IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.) C.A. No
AUDI OF AMERICA, LLC,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Audi of America, LLC ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed which the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware limited liability company with its principal office at 2200 Ferdinand Porsche Drive, Herndon, Virginia 20171. Defendant has appointed Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, Delaware 19808 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Audi A4, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Richard D. Kirk

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EXHIBIT A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,132,284	*	1/1979	Tomecek 180/179
5,376,917	*	12/1994	Yoshimoto et al 340/438
5,949,346	*	9/1999	Suzuki et al 340/815.45

OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

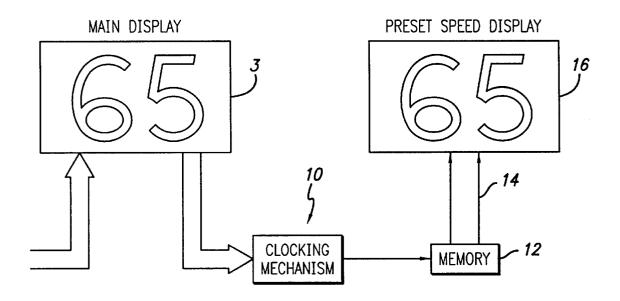
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets



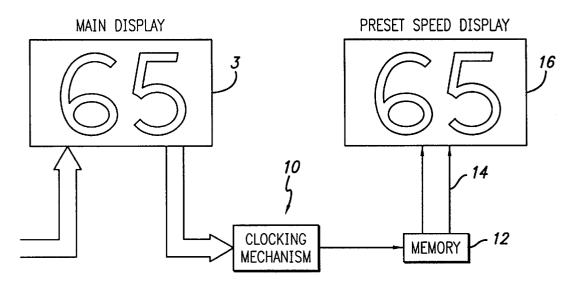
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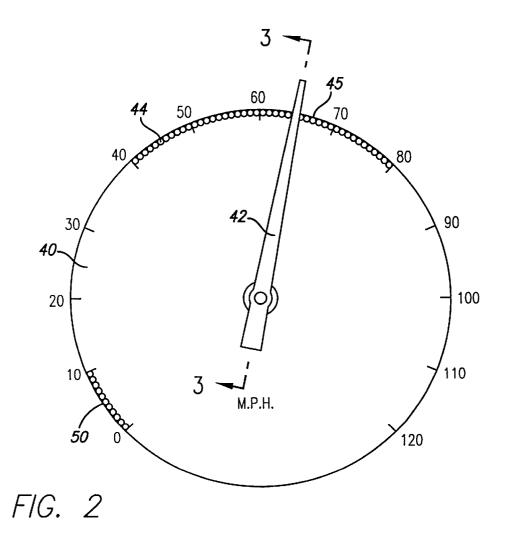
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FIG. 1







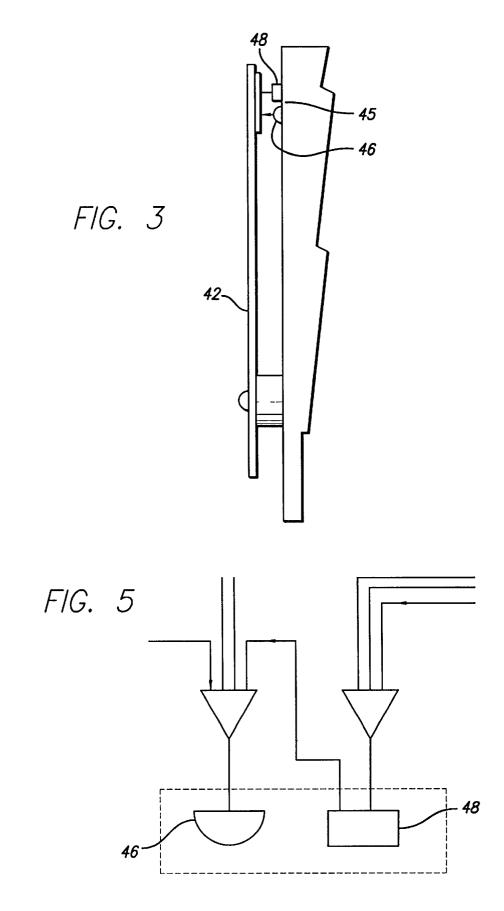
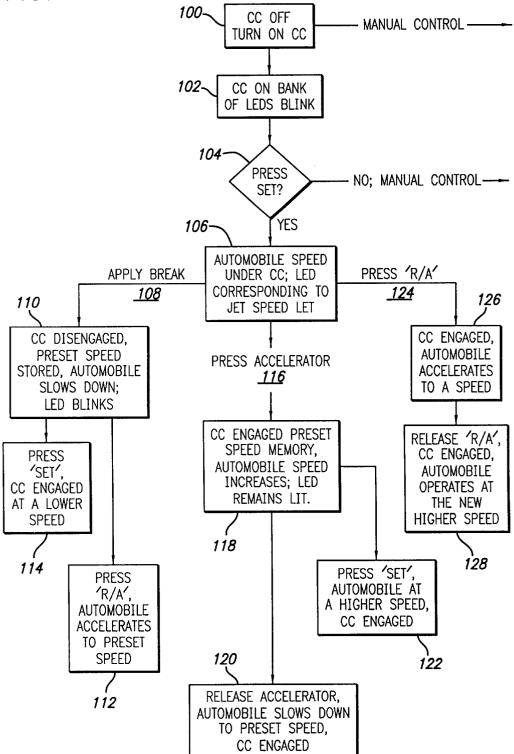




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01753-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS			DEFENDANTS					
CRUISE CONTROL TECHNOLOGIES LLC		AUDI OF AMERICA, LLC						
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware		ounty, Delaware	County Of I	Residence Of First Listed Defe	endant	New Castle County	, Delaware	
	Address And Telephone Number)	Attorneys	s (If Known)				
 (c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000 			Attorneys (If Known)					
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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.) C.A. No
BMW OF NORTH AMERICA, LLC,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant BMW of North America, LLC ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware limited liability company with its principal office at 300 Chestnut Ridge Road, Woodcliff Lake, New Jersey 07677. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed, thereby engaging the system; a memory which stores information indicative of the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example,

Defendant's 740i, 740Li, 750i, 750Li, 760Li, 750i xDrive, and 750Li xDrive vehicles (collectively, the "7 Series Vehicles"), and various versions thereof.

10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;

- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;
- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Richard D. Kirk

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EXHIBIT A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) **References Cited**

U.S. PATENT DOCUMENTS

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OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

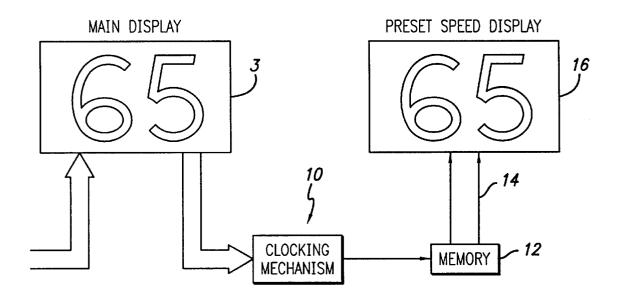
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

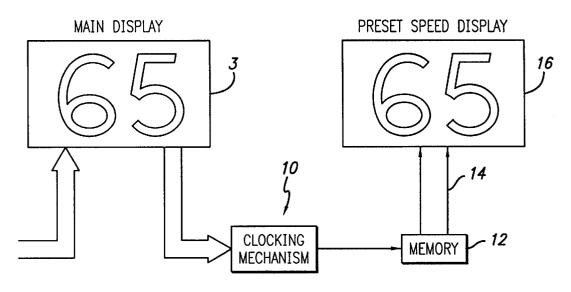


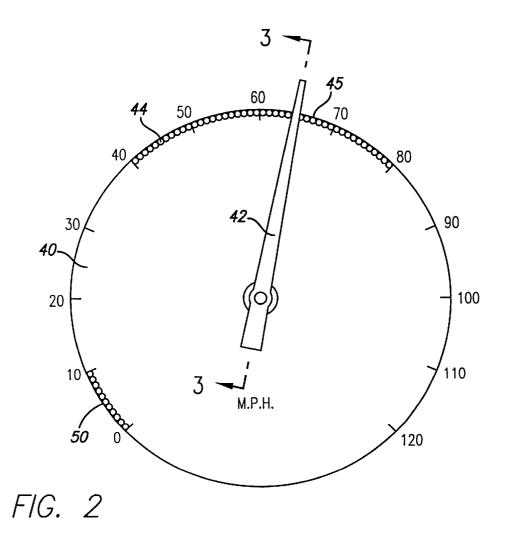
U.S. Patent

Sheet 1 of 3

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FIG. 1







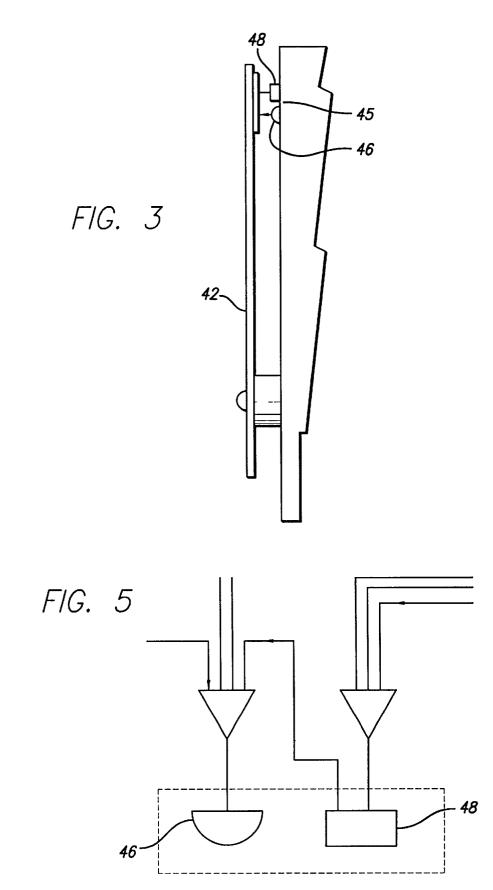
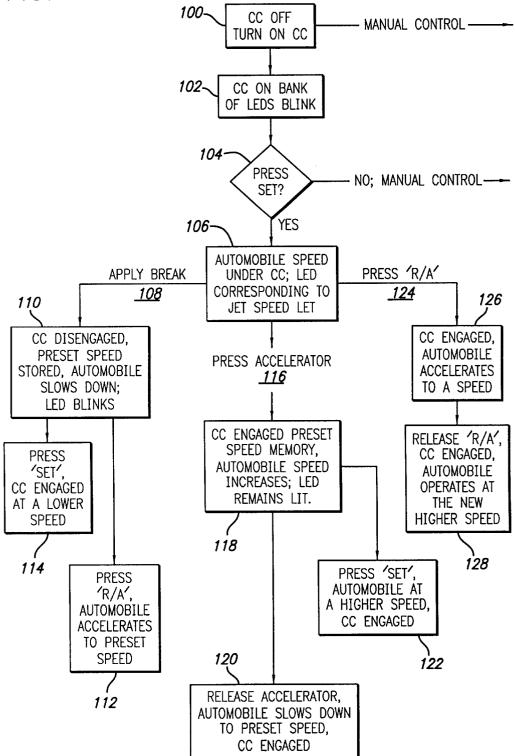




