, roll, or other relative metrics) of the structure can be calculated....” ETN1007, ¶[0012].

Garceau also discloses a remote unit that communicates wirelessly with the digital sensor 122. ETN1007, ¶[0035]. Examples of remote units include computers, cellular telephones and smartphones. *Id.* Using measurements provided by the digital sensor 122 “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static, or in motion.” *Id.* The remote unit can be used to manually or semi-automatically control the leveling system. *Id.*

D. TealLevel (ETN1018)

TealLevel discloses a vehicle leveling application for Palm devices. ETN1018. In use, the Palm device with the TealLevel application installed is laid flat on the floor of the RV. ETN1018, p.3-4. The TealLevel application calculates a height adjustment amount for the lower three wheels based on the vehicle’s track width and wheel base and displays the calculated height adjustment amounts on a graphical display as shown below. *Id.*



VII. Grounds 1 and 2-Obviousness Over Thorpe In View Of Clark (Ground 1) or TealLevel (Ground 2) and Further In View Of Garceau

Both Clark and TealLevel are cited to show a graphical display for a vehicle leveling system. These references are interchangeable. Due to the overlap of Grounds 1 and 2, the analysis of grounds 1 and 2 have been combined to avoid unnecessary redundancy.

A. Summary of Argument

Thorpe discloses a vehicle leveling system for use with recreational vehicles (RVs) comprising a level unit 12 that is placed inside the recreational vehicle and a control unit 14 that wirelessly communicates with the level unit. Based on measurements received from the level unit 12, the control unit 14 calculates and displays height adjustments needed to level the vehicle. The display in Thorpe comprises a character-based display that displays the height adjustments for leveling the vehicle one at a time.

Garceau teaches a vehicle leveling system including a digital sensor 122 and a remote unit. The digital sensor 122 comprises a digital accelerometer and the remote unit comprises a smart device, such as a computer or smartphone. The remote unit communicates wirelessly with the digital sensor 122. The remote unit can be used to manually or semi-automatically control the leveling system.

ETN1007, ¶[0035].

Clark and TealLevel both disclose graphical displays for vehicle leveling systems that display an image of the vehicle and simultaneously display pitch and roll measurements for leveling the vehicle.

It would have been obvious to a PHOSITA as of the Critical Date, in view of Garceau, to implement the remote unit (i.e., smart device) of a vehicle leveling system as an application on a computer or smartphone capable of displaying

graphics as a remote unit as taught by Garceau. ETN1004, ¶58. Garceau teaches that an application installed on a cellular telephone or smartphone can communicate wirelessly with the digital sensor in a vehicle leveling system and display text or graphics depicting the attitude of the vehicle. ETN1007, ¶[0035]. Using a computer or smartphone with graphical display as a remote unit avoids the need to manufacture a special purpose control unit and therefore reduces costs and saves time.

Further, it would have been obvious to a PHOSITA to use a graphical display as taught by Clark or TealLevel that displays an image representative of the vehicle and that simultaneously displays the adjustment pairs. ETN1004, ¶59. Clark discloses that the graphical representation of the vehicle in the display provides the user with “an intuitive understanding of the measurements taken by the clinometer 2, such as the roll and pitch conditions of the vehicle 1” and enables the vehicle to be “jacked and leveled with few persons and in less time” ETN1006, 3:57-63; 8:66-9:7. Wilson teaches that simultaneous display of height adjustment amounts is “greatly needed” in vehicle leveling systems. ETN1010, 1:54-57.

Replacing the character-based display of Thorpe with a graphical display as taught by Clark or TealLevel is a simple substitution of one known element (character-based display) for another known element (graphical display) that yields

no more than predictable results. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007)

It would also have been obvious to a PHOSITA as of the Critical Date to use a digital accelerometer as taught by Garceau in place of the analog accelerometer and A/D conversion circuit in Thorpe. Both analog and digital accelerometers were known as of the Critical Date. ETN1004, ¶60. Both analog and digital accelerometers perform the same function, the main difference being that, in the case of the digital accelerometer, the A/D conversion is performed before the signal is output. *Id.* Whether to use an analog or digital accelerometer is largely a matter of design choice. *Id.* The substitution of one known element for another yielding only predictable results is another textbook example of obviousness. *KSR*, 550 U.S. at 416.

The obviousness issue can be framed as a modification of Thorpe to include a graphical display as taught by Clark or TealLevel. Alternatively, obviousness can be framed as a modification of Clark to include height adjustment amounts as taught by Thorpe in Ground 1 or a modification of TealLevel put the sensor in a separate unit that communicates wirelessly with the smart phone as taught by Thorpe in Ground 2.

The combination of Thorpe, Clark, and Garceau renders claims 1-3, 6, 8-11, 13, 15, 16, and 19 obvious (Ground 1). The combination of Thorpe, TealLevel and Garceau renders claims 1-6, 8-13, 15-19 obvious (Ground 2).

B. Claim Analysis.

1. Claim 1 (Grounds 1 and 2)

a) Element [1.0]-leveling system

Thorpe discloses a “leveling system for use with recreational vehicles having one or more leveling mechanisms to level the vehicle in the side-to-side and front-to-back directions”. ETN1005, Abstract. The leveling system comprises a level unit 12 that is placed inside the recreational vehicle and a control unit 14 that wirelessly communicates with the level unit. *Id*; ETN1005, ¶[0035] (“A leveling system for recreational vehicles ...generally comprises a level unit 12 and a separate control unit 14 that is in spaced apart relation to level unit 12.”)

b) Element [1.1]-sensor device

The level unit 12 in Thorpe constitutes a sensor device as recited in Element [1.1]. The level unit 12 is placed inside a vehicle to sense the inclination of the vehicle when the vehicle is parked on an uneven surface of the ground. ETN1005, ¶[0012, 0036, 0044]. The level unit 12 includes a level sensing means “configured to determine the pitch and the roll of the recreational vehicle so the user can

operate the leveling mechanism to place the recreational vehicle in its level condition.” ETN1005, ¶[0012].

c) Elements [1.2], [1.2.1] and [1.2.2]-printed circuit board including a digital accelerometer and a processor

Figures 9-11 in Thorpe are schematic diagrams showing a printed circuit board 34 of the level unit 12 and control unit 14. The printed circuit board 34 includes “a controller 36 which is operatively connected to a level sensing means 38, power supply 40 and transmitter/receiver or transceiver 42, including antenna 44.” ETN1005, ¶[0037]. Thorpe further teaches that the “level sensing means 38 is a dual-axis accelerometer ... that is configured to detect tilting in both the front/back and left/right directions so as to determine the attitude of recreational vehicle 16 relative to a calibrated reference position (i.e., the level condition 20).” ETN1005, ¶[0038]. “[T]he output from level sensing means 38 goes to one or more analog conversion devices ... that convert the analog signal to a linear value that is used by controller 36 to determine the pitch and roll level position relative to the common reference 50.” *Id.* The controller constitutes a processor.

Thorpe discloses an analog accelerometer, although digital accelerometers were well-known in the art at the time that the ‘925 Patent was filed. ETN1004, ¶60. As one example, Garceau discloses a digital sensor for a vehicle leveling system. ETN1007, ¶[0012, 0037]. Garceau states that the digital sensor “can

include a 3-axis gyroscope and 3-axis accelerometer and a processor for interpreting motion data from the gyroscope and accelerometer.” *Id.*

Substituting a digital accelerometer as taught by Garceau for the analog accelerometer in Thorpe comprises a substitution of one known element for another known in the field to yield no more than a predictable result. *KSR*, 550 U.S. at 416

d) Element [1.3]-smart device with display

The control unit 14 of Thorpe is a special-purpose computer with processing capabilities that communicates wirelessly with the level unit 12 to exchange information. ETN1005, ¶[0037] (“The on-board wireless circuitry for transceiver 42 on controller 36 provides an integrated WiFi capability that allows level unit 12 to wirelessly communicate with control unit 14, which as described below also includes transceiver 42.”). The control unit 14 includes a controller 36 and a display 90. ETN1005, ¶[0040]; ETN1005, ¶[0012] (“The control unit also has a display panel for displaying the pitch and roll information received from the level unit...”).

The control unit 14 includes processing and networking capabilities and thus constitutes a “smart device” as recited in Element 1.3. ETN1004, ¶69. Alternatively, it would be obvious in view of Garceau to implement the remote

unit of a vehicle leveling system as an application on a computer or smartphone, which also constitute “smart devices.” *Id.*

e) Element [1.4]-configured to determine adjustment pairs

The control unit 14 in Thorpe receives pitch and roll measurements from the level unit 12 and determines “the amount in inches or other measurement units, based on a known length or width of recreational vehicle 16, that one end or side of the recreational vehicle 16 must be raised to place recreational vehicle 16 in level condition 20.” ETN1005, ¶[0040]. Alternatively, the final tilt adjustments can be computed by the level unit 12 and transmitted to the control unit 14. ETN1005, ¶[0038]. The measurements transmitted include both a height adjustment amount in inches and a direction to correct for both pitch and roll. The determined amount of the adjustment is displayed to the user on the display. *Id.*

Figure 6, reproduced below, shows an adjustment pair to correct for roll as “PASS +9.25””. The passenger side is a section of the vehicle. The “+” sign indicates that the passenger side of the vehicle needs to be raised (direction) and the measurement value “9.25” indicates the amount in inches the passenger side needs to be raised with respect to the ground (height adjustment amount). The specification goes on to describe a similar display of measurements for correcting pitch of the vehicle. ETN1005, ¶[0040, 0044]. The mode button 80 allows the

control unit 14 to toggle the display between the roll and pitch directions.