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01754-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS			DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC		BMW OF NORTH AMERICA, LLC				
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware		County Of Residence Of First Listed Defendant New Castle County, Delaware				
	Address And Telephone Number)		Attorney	s (If Known)		
 (c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000 						
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U.S. Government Defendant	4 Diversity (Indicate Citizer in Item III)	ship of Parties	Citizen		 a Interpreted and Third of Business in Another b Foreign Nation 	
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& Enforcement of Judgment 151 Medicare Act	330 Federal Employers'	Injury Pr	oduct Liability	640 RR & Truck 650 Airline Regs	820 Copyrights 830 Patent	470 Racketeer Influenced and Corrupt Organizations
152 Recovery of Defaulted Student Loans	Liability 340 Marine	PERSONAL P 370 Other Fra	ud	660 Occupational Safety/Health	840 Trademark	810 Selective Service 850 Securities/Commodities/
(Excl. Veterans)	345 Marine Product Liability	371 Truth in I 380 Other Per		690 Other		Exchange
153 Recovery of Overpayment of Veteran's Benefits	350 Motor Vehicle		Damage	LABOR 710 Fair Labor Standards	SOCIAL SECURITY	875 Customer Challenge 12 USC 3410
160 Stockholders' Suits 190 Other Contract	355 Motor Vehicle Product Liability	Product		Act	861 HIA (1395ff) 862 Black Lung (923)	891 Agricultural Acts 892 Economic Stabilization Act
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245 Tort Product Liability	444 Welfare	535 Death Per 540 Mandamu			or Defendant)	950 Constitutionality of
290 All Other Real Property	440 Other Civil Rights	550 Civil Righ	nts		871 IRS Third Party 26 USC 7609	State Statutes State Statutory Actions
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Action for patent infringement und	er 35 U.S.C. § 101, et seq. Ir	junctive and o		Statutes Unless Diversity y relief and for damag	ges for patent infringem	ent
VII. REQUESTED IN COMPLAINT	CHECK IF THIS ACTION UNDER F.R.C1		DEMA	ND \$	CHECK YES only if de JURY DEMAND :	
VIII. RELATEDCASE(S)	(See instructions)		Unassigned		Filed on Decemb	per 21 2012
Cruise Control Technologies LLC v. Audi o Cruise Control Technologies LLC v. Chrys			Unassigned		Filed on Decemb	per 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. General Motor Company			Unassigned Unassigned		Filed on December 21, 2012 Filed on December 21, 2012	
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC			Unassigned Unassigned		Filed on December 21, 2012 Filed on December 21, 2012	
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC Cruise Control Technologies LLC v. Porsche Cars North America, Inc.			Unassigned		Filed on December 21, 2012	
Cruise Control Technologies LLC v. Subaru of America, Inc. Unassigned DOCKET Filed on December 21, 2012 Cruise Control Technologies LLC v. Volvo Cars of North America, LLC JUDGE Unassigned NUMBERS						
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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.) C.A. No
CHRYSLER GROUP LLC,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Chrysler Group LLC ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware limited liability company with its principal office at 1000 Chrysler Drive, Auburn Hills, Michigan 48326. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Chrysler 300 vehicle, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Richard D. Kirk

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EXHIBIT A

Case 1:12-cv-01755-GMS Document 1-1



(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

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- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

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(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

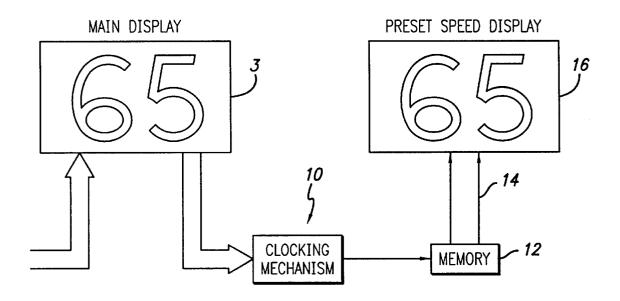
Assistant Examiner—Yonel Beaulieu

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(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

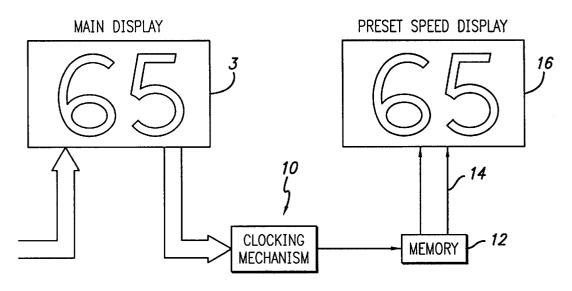


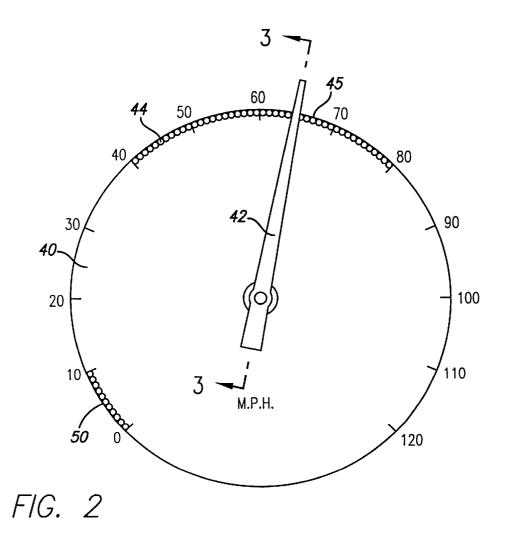
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Sheet 1 of 3

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FIG. 1







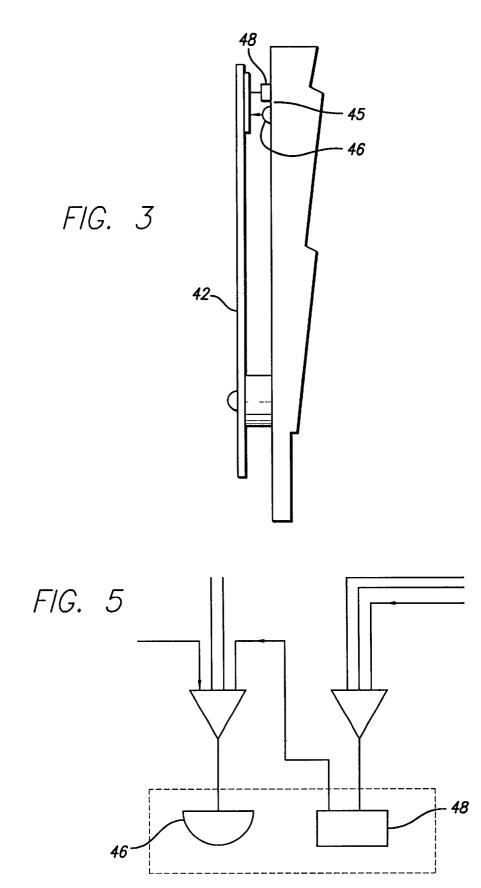
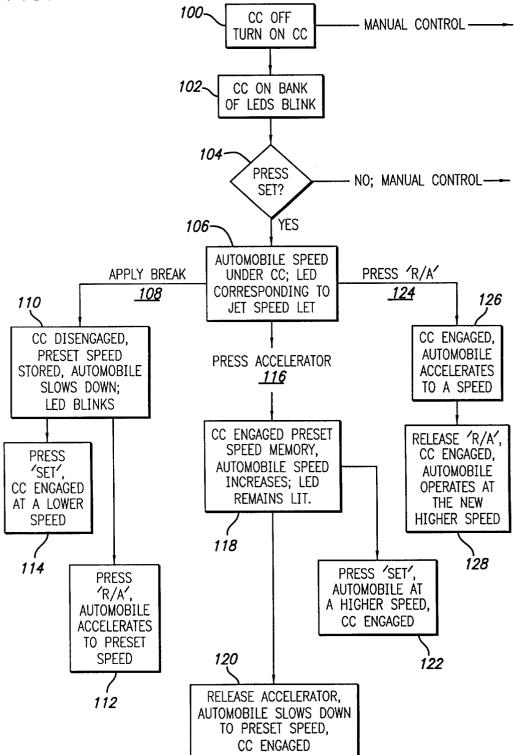




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01755-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

L(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				CHRYSLER GROUP LLC			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				Residence Of First Listed Defer	ndant New Castle Count	ty, Delaware	
(c) Attorneys (Firm Name, Address And Telephone Number)				s (If Known)			
(c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000							
II. BASIS OF JURISDI	CTION (PLACE AN ONLY)	"X" IN ONE BOX	III.CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff				
	oner)		(For Di	versity Cases Only) PTF I	And One Box D	For Defendant) PTF DEF	
U.S. Government Plaintiff	3 Federal Questi (U.S. Govern	on nment Not a Party)			Incorporated <i>or</i> Principal of Business in this Sta	te $\Box 4 \Box 4$	
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VI. CAUSE OF ACTION				Under Which You Are F Statutes Unless Diversity	iling And Write Brief State	nent Of Cause.	
Action for patent infringement und	ler 35 U.S.C. § 101, et seq. In	njunctive and d			ges for patent infringeme	ent	
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DECEMBER 21, 2012 /S/ RICHARD D. KIRK, ES				D. KIRK, ESQ. (RK0922)			
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RECEIPT #	AMOUNT	APPLYING IFP	JUI	DGE	MAG. JUDGE		

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.) C.A. No
FORD MOTOR COMPANY,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Ford Motor Company ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware corporation with its principal office at One American Road, Dearborn, Michigan 48126. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Ford Explorer, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Richard D. Kirk

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

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Of Counsel:

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EXHIBIT A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) References Cited

U.S. PATENT DOCUMENTS

4,132,284	*	1/1979	Tomecek 180/179
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OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

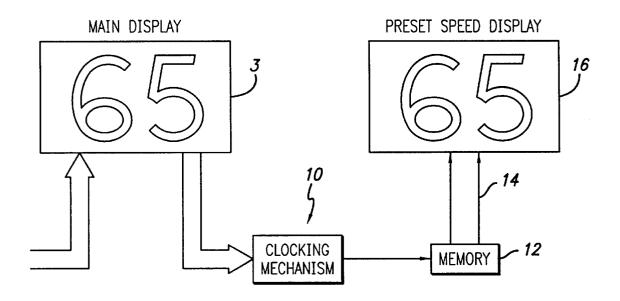
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

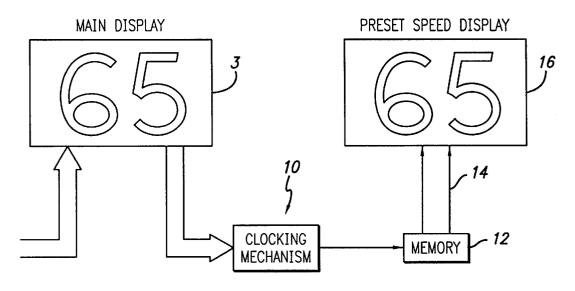


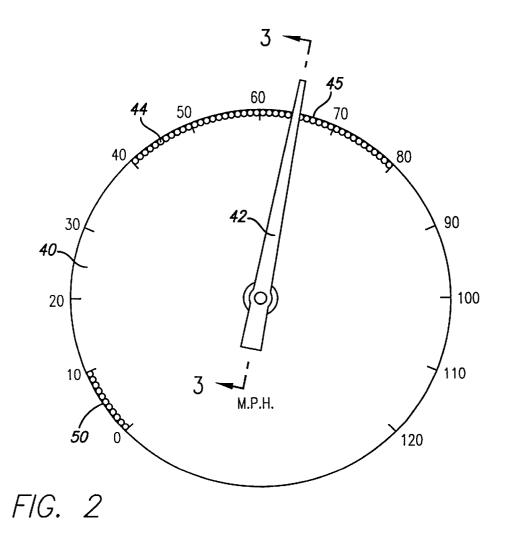
U.S. Patent

Sheet 1 of 3

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FIG. 1







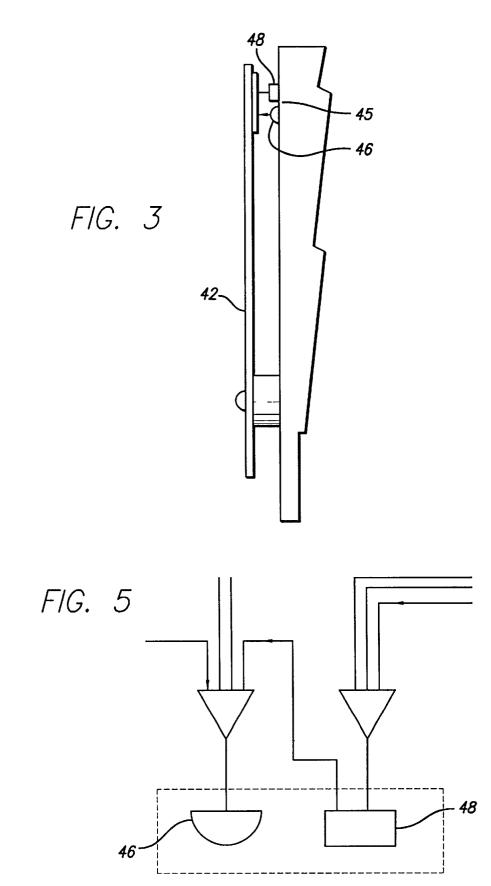
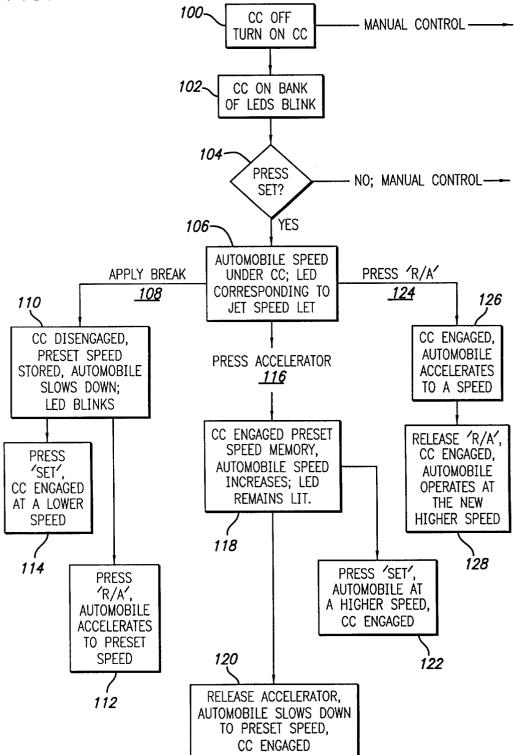




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01756-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS DEFENDANTS	DEFENDANTS				
CRUISE CONTROL TECHNOLOGIES LLC FORD MOTOR COMPANY	FORD MOTOR COMPANY				
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware County Of Residence Of First Listed Defendant New Castle County, Delaware					
(c) Attorneys (Firm Name, Address And Telephone Number) Attorneys (If Known)					
Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000	Attorneys (II Known)				
	III.CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff				
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VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cau Do Not Cite Jurisdictional Statutes Unless Diversity)	ise.				
Action for patent infringement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement					
VII. REQUESTED IN CHECK IF THIS IS A CLASS DEMAND \$ CHECK YES only if demanded in c	omplaint				
VII. REQUESTED IN COMPLAINTACTIONDEMAND 3CHECK YES only in demanded in c JURY DEMAND: \square YES \square UNDER F.R.CP. 23JURY DEMAND: \square YES \square					
VII. RELATEDCASE(S) (See instudions)					
Cruise Control Technologies LLC v. Audi of America, LLC Unassigned Filed on December 21, 2012 Cruise Control Technologies LLC v. BMW of North America, LLC Unassigned Filed on December 21, 2012	Filed on December 21, 2012 Filed on December 21, 2012				
Cruise Control Technologies LLC v. Drysler Group LLC Unassigned Filed on December 21, 2012					
Cruise Control Technologies LLC v. General Motor CompanyUnassignedFiled on December 21, 2012Cruise Control Technologies LLC v. Jaguar Land Rover North America LLCUnassignedFiled on December 21, 2012					
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC Unassigned Filed on December 21, 2012	Filed on December 21, 2012 Filed on December 21, 2012				
Cruise Control Technologies LLC v. Subaru of America, Inc. Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned					
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC JUDGE Unassigned NUMBERS Filed on December 21, 2012					
DATE SIGNATURE OF ATTORNEY OF RECORD					
DECEMBER 21, 2012 /S/ RICHARD D. KIRK, ESQ. (RK0922)					
FOR OFFICE USE ONLY					
RECEIPT # AMOUNT APPLYING IFP JUDGE MAG. JUDGE					

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
V.) C.A. No
GENERAL MOTORS COMPANY,)) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant General Motors Company ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware corporation with its principal office at 300 Renaissance Center, Detroit, Michigan 48243. Defendant has appointed Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, Delaware 19808 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Chevrolet Cruze, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Richard D. Kirk

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

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Of Counsel:

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EXHIBIT A

Case 1:12-cv-01757-GMS Document 1-1



(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

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OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

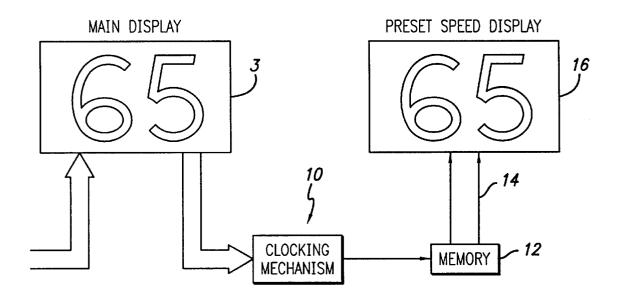
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets



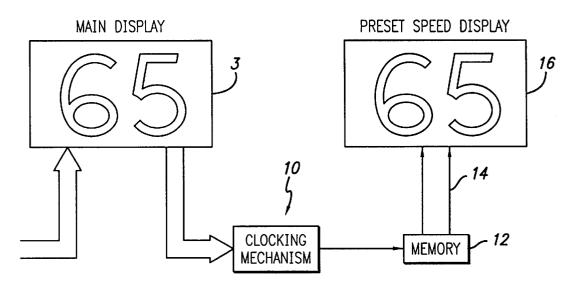
U.S. Patent

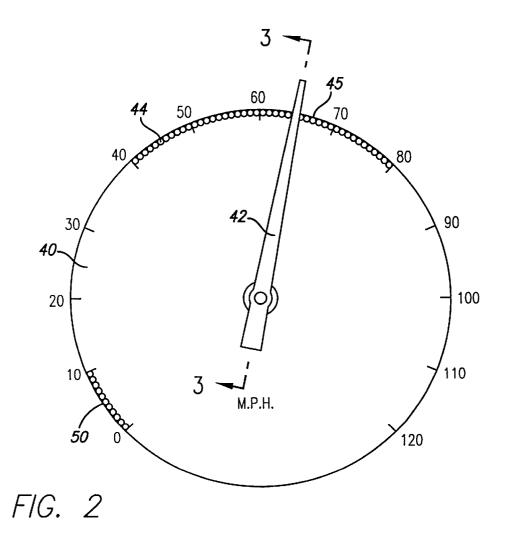
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Sheet 1 of 3

US 6,324,463 B1

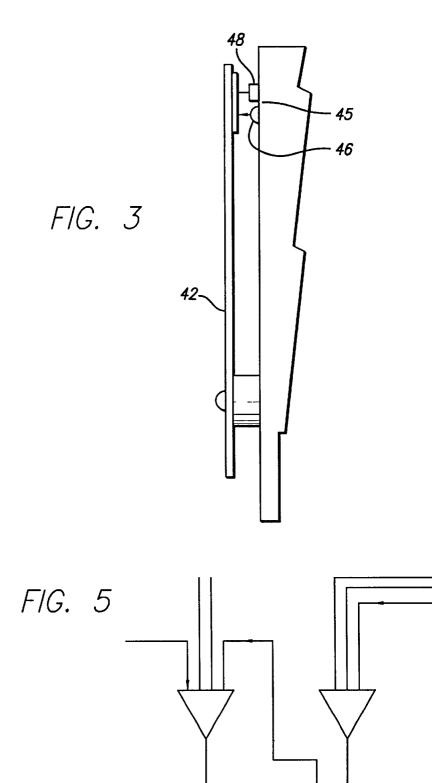
FIG. 1





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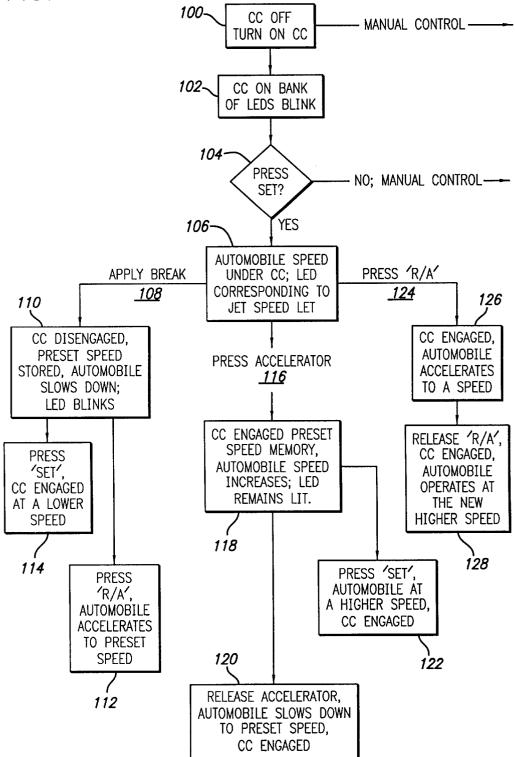






Sheet 3 of 3

FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01757-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				GENERAL MOTORS COMPANY			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				County Of Residence Of First Listed Defendant New Castle County, Delaware			
	Address And Telephone Number)		Attorney	s (If Known)			
 (c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000 				`			
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VII. RELATEDCASE(S) (See instructions) Cruise Control Technologies LLC v. Mdu of America, LLC Cruise Control Technologies LLC v. BMW of North America, LLC Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC Cruise Control Technologies LLC v. Sorth America, Inc. Cruise Control Technologies LLC v. Vorsche Cars North America, Inc. Cruise Control Technologies LLC v. Volvo Cars of North America, LLC JUDGE			TT - 1		Filed on December 21, 2012 Filed on December 21, 2012 DOCKET NUMBERS Filed on December 21, 2012 Filed on December 21, 2012		
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DECEMBER 21, 2012 /S/ RICHARI				D. KIRK, ESQ. (RK0922)			
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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.) C.A. No
JAGUAR LAND ROVER NORTH AMERICA LLC,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Jaguar Land Rover North America LLC ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware limited liability company with its principal office at 555 MacArthur Boulevard, Mahwah, New Jersey 07430. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Range Rover, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Stephen B. Brauerman

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EXHIBIT A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

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World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