ETN1005, ¶[0040, 0044] The height adjustment amount and direction for both the pitch and roll direction constitute “adjustment pairs.”

**f) Element [1.5]-configured to display an image
representative of vehicle**

Both Clark and TealLevel disclose a vehicle leveling system with a graphical display that displays an image of the vehicle. ETN1006, Figure 4; ETN1018, p. 3.

Clark states that the monitoring system can be used with “a vehicle 1 such as an aircraft, automobile, ship, bus, train, or recreational vehicle.” ETN1006, 2:51-55. Clark states that the graphical display “comprises at least one representation of the vehicle which rotates in real-time as the at least one inclination angle changes.” ETN1006, Abstract. The graphical display includes front and side views showing different sections of the vehicle. ETN1006, Figure 4.

TealLevel discloses a “vehicle mode to help level an RV or other vehicle. ETN1018, p.3-4. The graphical display in the vehicle mode includes a top view of the vehicle showing different sections of the vehicle (e.g., front driver side, front passenger side, etc.). The height adjustment amounts are displayed adjacent respective sections of the vehicle. The graphical displays in Clark and TealLevel provide an image representative of the vehicle as recited in Element [1.5].

Displaying an image of the vehicle in a graphical display of a smart device as taught by Clark or TealLevel would have been obvious to a PHOSITA as of the Critical Date because visualization of roll and pitch would provide users with “an intuitive understanding of the measurements such as the pitch and roll conditions of the vehicle” and reduce the chances of causing injury to users or damage to the vehicle. ETN1006, 1:31-36; 3:57-62; 9:2-7; ETN1004, ¶75.

Replacing the character-based display of Thorpe with a graphical display as taught by Clark or TealLevel is a substitution of one known element for another known in the field to yield no more than a predictable result is obvious. *KSR*, 550 U.S. at 416. Also, displaying an image representative of the vehicle is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

g) Element [1.6]-configured to simultaneously display adjustment pairs

The graphical interface in Clark simultaneously displays the roll indicators (top half of display) and pitch indicators (bottom half of display) adjacent respective sections of a vehicle as shown in Figure 4 below.

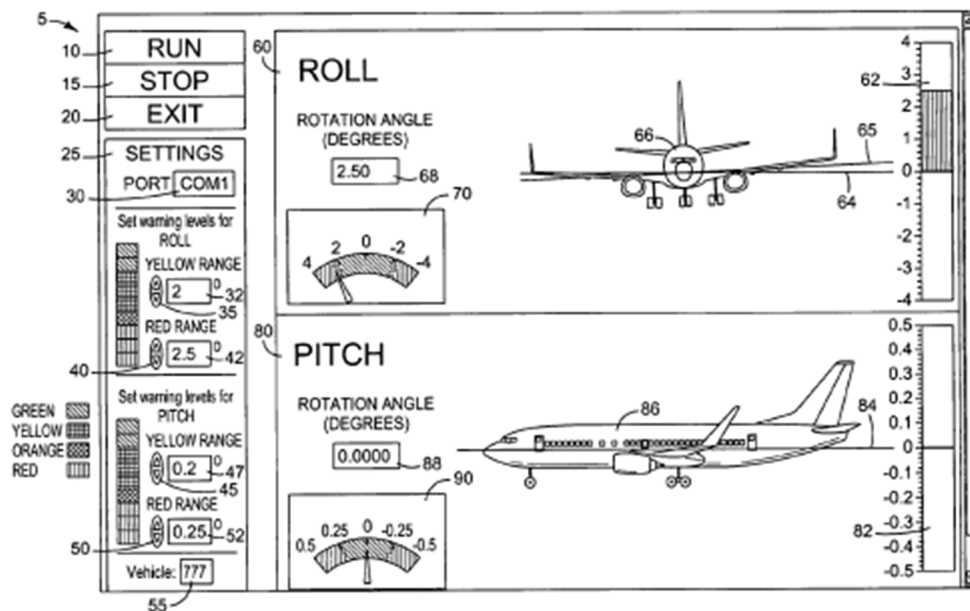


FIG. 4

Figure 4 illustrates three types of pitch and roll indicators in a single display screen: bar indicators (62, 82), dial indicators (70, 90), and numeric indicators (68, 88). The roll indicators (62, 68, 70) and pitch indicators (82, 88, 90) provide both the amount (in degrees) and direction of the pitch and roll respectively. The pitch and roll indicators are displayed adjacent respective section of the vehicle shown in the image.

TealLevel discloses a graphical display where the height adjustment amounts for the three lowest wheels are displayed adjacent respective sections of the vehicle. The height adjustment amounts are displayed simultaneously adjacent to each of the wheels to indicate which wheels need to be raised (direction).

There are a finite number of ways to display the measurements: either simultaneously or one at a time. ETN1004, ¶80. Simultaneously displaying the adjustment pairs as taught in Clark or TealLevel would have been obvious to a PHOSITA as of the Critical Date to enable the user of the vehicle leveling system to see the adjustments for all ground contact points at the same time. ETN1010, 1:53-56] (“Keeping the above in mind it can easily be seen why a leveling device that gives simultaneous readings for the four corners of a vehicle in inches is greatly needed by motorhome users.”); ETN1004, ¶80. Displaying the adjustment pairs simultaneously is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

h) Element [1.7]-configured to update display in real time

Thorpe does not explicitly state that the display is updated in real time, but the description suggests that the display is updated in real time while the user is engaging the leveling mechanism to level the vehicle. For example, in paragraph [0044] the description states that the “operator engages leveling mechanism 18 until the readout on display panel 90 goes to zero, indicating that recreational vehicle 16 is level in the front-to-back direction and, therefore, at its level condition 20. Because control unit 14 is hand-held, this can be accomplished with

the operator outside recreational vehicle 14 operating the leveling mechanisms 18.”

Thorpe also notes that the leveling can be accomplished “with the operator outside the recreational vehicle 14 operating the leveling mechanism 18.” *Id.* Based on this description, a PHOSITA would understand that the display updates in real-time. ETN1004, ¶81.

Even assuming that Thorpe does not teach real-time display, this aspect is explicitly taught by both Clark and Garceau. Clark states that “[t]he graphical representation and numerical representation may change substantially in real-time to correspond to real-time changes in the roll and pitch, as measured by the clinometer 2”. ETN1006, 3:54-57. Similarly, Garceau states that “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static, or in motion.” ETN1007, ¶[0035]

Clark states that “[b]y enabling visualization of roll and pitch measurements in substantially real-time, vehicles 1 or other objects can be jacked and leveled with few persons and in less time.” ETN1006, [8:66-9:2], thus providing explicit motivation to modify Thorpe to include real time updates of the height adjustment amounts as taught by Garceau. Updating the display in real time is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417

2. Element [2.0]-(Grounds 1 and 2)

A serial number is a unique identifier that is assigned to a product or item to distinguish it from others. ETN1074.

Thorpe teaches that a level unit in communication with the control unit 14 over a wireless communication channel. ETN1005, ¶[0037] (“The on-board wireless circuitry for transceiver 42 on controller 36 provides an integrated WiFi capability that allows level unit 12 to wirelessly communicate with control unit 14, which as described below also includes transceiver 42.”) Garceau teaches that the control unit can communicate with the sensor using Bluetooth, WiFi or other wireless communication standard. ETN1007, ¶[0035].

It would not be practical or necessary for a PHOSITA to design from scratch a custom communication protocol. Rather, a PHOSITA would use an existing communication protocol because chips and software were commercially available for existing protocols such as Bluetooth and using existing protocols, chips and software would reduce costs and save time. ETN1004, ¶86.

Using Bluetooth or other known communication protocol to establish the connection between the sensor device and smart device would have been obvious to a PHOSITA as of the Critical Date because smartphones at that time were equipped with Bluetooth capabilities and would save both cost and time.

ETN1004, ¶89. Implementing Bluetooth or other wireless communication protocol

would inherently involve the exchange and storage of unique device IDs (serial numbers) to enable connection between devices. ETN1004, ¶¶86-88.

3. Element [3.0]-(Grounds 1 and 2)¹

With respect to Grounds 1 and 2, Thorpe teaches that the leveling mechanism may comprise a “block type” leveling mechanism where blocks are placed underneath one of the wheels of the vehicle to raise one part of the vehicle. ETN1005, ¶¶[0011, 0035]. Blocking the wheels of the vehicle inherently raises the frame near or at the location of the wheels because the wheels are attached to the frame. ETN1004, ¶92.

With respect to Ground 2, TealLevel explicitly discloses height adjustment amounts for three of the four wheels of the vehicle.