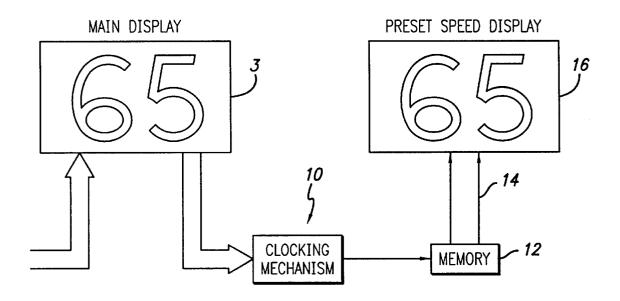
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

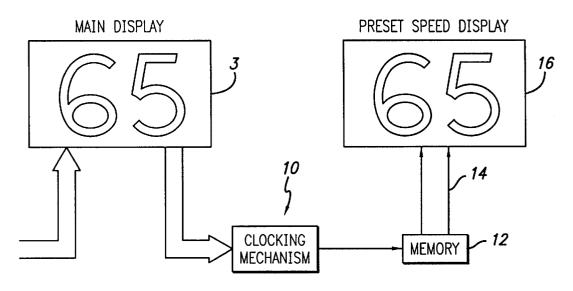


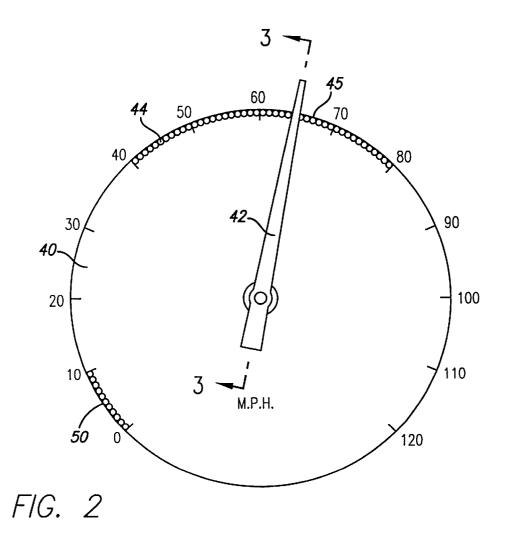
U.S. Patent

Sheet 1 of 3

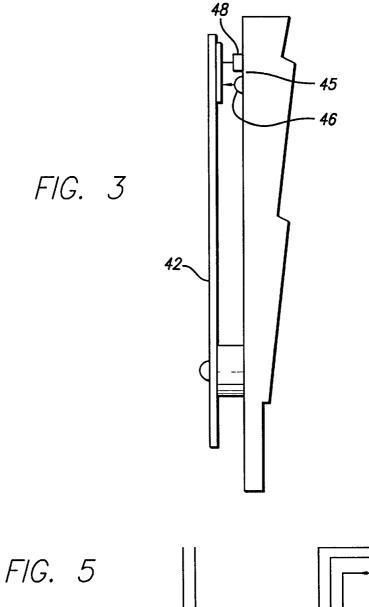
US 6,324,463 B1

FIG. 1









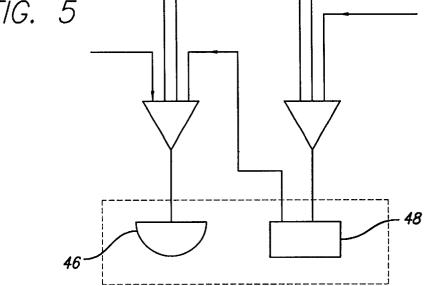
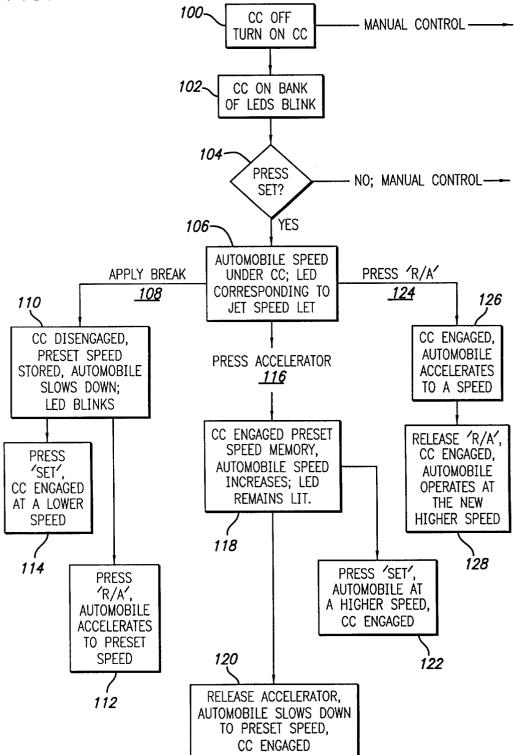




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01758-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				JAGUAR LAND ROVER NORTH AMERICA LLC			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				County Of Residence Of First Listed Defendant New Castle County, Delaware			
(c) Attorneys (Firm Name, A	Address And Telephone Number)		Attorneys	s (If Known)			
 (c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000 							
II. BASIS OF JURISDI	CTION (PLACE AN ONLY)	"X" IN ONE BOX	III.CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff (For Diversity Cases Only) And One Box For Defendant)				
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U.S. Government Defendant	4 Diversity (Indicate Citizen in Item III)	ship of Parties	Citizen	of Another State 2 or Subject of a 3 gn Country	² of Business in Another		
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☐ 160 Stockholders' Suits ☐ 190 Other Contract	355 Motor Vehicle Product Liability	385 Property Product		710 Fair Labor Standards Act	861 HIA (1395ff) 862 Black Lung (923)	891 Agricultural Acts	
190 Other Contract	360 Other Personal Injury			720 Labor/Mgmt Relations	863 DIWC/DIWW	892 Economic Stabilization Act 893 Environmental Matters	
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210 Land Condemnation 220 Foreclosure	441 Voting 442 Employment	510 Motions t Sentence		740 Railway Labor Act 790 Other Labor Litigation	865 RSI (405(g)	Information Act	
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290 All Other Real Property	290 All Other Real Property 440 Other Civil Rights 550 Civil				871 IRS Third Party	State Statutes 890 Other Statutory Actions	
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VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief St				ing And Write Brief Statem	nent Of Cause.		
Action for patent infingement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement							
VII. REQUESTED IN	CHECK IF THIS	IS A CLASS	DEMAN	ND \$	CHECK YES only if dem	anded in complaint	
COMPLAINT		1 22		+	JURY DEMAND:		
VIII. RELATEDCASE(S)	UNDER F.R.CF (See instructions)						
Cruise Control Technologies LLC v. Audi o	of America, LLC		Unassigned Unassigned		Filed on Decembe	r 21 2012	
Cruise Control Technologies LLC v. BMW of North America, LLC Cruise Control Technologies LLC v. Chrysler Group LLC					Filed on December 21, 2012		
Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. General Motors Company					Filed on December 21, 2012 Filed on December 21, 2012		
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC Cruise Control Technologies LLC v. Porsche Cars North America, Inc.					Filed on December 21, 2012 Filed on December 21, 2012		
Cruise Control Technologies LLC v. Subaru of America, Inc.					Filed on December 21, 2012 Filed on December 21, 2012		
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC JUDGE Unassigned Unassigned Unassigned NUMBERS Filed on December 21, 2012 Filed on December 21, 2012							
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DECEMBER 21, 2012		/S/	STEPHEN H	B. BRAUERMAN (SB4952)			
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RECEIPT #	AMOUNT	APPLYING IFP	JUI	DGE	MAG. JUDGE		

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
V .) C.A. No
MERCEDES-BENZ USA, LLC,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Mercedes-Benz USA, LLC ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware limited liability company with its principal office at 3 Mercedes Drive, Montvale, New Jersey 07645. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed, thereby engaging the system; a memory which stores information indicative of the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example,

Defendant's C-Class, E-Class, GL Class, R-Class, and SLK Class vehicles, and various versions thereof.

10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;

- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;
- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Stephen B. Brauerman

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

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EXHIBIT A

Case 1:12-cv-01759-GMS Document 1-1



(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,132,284	*	1/1979	Tomecek 180/179
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5,949,346	*	9/1999	Suzuki et al 340/815.45

OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

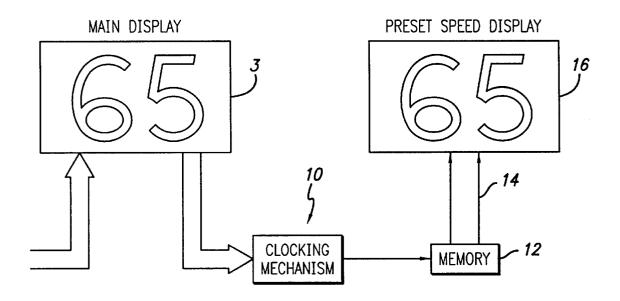
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

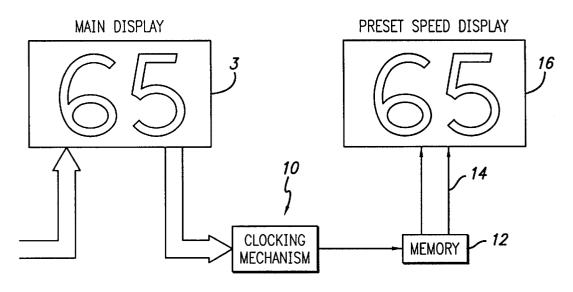


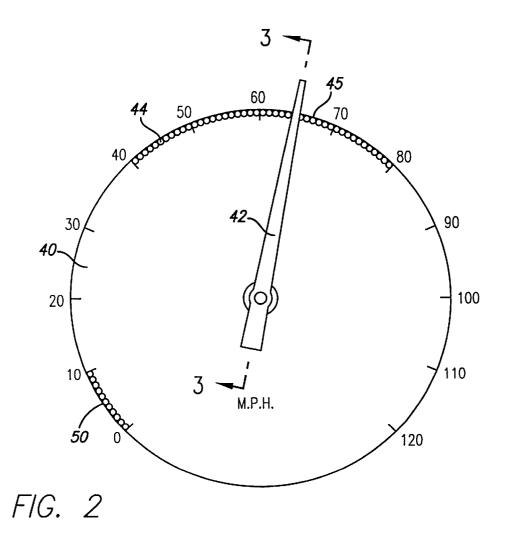
U.S. Patent

Sheet 1 of 3

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FIG. 1







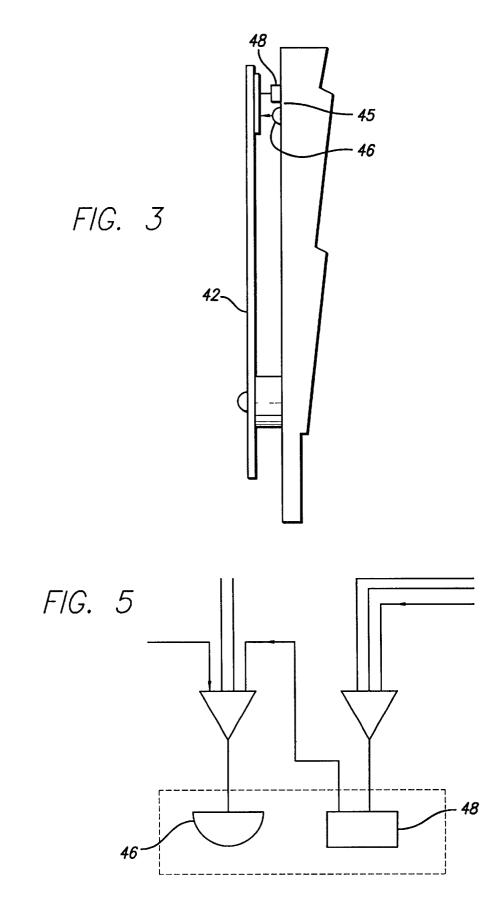
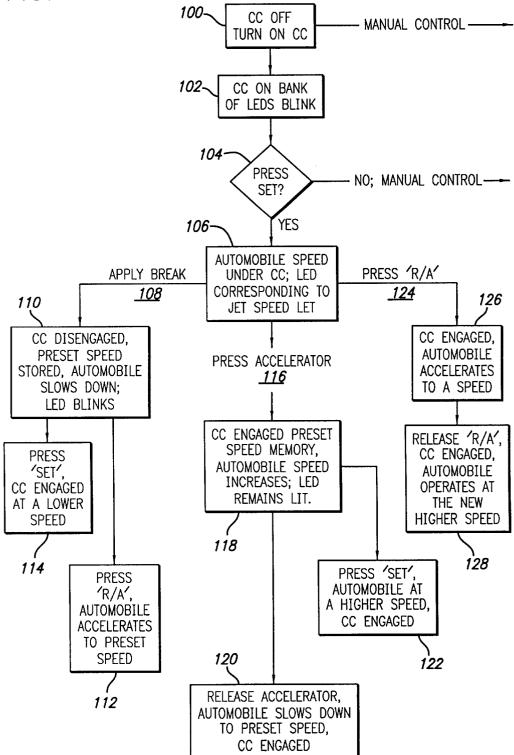




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01759-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS		Seket Sheet. (BEE	DEFENDANTS					
CRUISE CONTROL TECHNOLOGIES LLC				MERCEDES-BENZ USA, LLC				
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				County Of Residence Of First Listed Defendant New Castle County, Delaware				
(c) Attorneys (Firm Name, Address And Telephone Number)				s (If Known)				
(c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000								
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Action for patent infringement und	er 35 U.S.C. § 101, et seq. Ir	njunctive and o			es for patent infringeme	nt		
VII. REQUESTED IN COMPLAINT	CHECK IF THIS ACTION UNDER F.R.C		DEMAN	ND \$	CHECK YES only if den JURY DEMAND :			
VII. RELATEDCASE(S) (See instructions) Cruise Control Technologies LLC v. Audi of America, LLC Cruise Control Technologies LLC v. BMW of North America, LLC Cruise Control Technologies LLC v. Proysler Group LLC Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. General Motors Company Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC Cruise Control Technologies LLC v. Subaru of America, Inc. Cruise Control Technologies LLC v. Subaru of America, Inc. Cruise Control Technologies LLC v. Volvo Cars of North America, LLC) JUDGE	Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned Unassigned		Filed on December 21, 2012 Filed on December 21, 2012			
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DECEMBER 21, 2012		/S/	STEPHEN I	B. BRAUERMAN (SB4952)				
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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,	
v.) C.A. No
PORSCHE CARS NORTH AMERICA, INC.,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Porsche Cars North America, Inc. ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National

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Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware corporation with its principal office at 980 Hammond Drive, Suite 100, Atlanta, Georgia 30328. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

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6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to

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the operator of the vehicle. The infringing products and services include, for example, Defendant's Porsche Panamera, and various versions thereof.

10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;

- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;
- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Stephen B. Brauerman

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EXHIBIT A

Case 1:12-cv-01760-GMS Document 1-1



(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

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(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

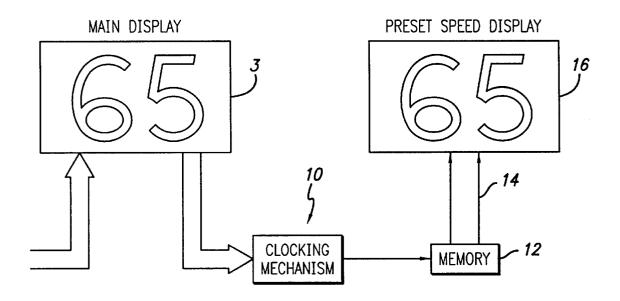
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

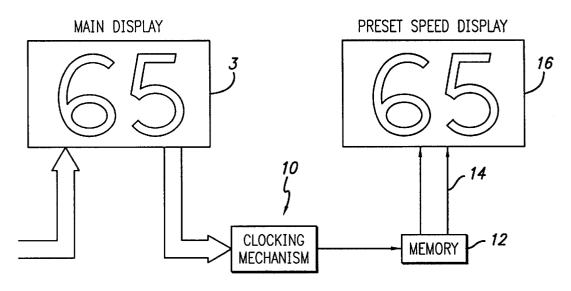


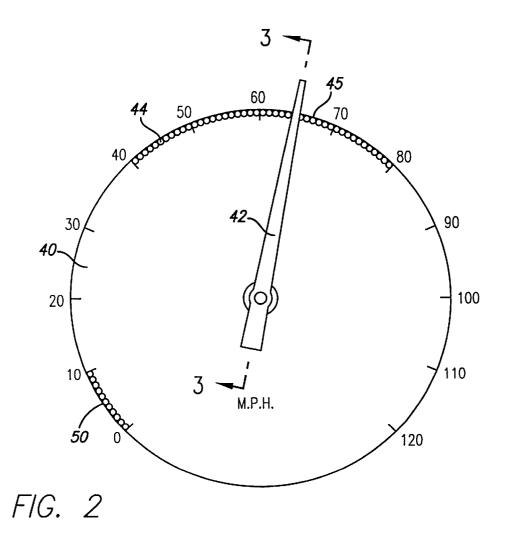
U.S. Patent

Sheet 1 of 3

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FIG. 1







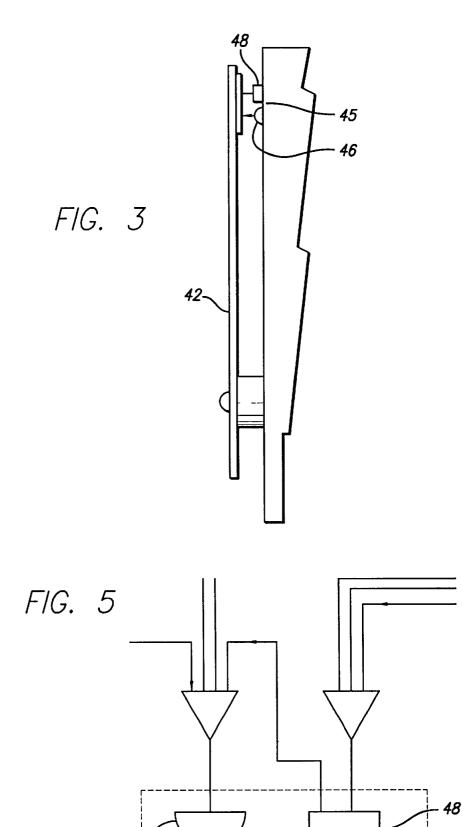
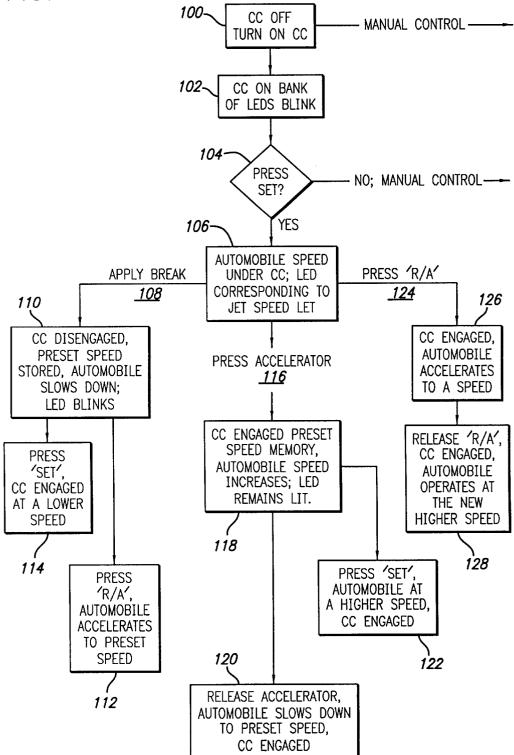




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01760-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				PORSCHE CARS NORTH AMERICA, INC.			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				County Of Residence Of First Listed Defendant New Castle County, Delaware			
(c) Attorneys (Firm Name, Address And Telephone Number)				s (If Known)			
Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130							
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Do Not Cite Jurisdictional Statutes Unless Diversity) Action for patent infringement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement CHECK IF THIS IS A CLASS Description							
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VII. RELATED CASE(S) (See instructions) Cruise Control Technologies LLC v. Audi of America, LLC Cruise Control Technologies LLC v. BMW of North America, LLC Cruise Control Technologies LLC v. Chrysler Group LLC Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. General Motors Company Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC Cruise Control Technologies LLC v. Subaru of America, ILC Cruise Control Technologies LLC v. Volvo Cars of North America, LLC		JUDGE	Ollassiglieu		DOCK	Theu on December	21, 2012 21, 2012 21, 2012 21, 2012 21, 2012 21, 2012 21, 2012 21, 2012 21, 2012
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DECEMBER 21, 2012 FOR OFFICE USE ONLY		/S/	STEPHEN H	B. BRAUERMAN (SB4952	2)		
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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
V.) C.A. No
SUBARU OF AMERICA, INC.,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Subaru of America, Inc. ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware corporation with its principal office at 2235 Marlton Pike West, Cherry Hill, New Jersey 08002. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's 2013 Legacy vehicle, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Stephen B. Brauerman

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

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Of Counsel:

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EXHIBIT A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) References Cited

U.S. PATENT DOCUMENTS

4,132,284	*	1/1979	Tomecek 180/179
5,376,917	*	12/1994	Yoshimoto et al 340/438
5,949,346	*	9/1999	Suzuki et al 340/815.45

OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

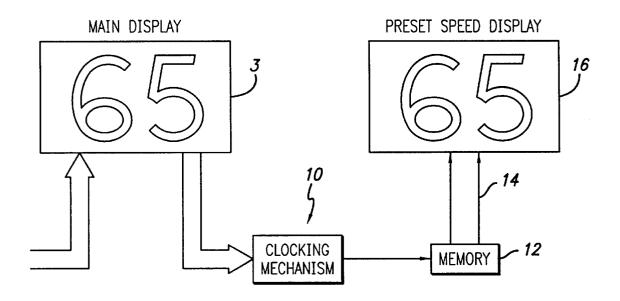
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