4. Element [4.0]-(Ground 2)

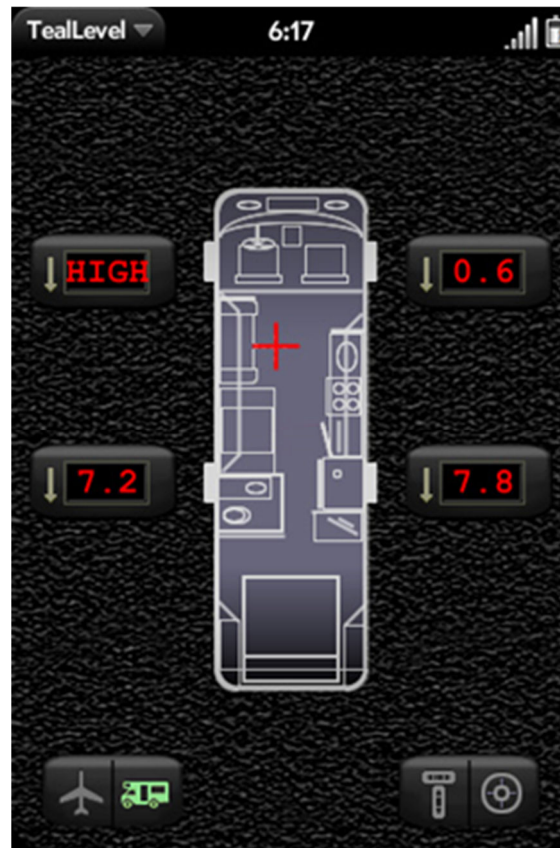
Claim 4 recites a known mathematical relationship of the height adjustment amounts needed to level a four-wheeled vehicle. This mathematical relationship is disclosed by TealLevel and would be known to a PHOSITA. ETN1004, ¶¶95-96.

In a four-wheeled vehicle, the height adjustment for the wheel opposite the highest wheel (the front passenger side wheel in this example) is the roll

¹ The term “adjustment indicators” is interpreted to mean “adjustment pairs.”

adjustment and the height adjustment of the wheel on the same of the vehicle (the rear driver side wheel in this example) is the pitch adjustment. Assuming a flat but inclined surface and that the vehicle is a rigid body, the height adjustment amount for the wheel diagonally opposite the highest wheel (i.e., the lowest wheel) is the sum of the roll adjustment and pitch adjustment. ETN1004, ¶¶95. This is a simple matter of vector addition. *Id.*

In the example illustrated in TealLevel, reproduced below, the roll adjustment is 0.6", the pitch adjustment is 7.2" and the height adjustment for the low wheel is 7.8" (the sum of 0.6" and 7.2").



Computing the height adjustment amount for the lowest wheel on a four-wheeled vehicle based on a known mathematical relationship is within the knowledge of a PHOSITA and is disclosed by TealLevel. ETN1004, ¶96.

5. Element[5.0]-(Ground 2)

Claim 5 simply repeats the mathematical relationship recited in claim 4 four times, each recitation depending on which wheel is lowest. Element [5.1] defines parts of the vehicle adjacent respective wheels (e.g., first part located near front driver-side wheel). Element [5.2] assumes that the front driver-side wheel is lowest, Element [5.3] assumes that the rear driver-side wheel is lowest, and so forth. Regardless of which wheel is lowest, the height adjustment for the lowest wheel will be sum of the height adjustment amount for the pitch and roll directions. The claim simply labels the pitch vector as a forward pitch or rearward pitch depending on which wheel is assumed to be the lowest. Similarly, the claim labels the roll vector as a right roll or left roll depending on which wheel is assumed to be the lowest.

Computing the height adjustment amount for the lowest wheel on a four-wheeled vehicle based on a known mathematical relationship is within the knowledge of a PHOSITA and is disclosed by TealLevel. ETN1004, ¶96.

6. Element [6.0]-(Grounds 1 and 2)

As previously discussed with respect to Element [1.7] of Ground 1, Thorpe, Clark, and Garceau teach updating the display in real-time height while the operator is engaged in leveling the vehicle. Updating the display in real time is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

7. Element [8.0]-(Grounds 1 and 2)

With respect to both Grounds 1 and 2, Figure 1 in Thorpe illustrates a vehicle with two axles and four wheels attached to the frame of the vehicle near the center of the frame. The roll adjustment in Thorpe indicates an amount that the wheels/frame on one side of the vehicle need to be raised to level the vehicle in the side-to-side direction.

With respect to Ground 2, TealLevel also discloses a graphical display including an image of a four-wheeled vehicle. As explained in the analysis of Element [4.0] in Grounds 1 and 2, regardless of which wheel is lowest, the height adjustment for the lowest wheel will be sum of the height adjustment amount for the pitch and roll directions.

8. Element [9.0]-(Grounds 1 and 2)

Thorpe teaches a “leveling system that communicates to the operator the amount one of the sides and/or one of the ends of the vehicle must be raised to place the vehicle in a level condition.” ETN1005, ¶[0011]. The adjustment in height needed to level the vehicle is determined based on the inclination sensed by the level unit 12 and the known length and width of the vehicle. ETN1005, ¶¶[0011, 0040]. TealLevel also calculates and displays a roll adjustment (wheel opposite the highest wheel) and pitch adjustment (wheel on same side as highest wheel). ETN1018, p. 3; ETN1004, ¶¶[101, 180.

9. Claim 10 (Grounds 1 and 2)**a) Element [10.0]-method for leveling a recreational vehicle**

Thorpe discloses a “leveling system for use with recreational vehicles having one or more leveling mechanisms to level the vehicle in the side-to-side and front-to-back directions”. ETN1005, Abstract. The leveling system comprises a level unit that is placed inside the recreational vehicle and a control unit that wirelessly communicates with the level unit. *Id.*; ETN1005, ¶[0035]

b) Element [10.1]-sensing inclination

The leveling system in Thorpe includes level unit 12 with a level sensing means 38 “to determine the pitch and roll of the vehicle” when the vehicle is

parked on an uneven surface of the ground. ETN1005, Abstract, ¶¶[0011-0012, 0036-0037, 0044]. The level unit 12 senses the inclination of the vehicle in both pitch and roll directions. *Id.*

c) Element [10.2]-determining adjustment pairs

The control unit 14 in Thorpe receives pitch and roll measurements from the level unit 14 and determines “the amount in inches or other measurement units, based on a known length or width of recreational vehicle 16, that one end or side of the recreational vehicle 16 must be raised to place recreational vehicle 16 in level condition 20.” ETN1005, ¶[000011-0012, 40, 0044]. The measurements include both a height adjustment amount in inches and a direction for both pitch and roll directions. *Id.*

Figure 6 shows an adjustment pair for a vehicle leaning towards the passenger side. The display indicates “PASS SIDE +9.25””. The passenger side is a section of the vehicle. The “+” indicates that the passenger side of the vehicle needs to be raised (direction) and the measurement value “9.25”” indicates the amount in inches the passenger side needs to be raised with respect to the ground (height adjustment amount). The specification goes on to describe a similar display of measurements for correcting pitch of the vehicle. ETN1005, ¶[0044]. The height adjustment amount and direction for both the pitch and roll directions constitute “adjustment pairs”.

**d) Element [10.3]-displaying at least one image
representative of the vehicle**

Both Clark and TealLevel disclose a vehicle leveling system with a graphical display that displays an image of the vehicle. ETN1006, Abstract & Figure 4; ETN1018, p. 3.

As discussed in the analysis of Element [1.5] of Ground 1 and 2, Both Clark and TealLevel teach graphical displays for vehicle leveling systems that display an image of the vehicle. Displaying an image of the vehicle in a graphical display of a smart device as taught by Clark or TealLevel would have been obvious to a PHOSITA as of the Critical Date because visualization of roll and pitch would provide users with “an intuitive understanding of the measurements taken by the clinometer 2, such as the pitch and roll conditions of the vehicle” and reduce the chances of causing injury to users or damage to the vehicle. ETN1006, 1:31-36; 3:57-62; 9:2-7; ETN1004, ¶75.

Substituting a graphic display showing an image of the vehicle as taught by Clark or TealLevel for the character-based display in Thorpe is a substitution of one known element for another known in the field to yield no more than a predictable result is obvious. *KSR*, 550 U.S. at 416; ETN1004, ¶109. Also, displaying an image representative of the vehicle is nothing more than the use of a

known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

e) Element [10.4]-simultaneously displaying the height adjustment amount and direction for each adjustment pair

The graphical interface in Clark simultaneously displays the roll indicators (top half of display) and pitch indicators (bottom half of display) adjacent respective sections of a vehicle as shown in Figure 4 below.

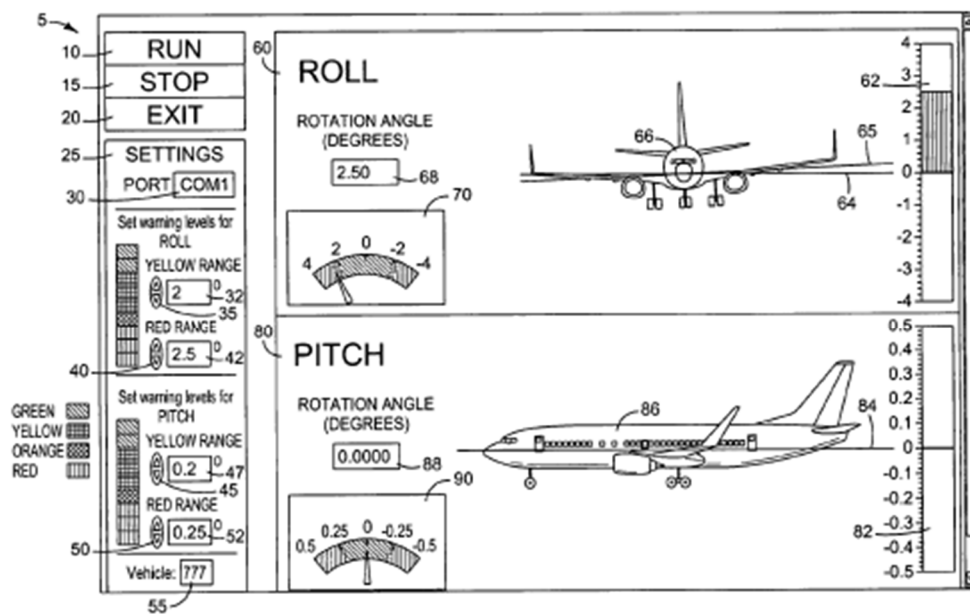


FIG. 4

Figure 4 illustrates three types of pitch and roll indicators in a single display screen: bar indicators (62, 82), dial indicators (70, 90), and numeric indicators (68, 88). The roll indicators (62, 68, 70) and pitch indicators (82, 88, 90) provide both the amount (in degrees) and direction of the pitch and roll. The pitch and roll

indicators are displayed adjacent respective section of the vehicle shown in the image.

TealLevel discloses a graphical display where the height adjustment amounts for the three lowest wheels are displayed. The height adjustment amounts are displayed simultaneously adjacent to each of the wheels. ETN1018, p. 3.

Displaying the adjustment pairs as taught by Clark or TealLevel would have been obvious to a PHOSITA as of the Critical Date to enable the user to see the adjustments for all ground contact points at the same time and there are only a finite number of ways to display the measurements: either simultaneously or one at a time. ETN1010, 1:53-56 (“Keeping the above in mind it can easily be seen when a leveling device that gives simultaneous readings for the four corners of a vehicle in inches is greatly needed by motorhome users.”); ETN1004, ¶113. Displaying the adjustment pairs simultaneously is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

f) Element [10.5]-real-time updates

As discussed in the analysis of Element [1.7], Thorpe, Clark and Garceau teach real time updating of a graphical display for a vehicle leveling system. Even assuming that real time updating is not taught by Thorpe, updating the graphical and numerical representations of the pitch and roll would have been obvious to a

PHOSITA as of the Critical Date to enable “visualization of roll and pitch measurements in substantially real-time” so that the vehicle “can be jacked and leveled with few persons and in less time.” ETN1006, 8:66-9:2. ETN1004, ¶116. Updating the display in real time is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

10. Element [11.0]-(Grounds 1 and 2)

As discussed in Element [2.0] in Grounds 1 and 2, a smartphone or other smart device implementing the Bluetooth standard would inherently store, at least temporarily, the BD_ADDR of the sensor device while engaged in communication with the sensor device. ETN1004, ¶¶85-89. The BD_ADDR constitutes a serial number as recited in Claim 20.

11. Element [12.0-12.6]-(Ground 2)

Claim 12 recites a known mathematical relationship of the height adjustment amounts needed to level a four-wheeled vehicle. This mathematical relationship is disclosed by TealLevel and would be known to a PHOSITA. ETN1004, ¶96.

Elements [12.1] and [12.2] recite the calculation of the pitch adjustment and roll adjustment respectively. Elements [12.3] –[12.6] recite the mathematical relationship between the height adjustment amounts for the lowest wheels. The

claimed mathematical relationship of the height adjustment amounts is inherent to a four-wheeled vehicle and is disclosed by TealLevel. *Id.*

Computing the height adjustment amount for the lowest wheel on a four-wheeled vehicle based on a known mathematical relationship of the height adjustment amounts is within the knowledge of a PHOSITA and is disclosed by TealLevel. ETN1004, ¶¶96, 124

12. Element [13.0]-(Grounds 1 and 2)

As previously discussed with respect to Element [1.7] of claim 1 and Element [10.5] of claim 10, Grounds 1 and 2 Thorpe, Clark, and Garceau all disclose a real-time update of the display while the operator is engaged in leveling the vehicle. Updating the display in real time is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417

13. Claim 15 (Grounds 1 and 2)

a) Element [15.0]-non-transitory computer readable medium

The control unit 14 in Thorpe includes a flash memory chip 60 to store program code. ETN1005, ¶[0039] (“The circuit board 34 shown in the figures also includes a memory chip connector 62 for programming the flash memory chip 60 with the manufacturer's computer control code...”). The flash memory constitutes

a non-transitory computer-readable medium comprising computer executable instructions.

b) Element [15.1]-receiving pitch angle measurement and roll angle measurements

The level unit 12 in Thorpe includes a level sensing means 38 and wireless transceiver to communicate with the control unit 14. ETN1005, ¶¶[0037-0038]. The output of the level sensing means 38 is converted to a linear value and used the controller 36 “to determine the pitch and roll level position relative to a common reference 50” *Id.* The pitch and roll measurements then transmitted wirelessly to the control unit 14. *Id.*

c) Element [15.2]-calculating adjustment pairs

Thorpe discloses that after receiving the pitch and roll measurements from the level unit 14, the control unit 14 determines “the amount in inches or other measurement units, based on a known length or width of recreational vehicle 16, that one end or side of the recreational vehicle 16 must be raised to place recreational vehicle 16 in level condition 20.” ETN1005, ¶[0040]. The measurements displayed include a height adjustment amount in inches and a direction. ETN1005, Figure 6. Thorpe computes a height adjustment amount and direction for both pitch and roll directions. ETN1005, ¶[0011-0012; 0044].

**d) [Element 15.3]-displaying at least one image
representative of the vehicle**

As discussed in the analysis of Elements [1.5] and [10.3], both Clark and TealLevel teach graphical displays for vehicle leveling systems that display an image of the vehicle. Displaying an image of the vehicle in a graphical display of a smart device as taught by Clark or TealLevel would have been obvious to a PHOSITA as of the Critical Date because visualization of roll and pitch would provide users with “an intuitive understanding of the measurements such as the pitch and roll conditions of the vehicle” and reduce the chances of causing injury to users or damage to the vehicle. ETN1006, 1:31-36; 3:57-62; 9:2-7; ETN1004, ¶133.

Substituting a graphic display showing an image of the vehicle as taught by Clark or TealLevel for the character-based display in Thorpe is a substitution of one known element for another known in the field to yield no more than a predictable result is obvious. *KSR*, 550 U.S. at 416. Also, displaying an image representative of the vehicle is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

e) Element [15.4]-simultaneously displaying the height adjustment amount and direction for each adjustment pair

As discussed in the analysis of Elements [1.6] and [10.4], both Clark and TealLevel teach graphical displays for vehicle leveling systems that simultaneously display pitch and roll measurements. There are a finite number of ways to display the measurements: either simultaneously or one at a time. ETN1004, ¶137.

Simultaneously displaying the adjustment pairs as taught by Clark or TealLevel would have been obvious to a PHOSITA as of the Critical Date to enable the user to see the adjustments for all ground contact points at the same time. ETN1010, 1:53-56(“Keeping the above in mind it can easily be seen when a leveling device that gives simultaneous readings for the four corners of a vehicle in inches is greatly needed by motorhome users.”). Displaying the adjustment pairs simultaneously is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

f) Element [15.5]-real-time updates

As discussed in the analysis of Elements [1.7] and [10.5] of Grounds 1 and 2, Thorpe, Clark and Garceau teach real time updating of a graphical display for a vehicle leveling system. Even assuming that real time updating is not taught by Thorpe, updating graphical and numerical representations of the pitch and roll on

the graphical display would have been obvious to a PHOSITA as of the Critical Date to enable “visualization of roll and pitch measurements in substantially real-time” so that the vehicle “can be jacked and leveled with few persons and in less time.” ETN1006, 8:66-9:2; ETN1004, ¶140. Updating the display in real time is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

14. Element [16.0]-(Grounds 1 and 2)

With respect to Grounds 1 and 2, Thorpe teaches that the leveling mechanism may comprise a “block type” leveling mechanism where blocks are placed underneath one of the wheels of the vehicle to raise one part of the vehicle. ETN1005, ¶¶[0011, 0035]. Blocking the wheels on one side of the vehicle to correct for roll raises a part of the frame of the vehicle at or near two of the wheels. ETN1004, ¶142.

With respect to Ground 2, TealLevel explicitly discloses height adjustment amounts for three of the four wheels of the vehicle.

15. Element [17.0-17.2]-(Ground 2)

Claim 17 recites a known mathematical relationship of the height adjustment amounts needed to level a four-wheeled vehicle. This mathematical relationship is disclosed by TealLevel and would be known to a PHOSITA. ETN1004, ¶96.