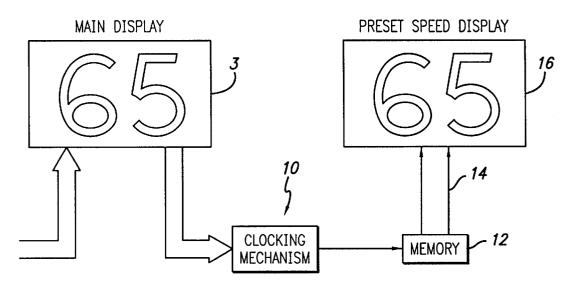
36 Claims, 3 Drawing Sheets

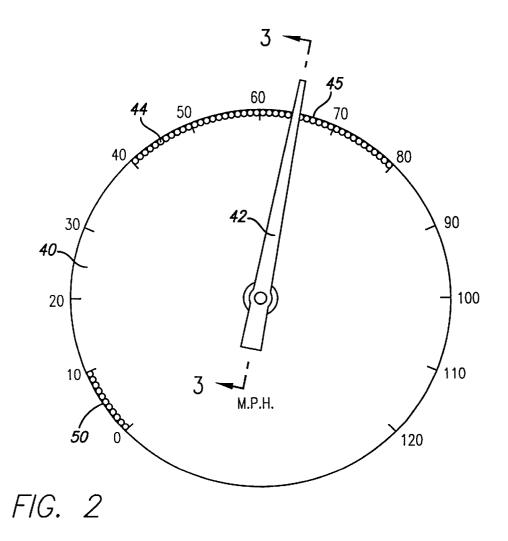


U.S. Patent

Sheet 1 of 3

FIG. 1







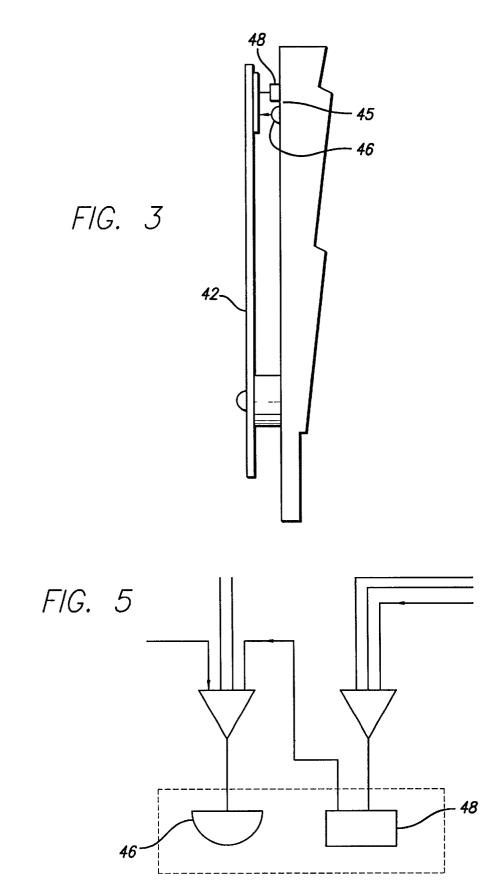
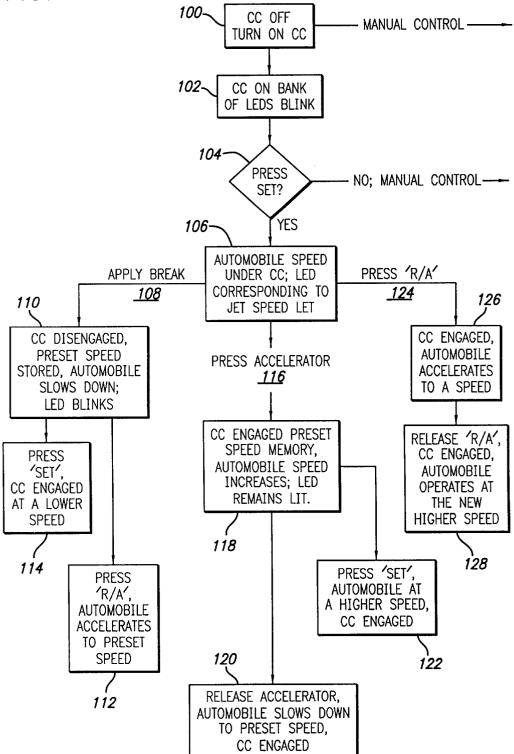




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01761-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				SUBARU OF AMERICA, INC.			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				County Of Residence Of First Listed Defendant New Castle County, Delaware			
()	Address And Telephone Number)	Attorney	s (If Known)			
Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130							
(302) 655-5000 II. BASIS OF JURISDIC		"X" IN ONE BOX	III.CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff				
	ONLY)		(For Diversity Cases Only) And One Box For Defendant) PTF DEF PTF DEF				
U.S. Government Plaintiff	3 Federal Questi (U.S. Govern	on nment Not a Party)	Citizen	of This State 🔲 1 🗌	Incorporated <i>or</i> Princip of Business in this Stat	e 4 4	
U.S. Government Defendant	4 Diversity (Indicate Citizen in Item III)	nship of Parties	Citizen	of Another State 2 or Subject of a 3	of Business in Another		
IV. NATURE OF SUIT	PLACE AN "X" IN ON	E BOX ONLY)	Forei	gn Country			
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150 Recovery of Overpayment	320 Assault, Libel & Slander	Product 368 Asbestos	Liability	630 Liquor Laws	PROPERTY RIGHTS	460 Deportation	
& Enforcement of Judgment 151 Medicare Act	330 Federal Employers' Liability		oduct Liability	1 050 All line Regs	820 Copyrights 830 Patent	470 Racketeer Influenced and Corrupt Organizations	
152 Recovery of Defaulted Student Loans	340 Marine	370 Other Fra 371 Truth in I	ud	660 Occupational Safety/Health	840 Trademark	810 Selective Service 850 Securities/Commodities/	
(Excl. Veterans) 153 Recovery of Overpayment	345 Marine Product Liability	380 Other Per	sonal	690 Other	SOCIAL SECURITY	Exchange 875 Customer Challenge	
of Veteran's Benefits 160 Stockholders' Suits	350 Motor Vehicle 355 Motor Vehicle	385 Property		710 Fair Labor Standards	861 HIA (1395ff)	12 USC 3410 891 Agricultural Acts	
 190 Other Contract 195 Contract Property Liability 	Product Liability 360 Other Personal Injury	Product	Liability	Act 720 Labor/Mgmt Relations	862 Black Lung (923) 863 DIWC/DIWW	892 Economic Stabilization Act	
REAL PROPERTY	CIVIL RIGHTS	PRISONER P	ETITIONS	730 Labor/Mgmt Reporting & Disclosure Act	(405(g)) 864 SSID Title XVI	893 Environmental Matters 894 Energy Allocation Act	
210 Land Condemnation	441 Voting	510 Motions t		☐ 740 Railway Labor Act ☐ 790 Other Labor Litigation	□ 865 RSI (405(g)	895 Freedom of I Information Act	
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 240 Torts to Land 245 Tort Product Liability 	Accommodations	530 General 535 Death Per		Security Act	870 Taxes (U.S. Plaintiff or Defendant)	Justice 950 Constitutionality of	
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V. ORIGIN I Original Proceeding 2 Removed from State Court 3 Remanded from 4 Reinstated or Reopened 5 Transferred from 6 Multidistrict Litigation 0 District Judge from Judge from Judge from Litigation District Judge from Jud							
VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause.				nent Of Cause.			
Do Not Cite Jurisdictional Statutes Unless Diversity) Action for patent infringement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement					nt		
VII. REQUESTED IN COMPLAINT	CHECK IF THIS ACTION UNDER F.R.C		DEMA	ND \$	CHECK YES only if den JURY DEMAND :		
VIII. RELATEDCASE(S)	(See instructions)	Unaggionad				
Cruise Control Technologies LLC v. Audi of America, LLC Cruise Control Technologies LLC v. BMW of North America, LLC Cruise Control Technologies LLC v. Chrysler Group LLC Cruise Control Technologies LLC v. Ford Motor Company			Unassigned Unassigned Unassigned Unassigned		Filed on Decembe Filed on Decembe Filed on Decembe	r 21, 2012	
Cruise Control Technologies LLC v. General Motors Company Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC			Unassigned Unassigned		Filed on December 21, 2012 Filed on December 21, 2012		
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC			Unassigned Unassigned		Filed on Decembe Filed on Decembe		
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC JUDGE Unassigned DOCKET				Flied on Decembe			
DATE SIGNATURE OF ATTORNEY OF RECORD							
DECEMBER 21, 2012				B. BRAUERMAN (SB4952)			
FOR OFFICE USE ONLY							
RECEIPT #	AMOUNT	APPLYING IFP	JU	DGE	MAG. JUDGE		

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.)) C.A. No
VOLVO CARS OF NORTH AMERICA, LLC,) TRIAL BY JURY DEMANDED
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Volvo Cars of North America, LLC ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a Delaware limited liability company with its principal office at 1 Volvo Drive, Rockleigh, New Jersey 07647. Defendant has appointed The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Volvo S60, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

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others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: December 21, 2012

BAYARD, P.A.

/s/ Stephen B. Brauerman

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

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EXHIBIT A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) References Cited

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OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

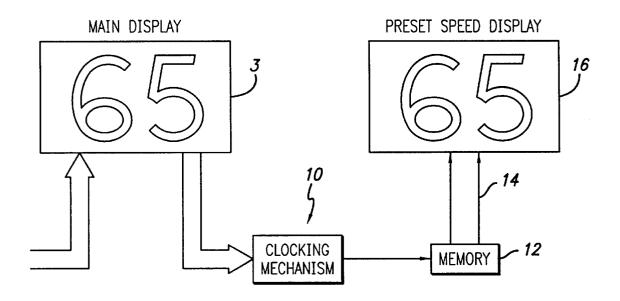
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) ABSTRACT

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets



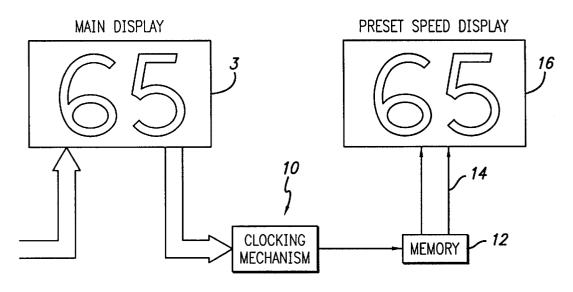
U.S. Patent

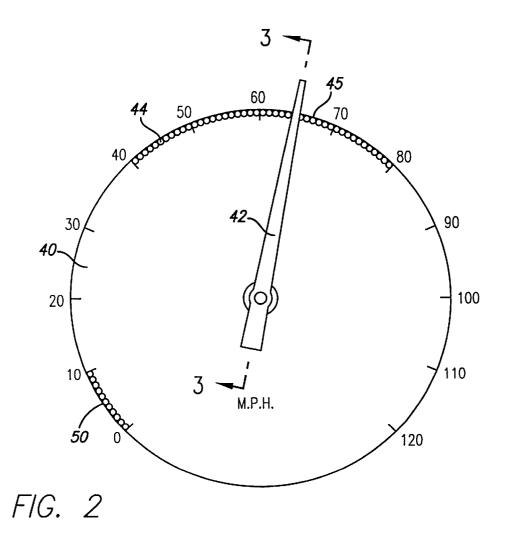
Nov. 27, 2001

Sheet 1 of 3

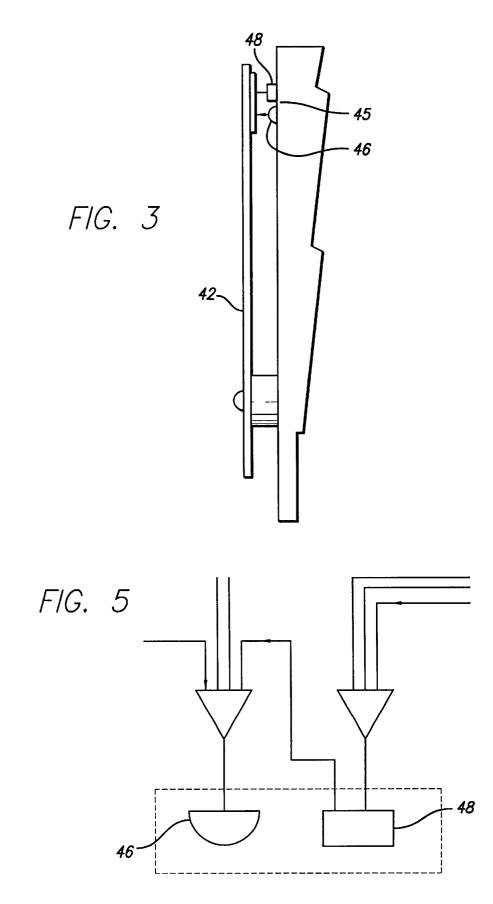
US 6,324,463 B1

FIG. 1





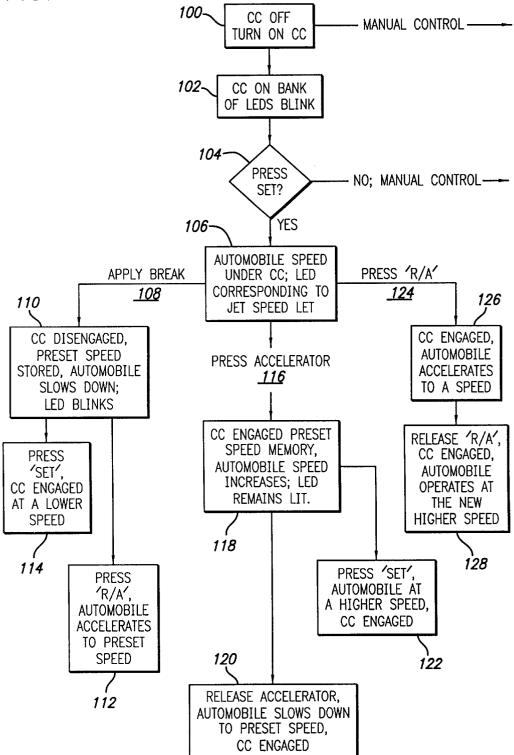






Sheet 3 of 3

FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the transportation means that could utilize a cruise control 40 operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