As discussed in the analysis of Element [4.0] in Grounds 1 and 2, the height adjustment of the lowest wheel in a four-wheeled vehicle can be obtained by adding (combining) the pitch and roll adjustments. Computing the height adjustment amount for the lowest wheel on a four-wheeled vehicle known mathematical relationship is within the knowledge of a PHOSITA and is disclosed by TealLevel. ETN1004, ¶144.

16. Element [18.0-18.4]-(Ground 2)

Claim 18 simply repeats the mathematical relationship recited in claim 17 four times, each recitation depending on which wheel is lowest. The mathematical relationships recited in Elements [18.1]-[18.4] are stated in the alternative, assuming that different wheels are the lowest.

As discussed in the analysis of Elements [5.0-5.5] in Grounds 1 and 2, using the known mathematical relationship between the height adjustment amounts for different wheels to compute the height adjustment amount for the lowest wheel on a four-wheeled vehicle would have been obvious to a PHOSITA as of the Critical Date. ETN1004, ¶147.

17. Element [19.0]-(Grounds 1 and 2)

As previously discussed with respect to Elements [1.7] and [10.5], the references disclose a real-time height adjustment while the operator is engaged in leveling the vehicle. Clark states that “[b]y enabling visualization of roll and pitch

measurements in substantially real-time, vehicles 1 or other objects can be jacked and leveled with few persons and in less time.” ETN1006, 8:66-9:2. Clark provides explicit motivation to modify Thorpe to include real time updates of the height adjustment amounts as taught by Garceau. Updating the display in real time is nothing more than the use of a known technique disclosed in both Clark and TealLevel to improve the vehicle leveling system disclosed in Thorpe. *KSR*, 550 U.S. at 417.

VIII. Grounds 3 and 4-Obviousness Over Thorpe In View Of Clark or TealLevel and Further In View Of Garceau and Common Knowledge (Claims 7, 14, 20)

Grounds 3 and 4 add the same additional reference to Grounds 1 and 2 respectively. Due to the overlap of Grounds 1 and 2, the discussion of Grounds 3 and 4 have been combined to avoid unnecessary redundancy.

The application of Thorpe, Clark or TealLevel, and Garceau to claims 1, 10, and 15 is discussed in Grounds 1 and 2. See Section VII above. Claims 7, 14 and 20 depend respectively from claims 1, 10 and 15 and add limitations related to temperature compensation. Claim 7 recites “a temperature calibration lookup table” and states that “the smart device is configured to correct the height adjustment amounts based on current temperature readings and information from the temperature calibration lookup table.” Claim 14 recites a step of “correcting

the height adjustment amounts based on current temperature readings and information from a temperature calibration lookup table.” Claim 20 recites instructions to “control the smart device to correct the adjustments in height based on current temperature readings and information from a temperature calibration lookup table.” The crux of these claims is using a lookup table to compensate the height adjustment based on a current temperature.

Garceau discloses a leveling system including “temperature compensation to ensure maximum resolution and stability over a wide range of temperature conditions.” ETN1007, ¶¶[0013, 0031]. Garceau does not specifically disclose using a lookup table for the temperature compensation. However, it was well-known as of the Critical Date to use a look up table for temperature calibration of an accelerometer or tilt sensor. ETN1004, ¶150; ETN1051, p.3. A PHOSITA would understand that there are only a finite number of ways to implement temperature compensation: by using a known mathematical relationship between the measured temperature and the error correction amount to calculate the error correction or by using a lookup table to lookup the error correction for a given temperature measurement. *Id.* The limitations of claims 7, 14, and 20 would be within the knowledge of a PHOSITA.

**IX. Ground 5 & 6-Obviousness Over Garceau In View of TealLevel
(Ground 5) and Further In View of Common Knowledge (Ground 6)**

Ground 6 substantially overlaps with Ground 5 and adds common knowledge as an additional reference for claims 1-9, 14, and 20. Due to the overlap of Grounds 5 and 6, the discussion of these grounds has been combined to avoid unnecessary redundancy.

A. Summary of Argument

Garceau teaches a vehicle leveling system including a digital sensor 122 and a remote unit that communicates wirelessly with the digital sensor 122. ETN1007, ¶¶[0035, 0037]. The digital sensor 122 may comprise a digital accelerometer. ETN1007, ¶¶[0012, 0037]. The remote unit may comprise a smart device, such as a computer or smartphone. ETN1007, ¶¶[0035]. An application installed on the remote unit can communicate wirelessly with the digital sensor and display text or graphics depicting the attitude of the vehicle in real time while the vehicle is being leveled. ETN1007, ¶[0035]. The remote unit can be used to manually or semi-automatically control the leveling system. *Id.*

TealLevel discloses a graphical display for an application on a smartphone that displays an image of a vehicle being leveled and simultaneously displays a plurality of height adjustment amounts for leveling the vehicle adjacent respective sections of the vehicle. ETN1018, pp.3.-4.

Combining the graphical display as taught by TealLevel with the vehicle leveling system as taught by Garceau would have been obvious to a PHOSITA as of the Critical Date. Both Garceau and TealLevel relate to vehicle leveling systems for a four-wheeled vehicle. Clark teaches that the graphical representation of the vehicle on the display provides the user with “an intuitive understanding of the measurements taken by the clinometer 2, such as the roll and pitch conditions of the vehicle 1” and enables the vehicle to be “jacked and leveled with few persons and in less time” ETN1006, 3:57-60; 8:66-9:2. Wilson teaches that “a leveling device that gives simultaneous readings for the four corners of a vehicle in inches is greatly needed by motorhome users.” ETN1010, 1:53-56.

Combining the graphical display as taught by TealLevel with the vehicle leveling system as taught by Garceau is a combination of known elements that perform the functions for which they are known and that yields predictable results. *KSR*, 550 U.S. at 417. The analysis can be framed as either a modification of Garceau to include a graphical display as taught by TealLevel, or as a modification of TealLevel to separate the sensor device from the smart device. The analysis below supports both ways to view the issue.

The combination of Garceau, TealLevel, and common knowledge renders claims 1-9, 14, and 20 obvious (Ground 6). The combination of Garceau and TealLevel renders claims 10-13 and 15-19 obvious (Ground 5).

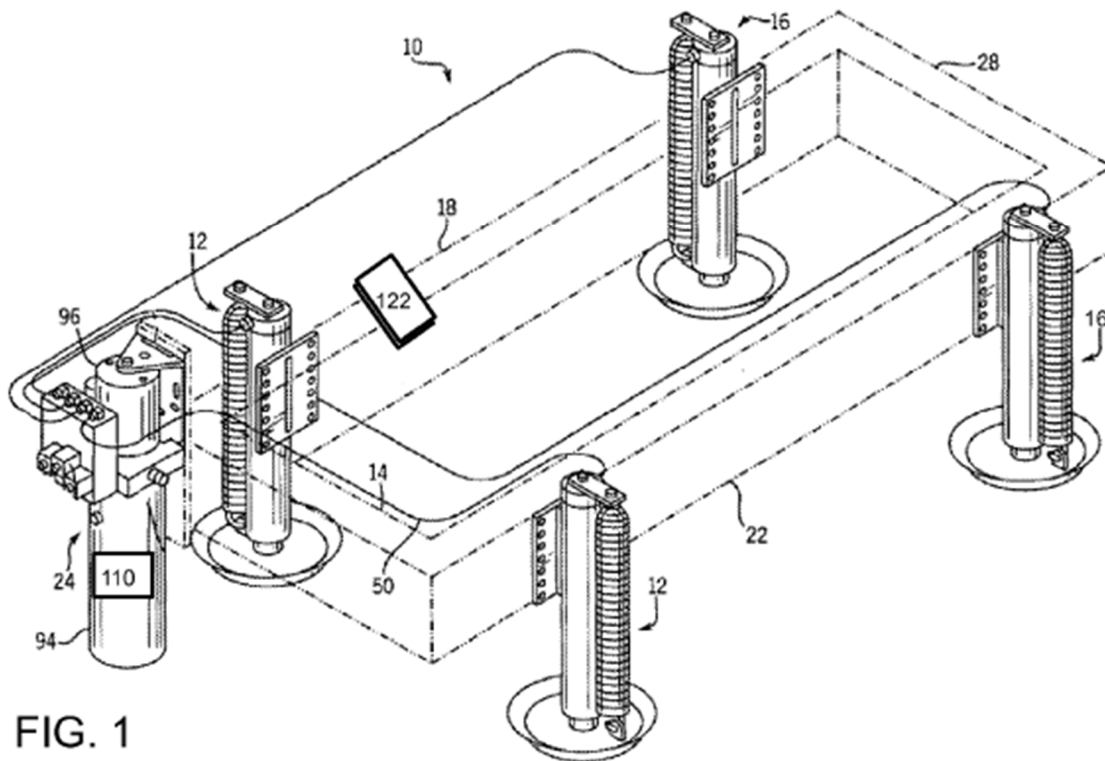
B. Analysis of Claims

1. Claim 1-Ground 6

a) Element [1.0]-leveling system

Garceau discloses “[a] leveling assembly and method for analyzing the attitude of a platform or structure such as a motor vehicle”. ETN1007, ¶[0012].

“A control system actuates leveling jacks attached to or in contact with the platform or structure using feedback from a multi axis digital sensor.” *Id.* The leveling system is specially designed for leveling a recreational vehicle. ETN1007, ¶[0017]. Figure 1 of Garceau is reproduced below.



b) Element [1.1]-sensor device

The leveling system in Garceau “includes a multi-axis digital sensor 122, which may be mounted to the vehicle in any satisfactory location.” ETN1007, ¶¶0012, 0037]. “The multi-axis digital sensor is configured to provide digital signals to the controller representing, for example, the degree of longitudinal pitch and lateral roll of a vehicle to which the multi-axis digital sensor is connected.” ETN1007, ¶¶0030]; ETN1007, ¶¶0012].

c) Elements [1.2, 1.2.1, 1.2.2]-printed circuit board comprising a digital accelerometer and a processor

The multi-axis digital sensor 122 in Garceau “can include a 3-axis gyroscope and 3-axis accelerometer and a processor for interpreting motion data from the gyroscope and accelerometer.” ETN1007, ¶¶0012]. Garceau does not explicitly state that these components are on a printed circuit board, but virtually all modern electronics require a printed circuit board to mount and interconnect these components. ETN1004, ¶158. Thorpe² also teaches mounting the sensor and processor to a PCB. ETN1005, ¶¶0037]. Mounting the digital accelerometer and

² Thorpe is not relied upon in this ground but is cited as evidence of common knowledge in the field.

processor in Garceau to a printed circuit board would involve nothing more than the application of common knowledge possessed by a PHOSITA. ETN1004, ¶158.

d) Element [1.3]-smart device with display

Garceau discloses a remote unit that communicates wirelessly with the digital sensor 122. ETN1007, ¶[0035]. Examples of remote units include computers, cellular telephones and smartphones. *Id.* Garceau explains:

For example, a cellular telephone or smart phone “app” can be installed to communicate with a controller and/or the six-axis digital sensor (e.g., wirelessly through Bluetooth™ or WiFi™, wirelessly through the Internet where the controller is internet-enabled, wired through USB, or others). The app can transmit information to and receive information from the controller and/or six-axis digital sensor. With information received from the controller and/or the six-axis digital sensor, **text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion.**

Id.

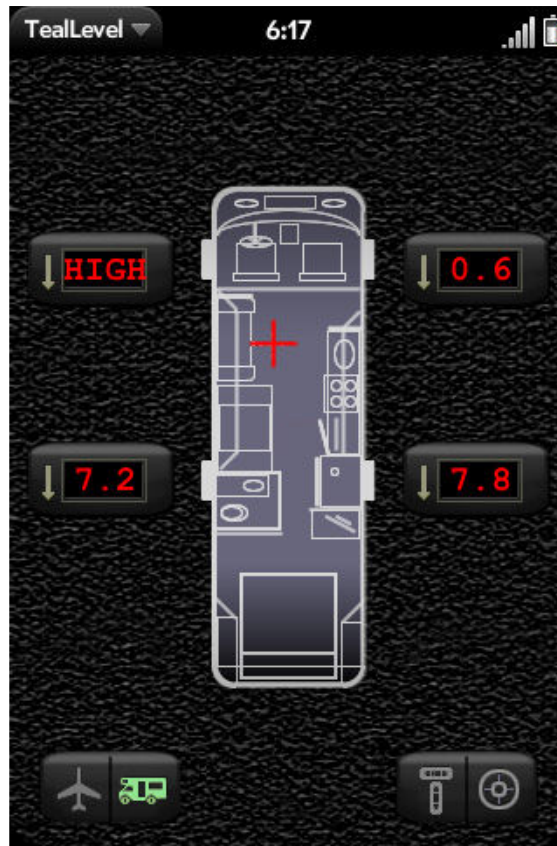
Garceau does not depict a display in the drawings, but a display would be inherently present in computer, cellular phone, or smartphone that provides “text or graphics depicting the attitude of the [vehicle]” ETN1007, ¶[0035]; ETN1004, ¶159. Further, Garceau explicitly teaches that the vehicle leveling system could include “display devices”. ETN1007, ¶[0016].

e) Element [1.4]-configured to determine adjustment pairs

Garceau discloses that the processor associated with the digital sensor can use “data from the gyroscope and accelerometer” to calculate “the attitude (e.g., pitch, roll, or other relative metrics) of the structure ...” ETN1007, ¶[0012].

Garceau does not describe the specific measurements calculated by the processor but does state that “**text or graphics depicting the attitude of the structure** can be provided in real-time when the structure is static or in motion” ETN1007, ¶[0035].

TealLevel discloses a graphical display for an RV leveling application running on a smart device (e.g., Palm Pre). ETN1018, pp. 3-4. The graphical display for the TealLevel application is shown below.

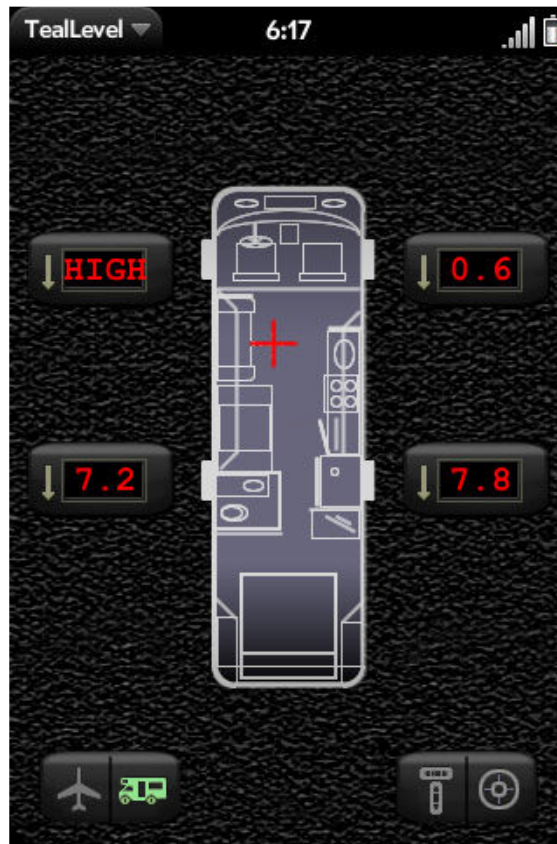


The graphical display shows which wheel of the RV is high and the “how high the three lower wheels must be raised” to level the vehicle. A PHOSITA would understand that the processor in the Palm device running the TealLevel application would necessarily calculate the height adjustment amounts for the three lowest wheels displayed on the display. ETN1004, ¶163.

**f) Element [1.5]-configured to display an image
representative of vehicle**

Garceau teaches that a smart device can provide “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static

or in motion.” ETN1007, ¶[0035]. TealLevel discloses a graphical display for a vehicle leveling application running on a smart device (e.g. Palm Pre). The graphical display for the TealLevel application is shown below.



Combining the graphical display as taught by TealLevel with the vehicle leveling system as taught by Garceau is a combination of known elements that perform the functions for which they are known to yield predictable results. *KSR*, 550 U.S. at 417.

g) Element [1.6]-configured to simultaneously display adjustment pairs

Each height adjustment amount in TealLevel is displayed adjacent a respective section of the vehicle and indicates the amount (in inches or other units) the respective section of the vehicle that needs to be raised (direction). The height adjustments are displayed simultaneously. Combining the graphical display as taught by TealLevel with the vehicle leveling system as taught by Garceau is a combination of known elements that perform the functions for which they are known and that yields predictable results. *KSR*, 550 U.S. at 417.

h) Element [1.7]-configured to update the display in real time

Garceau teaches that “[w]ith information received from the controller and/or the six-axis digital sensor, text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion. ETN1007, ¶¶0035]. The phrase “in real-time” in this context means while the vehicle is being leveled. ETN1004, ¶167.

2. Element [2.0]- Ground 6

A serial number is a unique identifier that is assigned to a product or item to distinguish it from others. ETN1074.

Garceau teaches that the remote unit can communicate with the sensor using Bluetooth, WiFi or other wireless communication standard. As discussed in Element [2.0] in Grounds 1 and 2, a smartphone or other smart device implementing the Bluetooth standard would inherently store, at least temporarily, the BD_ADDR of the sensor device while engaged in communication with the sensor device. ETN1004, ¶¶85-89. The BD_ADDR constitutes a serial number as recited in Claim 20.

3. Element [3.0]-Ground 6

TealLevel discloses an application for a Palm device that is used to level an RV having four wheels proximate the four corners of a generally rectangular frame. The TealLevel application calculates the necessary jacking or blocking heights for each tire and displays the results on the display of the Palm device. ETN1004, ¶172. The height adjustment amounts are displayed adjacent respective wheels.