> At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:12-cv-01762-GMS Document 1-2 Filed 12/21/12 Page 1 of 1 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS				
CRUISE CONTROL TECHNOLOGIES LLC				VOLVO CARS OF NORTH AMERICA, LLC				
 (b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware (c) Attorneys (Firm Name, Address And Telephone Number) Richard D. Kirk (No. 0922) 				County Of Residence Of First Listed Defendant New Castle County, Delaware Attorneys (If Known)				
Stephen Brauerman (No. 4952) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130 (302) 655-5000								
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VIII. RELATEDCASE(S)	(See instructions)							
Cruise Control Technologies LLC v. Audi o			Unassigned Unassigned			Filed on December	21, 2012	
Cruise Control Technologies LLC v. BMW of North America, LLC Cruise Control Technologies LLC v. Chrysler Group LLC			Unassigned			Filed on December	21, 2012	
Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. General Motors Company			Unassigned Unassigned			Filed on December 21, 2012 Filed on December 21, 2012		
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC			Unassigned Unassigned		Filed on December Filed on December			
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Cruise Control Technologies LLC v. Subaru of America, Inc. JUDGE Unassigned Unassigned Unassigned Unassigned DOCKET Filed on December 21, 2012 Filed on December 21, 2012 NUMBERS								
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FOR OFFICE USE ONLY					<i>,</i>			
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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)				
Plaintiff,))				
V.)				
AMERICAN HONDA MOTOR CO., INC.,					
Defendant.)				

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant American Honda Motor Co., Inc. ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a California corporation with its principal office at 1919 Torrance Boulevard, Torrance, California 90501. Defendant has appointed CT Corporation System, 818 West Seventh Street, Los Angeles, California 90017 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

<u>COUNT I</u>

INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to

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the operator of the vehicle. The infringing products and services include, for example, Defendant's Acura MDX, and various versions thereof.

10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;

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- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;
- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: January 15, 2013

Of Counsel:

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Attorneys for Plaintiff Cruise Control Technologies LLC

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Exhibit A

Case 1:13-cv-00082-GMS Document 1-1



(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) **References Cited**

U.S. PATENT DOCUMENTS

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(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

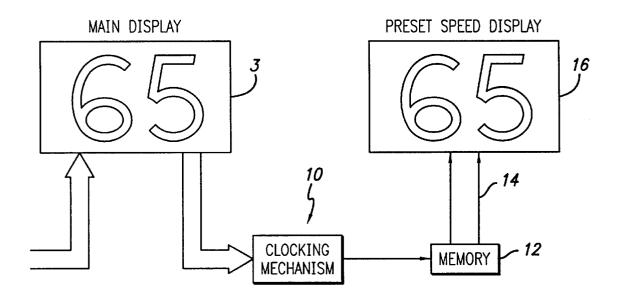
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets

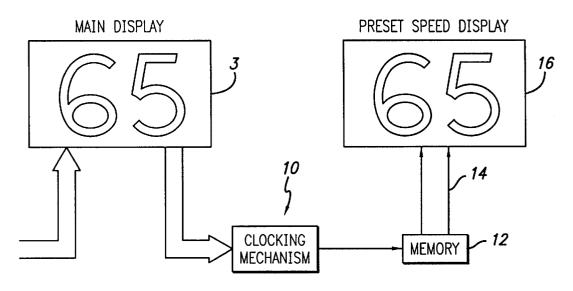


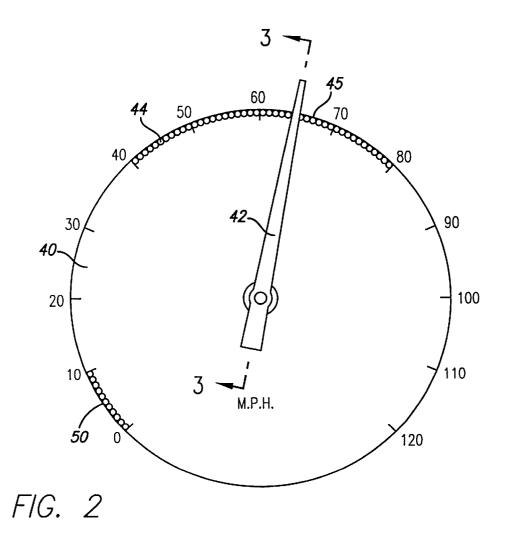
U.S. Patent

Sheet 1 of 3

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FIG. 1







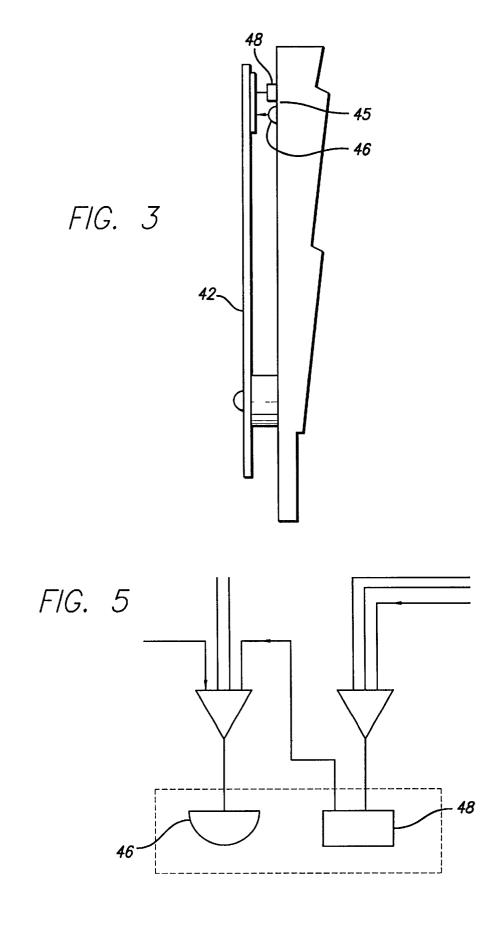
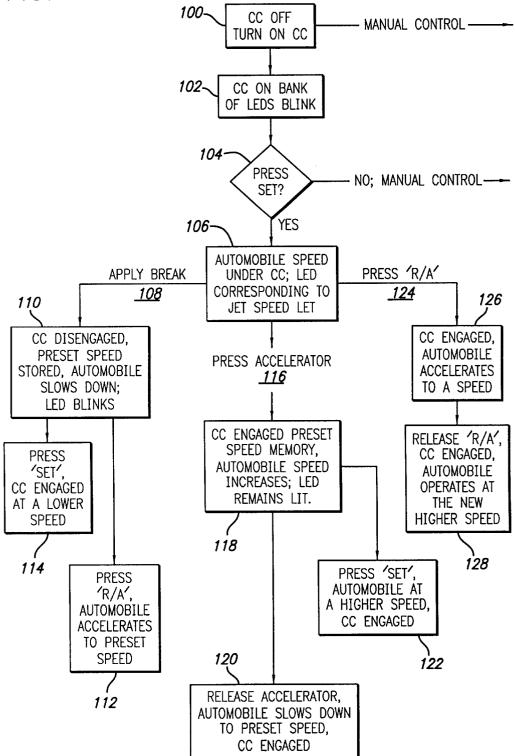




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of transportation means that could utilize a cruise control system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the $_{40}$ operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:13-cv-00082-GMS Document 1-2 Filed 01/15/13 Page 1 of 2 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				AMERICAN HONDA MOTOR CO., INC.			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				Residence Of First Listed Defer	endant	Los Angeles Count	y, California
(c) Attorneys (Firm Name, A	Address And Telephone Number)		Attorneys	s (If Known)			
Richard D. Kirk (No. 0922) Stephen Brauerman (No. 4952) Bayard, P.A. 222 Delaware Avenue, Suite 900 Wilmington, DE 19899-5130							
(302) 655-5000 II. BASIS OF JURISDI		X" IN ONE BOX	III.CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff				
	ONLY)		(For Di	versity Cases Only) PTF I	DEF	And One Box Fo	or Defendant) PTF DEF
U.S. Government Plaintiff	3 Federal Question (U.S. Governm	n nent Not a Party)	Incorporated or Principal Place Citizen of This State 1 1 of Business in this State 4 4				
2 U.S. Government	4 Diversity		Citizen	of Another State 2		² of Business in Another	
Defendant	(Indicate Citizens in Item III)	-		or Subject of a 3 [gn Country		3 Foreign Nation	
IV. NATURE OF SUIT	PLACE AN "X" IN ONE	/					
CONTRACT	TOR BEDEONAL INHURV		INTUDY	FORFEITURE/PENAL		BANKRUPTCY	OTHER STATUTES
 ☐ 110 Insurance ☐ 120 Marine ☐ 130 Miller Act ☐ 140 Negotiable Instrument ☐ 150 Recovery of Overpayment & Enforcement of Judgment ☐ 151 Medicare Act ☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans) ☐ 153 Recovery of Overpayment of Veteran's Benefits ☐ 160 Stockholders' Suits ☐ 190 Other Contract ☐ 195 Contract Property Liability REAL PROPERTY ☐ 210 Land Condemnation ☐ 220 Foreclosure ☐ 20 All Other Real Property		PERSONAL PERSONAL Globel{eq:product} Product I Globel{eq:product} PERSONAL PI Globel{eq:product} PERSONAL PI Globel{eq:product} PERSONAL PI Slobel{eq:product} PRISONER PI Slobel{eq:product} PRISONER PI Slobel{eq:product} PRISONER PI Slobel{eq:product} Slobel{eq:product} PRISONER PI Slobel{eq:product} PRISONER	Injury Ipractice Injury Ipractice Injury Personal oduct Liability ROPERTY ud ending sonal Damage Liability ETITIONS o Vacate DRPUS: halty is & Other tis ndition 4	□ 610 Agriculture □ 620 Other Food & Drug □ 620 Other Food & Drug □ 620 Drug Related Seizure □ 630 Liquor Laws □ 640 RR & Truck □ 650 Airline Regs □ 660 Occupational Safety/Health 690 Other □ 710 Fair Labor Standards Act	8881 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		↓ 400 State Reapportionment ↓ 410 Antitrust ↓ 420 Banks and Banking ↓ 450 Commerce/ICC Rates/etc. ↓ 450 Deportation ↓ 470 Racketeer Influenced and Corrupt Organizations ↓ 810 Selective Service ↓ 850 Securities/Commodities/ Exchange ↓ 875 Customer Challenge 12 USC 3410 ↓ 891 Agricultural Acts ↓ 892 Economic Stabilization Act ↓ 893 Environmental Matters ↓ 894 Energy Allocation Act ↓ 895 Freedom of 1 Information Act ↓ 900 Appeal of Fee Determination Under Equal Access to Justice ↓ 950 Constitutionality of State Statutes ↓ 890 Other Statutory Actions
		·		*	(spe	ecify)	Judgment
VI. CAUSE OF ACTION				Under Which You Are F Statutes Unless Diversity		And write Brief Statem	ient OI Cause.
Action for patent infringement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement							
VII. REQUESTED IN COMPLAINT CHECK IF THIS IS A CLASS ACTION DEMAND \$ CHECK YES only if demanded in complaint JURY DEMAND: UNDER F.R.CP. 23 VII. CHECK YES only if demanded in complaint JURY DEMAND: YES							
VII. RELATEDCASE(S)(See instructions)DOCKETSee Addendum attached hereto.JUDGENUMBERS							
DATE SIGNATURE OF ATTORNEY OF RECORD							
JANUARY 15, 2013 /s/ STEPHEN B. BRAUERMAN (SB4952)							
FOR OFFICE USE ONLY							
RECEIPT #	AMOUNT	APPLYING IFP	JUI	DGE		MAG. JUDGE	