4. Element [4.0]-Ground 6

Claim 4 recites a known mathematical relationship of the height adjustment amounts needed to level a four-wheeled vehicle. This mathematical relationship is disclosed by TealLevel and would be known to a PHOSITA. ETN1004, ¶96. For reasons discussed in the analysis of claim 4 in Grounds 1 and 2, the height adjustment of the lowest wheel in a four-wheeled vehicle can be obtained by

adding (combining) the pitch and roll adjustments. This relationship of the height adjustment amounts is disclosed in TealLevel. ETN1018, p. 3.

5. Elements [5.0-5.5]-Ground 6

Claim 5 simply repeats the mathematical relationship recited in claim 4 four times, each recitation depending on which wheel is lowest. Element [5.1] defines parts of the vehicle adjacent each wheel (e.g., first part located near front driver-side wheel). Element [5.2] assumes that the front driver-side wheel is lowest, Element [5.3] assumes that the rear driver-side wheel is lowest, and so forth. Regardless of which wheel is lowest, the height adjustment for the lowest wheel will be sum of the height adjustment amount for the pitch and roll directions. The claim simply labels the pitch vector as a forward pitch or rearward pitch depending on which wheel is assumed to be the lowest. Similarly, the claim labels the roll vector as a right roll or left roll depending on which wheel is assumed to be the lowest.

Computing the height adjustment amount for the lowest wheel on a four-wheeled vehicle based on a known mathematical relationship is within the knowledge of a PHOSITA and is disclosed by TealLevel. ETN1004, ¶96.

6. Element [6.0]- Ground 6

Garceau teaches that “[w]ith information received from the controller and/or the six-axis digital sensor, text or graphics depicting the attitude of the structure

can be provided in real-time when the structure is static or in motion in motion.” In this context means while the vehicle is being leveled. ETN1007, ¶[0035]; ETN1004, ¶176. Updating the display in real time is nothing more than the use of a known technique disclosed in Clark and TealLevel to improve the remote unit of the vehicle leveling system. *KSR*, 550 U.S. at 417.

7. Element [7.0]- Ground 6

Garceau discloses a leveling system including “temperature compensation to ensure maximum resolution and stability over a wide range of temperature conditions.” ETN1007, ¶[0031] However, it was well-known as of the Critical Date to use a look up table for temperature calibration of an accelerometer or tilt sensor. ETN1004, ¶177; ETN1051, p.3. A PHOSITA would understand that there are only a finite number of ways to implement temperature compensation: by using a known mathematical relationship between the measured temperature and the error correction amount to calculate the error correction or by using a lookup table to lookup the error correction for a given temperature measurement. ETN1004, ¶177.

8. Element [8.0]- Ground 6

Garceau and TealLevel each disclose a vehicle with four wheels. TealLevel calculates and displays height adjustment amounts for the three lowest wheels. As explained in the analysis of Element [4.0] in Grounds 1 and 2, regardless of which

wheel is lowest, the height adjustment for the lowest wheel will be sum of the height adjustment amount for the pitch and roll directions.

9. Element [9.0]- Ground 6

Garceau and TealLevel each disclose a vehicle with four wheels. TealLevel calculates and displays height adjustment amounts for the three lowest wheels. As explained in the analysis of Element [4.0] in Grounds 1 and 2, the adjustment for the wheel opposite the highest is a roll adjustment and the adjustment for wheel on same side as highest wheel is the pitch adjustment. ETN1018, p. 3; ETN1004, ¶180.

10. Claim 10-Ground 5

a) Element [10.0]-method for leveling a recreational vehicle

Garceau discloses “[a] leveling assembly and method for analyzing the attitude of a platform or structure such as a motor vehicle” ETN1007, ¶[0012].

b) Element [10.1]-sensing inclination

The leveling system in Garceau “includes a multi-axis digital sensor 122, which may be mounted to the vehicle in any satisfactory location.” ETN1007, ¶[0037]. “The multi-axis digital sensor is configured to provide digital signals to the controller representing, for example, the degree of longitudinal pitch and lateral

roll of a vehicle to which the multi-axis digital sensor is connected.” ETN1007, ¶¶[0012, 0035]

c) Element [10.2]-determining adjustment pairs

Garceau discloses that the processor can use “data from the gyroscope and accelerometer” to calculate “the attitude (e.g., pitch, roll, or other relative metrics) of the structure ...” ETN1007, ¶¶[0012]. Garceau does not describe the specific metrics calculated by the processor but does state that “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion” ETN1007, ¶¶[0035].

TealLevel discloses a graphical display for an RV leveling application for a smart device (e.g., Palm Pre). ETN1018, p.3-4. The graphical display shows which wheel of the RV is high and the “how high the three lower wheels must be raised” to level the vehicle. *Id.* Thus, TealLevel calculates and displays both a height adjustment amount and direction for the three lowest wheels.

d) Element [10.3]-displaying image representative of vehicle

Garceau teaches that a smart device can provide “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion.” ETN1007, ¶¶[0035]. TealLevel discloses a graphical display for a

vehicle leveling application running on a smart device (e.g. Palm Pre) that displays an image of the vehicle. ETN1018, p.3.

e) Element [10.4]-simultaneously displaying

The graphical display in TealLevel displays the height adjustment amounts and direction for each wheel simultaneously. The TealLevel application indicates which wheels need to be raised (direction) and the amount that the wheel needs to be raised to level the vehicle. ETN1018, p. 3; ETN1004 ¶172.

f) Element [10.5]-real-time updates

Garceau teaches that “[w]ith information received from the controller and/or the six-axis digital sensor, text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion. ETN1007, ¶[0035].

11. Element [11.0]- Ground 5

As discussed in Element [2.0] in Grounds 1 and 2, a smartphone or other smart device implementing the Bluetooth standard would inherently store, at least temporarily, the BD_ADDR of the sensor device while engaged in communication with the sensor device. ETN1004, ¶¶85-89. The BD_ADDR constitutes a serial number.

12. Element [12.0-12.6]- Ground 5

Claim 12 recites a known mathematical relationship of the height adjustment amounts needed to level a four-wheeled vehicle. Elements [12.3]-[12.6] recite the mathematical relationship between the height adjustment amounts for the lowest wheels, each recitation assuming a different wheel. This mathematical relationship is disclosed by TealLevel and would be known to a PHOSITA. ETN1004, ¶¶96

Computing the height adjustment amount for the lowest wheel on a four-wheeled vehicle based on a known mathematical relationship is within the common knowledge of a PHOSITA. ETN1004, ¶¶96, 198.

13. Element [13.0]- Ground 5

As previously discussed with respect to Element [6.0] of Ground 6 and Element [10.5] of Ground 5, Garceau discloses a real-time display while the operator is engaged in leveling the vehicle. ETN1004, ¶¶176, 190.

14. Element [14.0]- Ground 6

As discussed in the analysis of Claim 7 in Grounds 3 and 4, Garceau discloses a leveling system including “temperature compensation to ensure maximum resolution and stability over a wide range of temperature conditions.” Using a lookup table to perform calibration is within the knowledge of a PHOSITA. ETN1004, ¶200.

15. Claim 15- Ground 5**a) Preamble [15.0]-non-transitory computer readable medium**

Garceau and TealLevel both disclose vehicle leveling applications running on smart devices, such as computers, cellular telephones and smart phones.

ETN1007, ¶[0035]; ETN1018. Such devices inherently include memory to store the applications.

b) Element [15.1]-receiving pitch and roll measurements

Garceau discloses an application for a smart device that receives pitch and roll measurements from the digital sensor 122. ETN1007, ¶[0035]. Garceau states:

“Control aspects herein can be implemented using remote devices, including through use of leveling control or visualization applications **installed on computers or mobile devices**. For example, a cellular telephone or smart phone “app” can be installed to communicate with a controller and/or the six-axis digital sensor (e.g., wirelessly through Bluetooth™ or WiFi™, wirelessly through the Internet where the controller is internet-enabled, wired through USB, or others). The app can transmit information to and **receive information from the controller and/or six-axis digital sensor**. “With information received from the controller and/or the six-axis digital sensor, text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion”.

Id. (emphasis added)

c) Element [15.2]-calculating adjustment pairs

Garceau discloses that the processor can use “data from the gyroscope and accelerometer” to calculate “the attitude (e.g., pitch, roll, or other relative metrics) of the structure ...” ETN1007, ¶[0012]. Garceau does not provide details about the information presented except to say that “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion” ETN1007, ¶[0035].

TealLevel discloses a graphical display for an RV leveling application running on a smart device (e.g., Palm Pre). The graphical display shows which wheel of the RV is high and the how high the three lower wheels must be raised to level the vehicle. A PHOSITA would understand that the processor in the Palm device running the TealLevel application would necessarily calculate the height adjustment amounts for the three lowest wheels displayed on the display. ETN1004, ¶[163, 206.

d) Element [15.3]-displaying image of vehicle

Garceau teaches that a smart device can provide “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion.” ETN1007, ¶[0035]. TealLevel discloses a graphical display for a vehicle leveling application running on a smart device (e.g. Palm Pre). The

graphical display for the TealLevel application shows an image of the vehicle.

ETN1018, p.3.

e) Element [15.4]-simultaneously displaying

The graphical display in TealLevel simultaneously displays the height adjustment amounts and direction for each wheel adjacent respective section of the vehicle. The TealLevel application indicates which wheels need to be raised (direction) and the amount that the wheels need to be raised to level the vehicle.

ETN1018, p.3.

16. Element [15.5]-real-time updates

Garceau teaches that “[w]ith information received from the controller and/or the six-axis digital sensor, text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static or in motion. ETN1007, ¶[0035]. “In motion” in this context means while the vehicle is being leveled. ETN1004, ¶210.

17. Element [16.0]- Ground 5

TealLevel discloses an application for a Palm device that is used to level an RV having four wheels proximate the four corners of a generally rectangular frame. The TealLevel application calculates a height adjustment amount for the lower three wheels based on the vehicle’s track width and wheel base and displays

the calculated height adjustment amounts on a graphical display. ETN1018, pp. 3-4.

18. Element [17.0-17.2]- Ground 5

Claim 17 recites a known mathematical relationship of the height adjustment amounts needed to level a four-wheeled vehicle. This mathematical relationship is disclosed by TealLevel and would be known to a PHOSITA. ETN1004, ¶96.

As discussed in the analysis of Element [4.0] in Grounds 1 and 2 (Section VII.B.4), the height adjustment of the lowest wheel in a four-wheeled vehicle can be obtained by adding (combining) the pitch and roll adjustments. Applying the known mathematical relationship to compute the height adjustment amount for the lowest wheel on a four-wheeled vehicle is within the knowledge of a PHOSITA and is disclosed by TealLevel. ETN1004, ¶96

19. Element [18.0-18.4]- Ground 5

Claim 18 simply repeats the mathematical relationship recited in claim 17 four times, each recitation depending on which wheel is lowest. The mathematical relationships recited in Elements [18.1]-[18.4] are stated in the alternative, assuming that different wheels are the lowest.

As discussed in the analysis of claims 4 and 5 in Grounds 1 and 2 (Section VII.B.4-5), using the known mathematical relationship between the height adjustment amounts for different wheels to compute the height adjustment amount

for the lowest wheel on a four-wheeled vehicle would have been obvious to a PHOSITA as of the Critical Date.

20. Element [19.0]- Ground 5

As previously discussed with respect to Element [1.7] in Grounds 5 and 6, Garceau discloses a real-time display while the operator is engaged in leveling the vehicle.

21. Element [20.0]- Ground 6

As discussed in the analysis of Element [7.0] in Grounds 5 and 6, Garceau discloses a leveling system including “temperature compensation to ensure maximum resolution and stability over a wide range of temperature conditions.”. Using a lookup table to perform calibration is within the knowledge of a PHOSITA.

X. PTAB DISTRECTION SHOULD NOT PRECLUDE REVIEW

A. 314(a)

The parties are in the early stages of litigation. The Petitioner has not filed an Answer and discovery has not started. The district court addressed the issue of infringement only in its Order denying the Patent Owner’s motion for a temporary restraining order and granting Petitioner’s motion to dismiss the Amended Complaint without prejudice for failure to state a plausible claim of infringement. ETN1075, pgs.[1-8, 61-77].

Patent Owner missed the court-ordered deadline to file a Second Amended Complaint but instead filed an appeal to the Federal Circuit, which was dismissed. ETN1075, pgs.[78-82]. The case was remanded to the district court where the Patent Owner has filed a motion seeking leave to file the Second Amended Complaint. ETN1075, pgs.[83-86]. Even if the Court allows Patent Owner to file a Second Amended Complaint, the record indicates that it is unlikely to survive a motion to dismiss it and it is unlikely that invalidity of the claims will ever be adjudicated in the pending case.

The “Fintiv Factors” do not support discretionary denial of this Petition. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB March 20, 2020). There is no indication that a trial will be scheduled before March 2026 which is the expected timing of a Final Written Decision (FWD) of this Petition. The median time in 2023 from filing to disposition in this court was 31.2 months. ETN 1078. Further, due to the early stage of the litigation, it would appear likely that the district court would grant a stay if the present Petition was granted. *Fintiv* Factors 1 and 2 favor institution.

The order dismissing the Amended Complaint was entered in early June and Petitioner has been diligently working on this Petition since that date after it became apparent that Patent Owner would continue to pursue its baseless patent infringement claims. Even though the filing of this Petition is near the end of the

statutory period, it was both prudent and economical for Petitioner to wait for the Court's ruling on its motion to dismiss before making a substantial investment in filing this Petition. *Fintiv* Factor 3 favors institution.

No Answer has been filed in the pending suit and the question of invalidity has not been presented in any motions filed with the Court. While the parties are the same, Petitioner does not intend to raise invalidity defenses that are presented in this Petition or that could have been presented in this Petition. Further, it is noted that Patent Owner has filed a separate lawsuit against another party asserting infringement of the '925 Patent. Institution would promote judicial efficiency by allowing adjudication of validity defenses in a single proceeding. *Fintiv* Factors 4 and 5 favor institution.

Finally, the Petition's "strong showing on the merits" invalidity based on prior art not previously considered by the Office weighs against denial. *Apple Inc. v. Seven Networks, LLC.*, IPR2020-00180, Paper 12 at 17 (August 14, 2020). Further, the Petition challenges all 20 patent claims, whereas Patent Owner only asserted 3 claims in the litigation. *Apple*, Paper 12 at 14 (institution favored where IPR challenges more claims than litigation).

All of the *Fintiv* Factors favor institution. Accordingly, the Director should not exercise discretion under 314(a) to deny the Petition.

B. 325(d)

Grounds 1 – 4 rely on Thorpe, which was previously considered by the Office. Thorpe discloses a vehicle leveling system with a sensor device and control unit that wirelessly communicates with the sensor device but does not disclose the limitations related to the graphical display. There is no indication that the Examiner considered any references showing a graphical display for a vehicle leveling system used to level a vehicle parked on the ground. Instead, the Examiner relied on references such as Zhong (ETN1071), showing pitch and roll indicators for UAVS while in flight. Patent Owner distinguished the references cited by the Examiner as being non-analogous art, for failing to display an image of a vehicle “**parked on an uneven surface of the ground** as claimed”, and for failing to display height adjustment amount or adjustment pairs needed to level a vehicle parked on the ground. ETN1004, pp. 496-497.

The asserted Grounds rely on three new references not previously considered by the Office:

- **Clark** – Clark discloses a vehicle leveling system with a sensor device and smart device (computer or mobile phone) that wirelessly communicates with the sensor device. The smart device includes a graphical display that simultaneously displays pitch and roll indicators for the vehicle along with “at least one representation of the vehicle

which rotates in real-time as the at least one inclination angle changes.”

- **TealLevel** - TealLevel discloses a vehicle leveling application for a smartphone (e.g., Palm device). The TealLevel application calculates a height adjustment amount for the lower three wheels and displays the calculated height adjustment amounts along with an image of the vehicle on a graphical display.
- **Garceau** - Clark discloses a vehicle leveling system with a sensor device and smart device (computer or mobile phone) that wirelessly communicates with the sensor device and provides “text or graphics depicting the attitude of the structure can be provided in real-time when the structure is static, or in motion.”

The references relied upon in this Petition are in the same field of endeavor (i.e. leveling vehicles parked on the ground) and are more pertinent than Zhong. Not only do the references explicitly teach a graphical display for a vehicle leveling system including an image of the vehicle that rotates in real time, but also provide explicit motivation for combining their teachings with Thorpe. Clark, for example, states that the graphical interface provides users with “an intuitive understanding of the measurements taken by the clinometer 2, such as the roll and pitch conditions of the vehicle 1” and enables the vehicle to be “jacked and leveled

with fewer persons and in less time” ETN1006, [3:57-60; 8:66 – 9:2]. Wilson, which is relied upon to show motivation to combine the cited references, states that “a leveling device that gives simultaneous readings for the four corners of a vehicle in inches is greatly needed by motorhome users.” ETN1010, [1:53-56].

The prior art relied upon and arguments made are not the same as, or substantially similar to, art and arguments previously presented to the Office in connection with the ‘925 Patent. *Oticon Medical A.B v. Cochlear Ltd*, IPR2019-00975, Paper 15 at 20 (October 16, 2019)(finding error in prosecution because new references non-cumulative references not considered).

XI. Conclusion

For the foregoing reasons, Petitioner respectfully requests that *inter partes* review be instituted and that all of claims of the ‘925 Patent be found unpatentable.

Dated: September 16, 2024

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner hereby certifies, in reliance on the word count of the word-processing system (Microsoft Office Word) used to prepare this petition, that the number of words in this paper is 13968. This word count excludes the tables of contents, tables of authorities, mandatory notices under 37 C.F.R. § 42.8, certificate of word count, certificate of service, or appendix of exhibits or claim listing. Petitioner certifies that this Petition for Inter Partes Review does not exceed the applicable type-volume limit of 37 C.F.R. § 42.24(a).

Dated: September 16, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned hereby certifies that a true copy of the foregoing PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,890,925, Petitioner's Power of Attorney, and all supporting exhibits (Exhibits 1001-1078) were served in their entirety upon the Patent Owner at the correspondence address of record via United Parcel Service:

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Copies of this Petition and all supporting exhibits were also served via electronic mail on Patent Owner's counsel and addressed as follows:

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