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Toyota Motor North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Volkswagen Group of America, Inc.	Unassigned	Filed January 15, 2013

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
V.)
HYUNDAI MOTOR AMERICA,)
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Hyundai Motor America ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National

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Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed which the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a California corporation with its principal office at P.O. Box 20850, Fountain Valley, California 92708. Defendant has appointed National Registered Agents, Inc., 2875 Michelle Drive, Suite 100, Irvine, California 92606 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

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6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed, thereby engaging the system; a memory which stores information indicative of the

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preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Hyundai Equus, and various versions thereof.

10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;
- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: January 15, 2013

Of Counsel:

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/s/ Stephen B. Brauerman

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Attorneys for Plaintiff Cruise Control Technologies LLC

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Exhibit A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,132,284	*	1/1979	Tomecek 180/179
5,376,917	*	12/1994	Yoshimoto et al 340/438
5,949,346	*	9/1999	Suzuki et al 340/815.45

OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

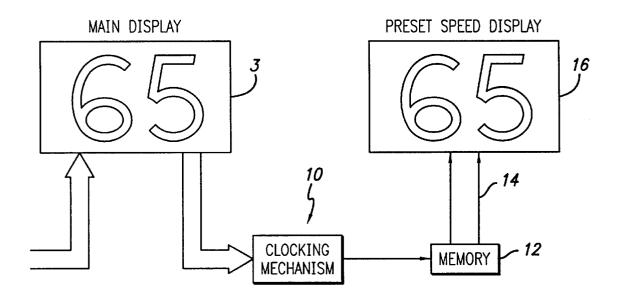
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

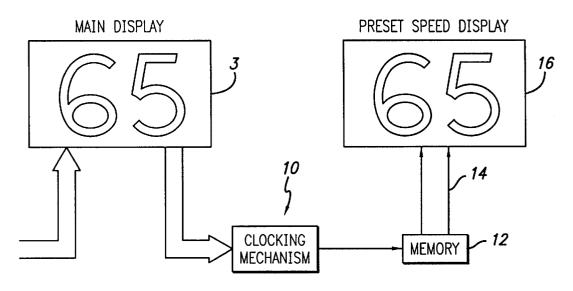
36 Claims, 3 Drawing Sheets

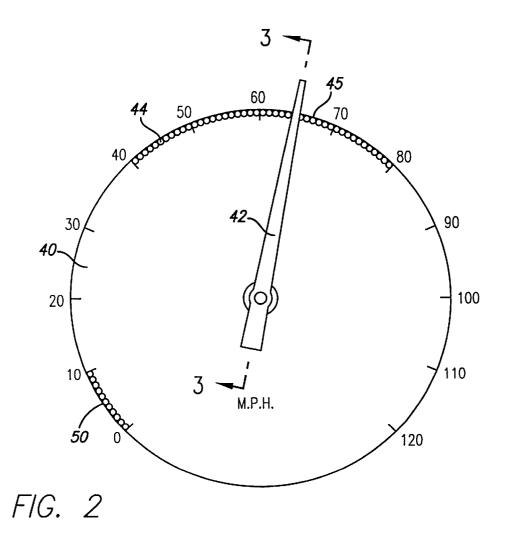


U.S. Patent

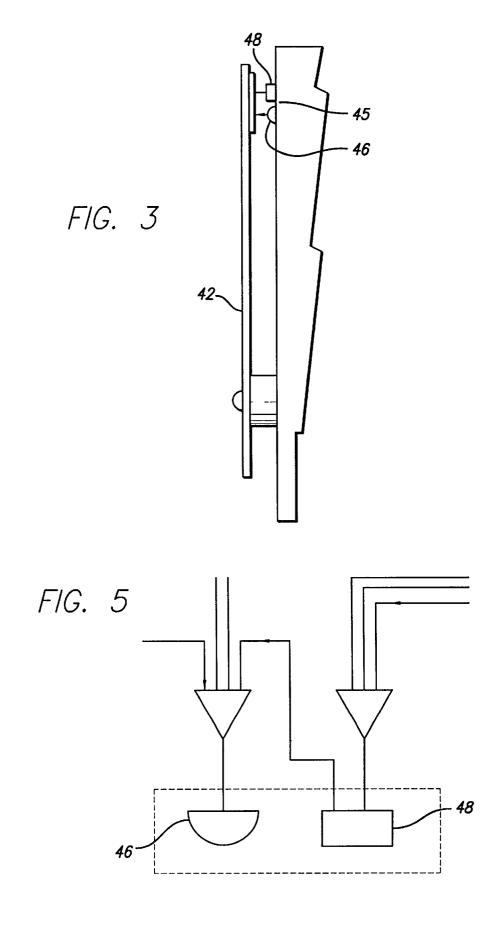
Sheet 1 of 3

FIG. 1





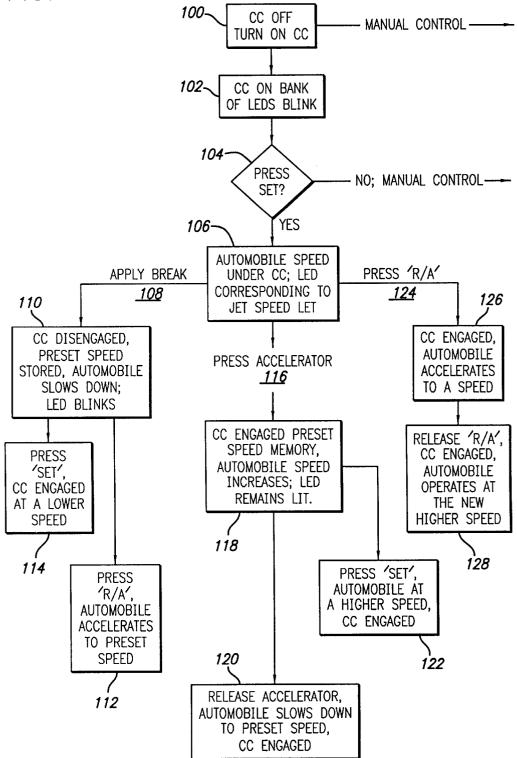






Sheet 3 of 3

FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of transportation means that could utilize a cruise control system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the $_{40}$ operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:13-cv-00084-GMS Document 1-2 Filed 01/15/13 Page 1 of 2 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC				HYUNDAI MOTOR AMERICA			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				Residence Of First Listed Defendar	nt Orange County, Ca	lifornia	
(c) Attorneys (Firm Name, A	Address And Telephone Number)		Attorneys	s (If Known)			
Richard D. Kirk (No. Stephen Brauerman Bayard, P.A. 222 Delaware Avenu Wilmington, DE 1989 (302) 655-5000	0922) (No. 4952) ie, Suite 900						
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□ 120 Marine □ 130 Miller Act □ 140 Negotiable Instrument □ 150 Recovery of Overpayment ∞ Enforcement of Judgment □ 151 Medicare Act □ 152 Recovery of Defaulted Student Loans (Excl. Veterans) □ 153 Recovery of Overpayment of Veteran's Benefits 160 □ 100 Stockholders' Suits □ 190 Other Contract □ 195 Contract Property Liability REAL PROPERTY □ 210 Foreclosure □ 230 Rent Lease & Ejectment □ 240 Torts to Land □ 245 Tort Product Liability □ 290 All Other Real Property	310 Airplane 315 Airplane Product Liability 320 Assault, Libel & Slander 330 Federal Employers' Liability 340 Marine 345 Marine Product Liability 350 Motor Vehicle 355 Motor Vehicle 360 Other Personal Injury CIVIL RIGHTS 441 Voting 442 Employment 443 Housing/ Accommodations 444 Weffare 440 Other Civil Rights	□ 362 Personal I Med. Ma 365 Personal I □ 368 Asbestos □ njury Pr Injury Pr □ 370 Other Fra □ 371 Truth in I □ 380 Other Per □ 371 Truth in I □ 380 Other Per □ 385 Property □ 385 Property □ 510 Motions t Sentence HABEUS CC 530 □ 530 General □ 540 Mandamu □ 555 Prison Co	Injury Ipractice Injury Ipractice Injury Personal oduct Liability ROPERTY ud ending sonal Damage Liability ETITIONS o Vacate DRPUS: halty is & Other tis ndition 4	G20 Other Food & Drug G25 Drug Related Seizure of Property 21 USC 881 G30 Liquor Laws G40 R & Truck G50 Airline Regs G60 Occupational Safety/Health G90 Other LABOR 710 Fair Labor Standards Act 720 Labor/Mgmt Relations 730 Labor/Mgmt Reporting & Disclosure Act 740 Railway Labor Act 790 Other Labor Litigation 791 Empl Ref Inc Security Act	423 Withdrawal 28 USC 157 PROPERTY RIGHTS 820 Copyrights 830 Patent 840 Trademark SOCIAL SECURITY 861 HIA (1395ft) 862 Black Lung (923) 863 DIWC/DIWW (405(g)) 865 RSI (405(g) FEDERAL TAX SUITS 870 871 IRS 11RS Third Party 26 USC 7609	↓ 410 Antitrust ↓ 420 Banks and Banking ↓ 420 Banks and Banking ↓ 420 Banks and Banking ↓ 450 Commerce/ICC Rates/etc. ↓ 460 Deportation ↓ 470 Racketeer Influenced and Corrupt Organizations □ 810 Selective Service □ 850 Securities/Commodities/ Exchange □ 875 Customer Challenge 12 USC 3410 □ 891 Agricultural Acts □ 892 Economic Stabilization Act □ 893 Environmental Matters ■ 894 Energy Allocation Act □ 895 Freedom of I Information Act □ 900 Appeal of Fee Determination Under Equal Access to Justice □ 950 Constitutionality of State Statutes □ 890 Other Statutory Actions	
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VI. CAUSE OF ACTION				Under Which You Are Filin Statutes Unless Diversity)	ng And Write Brief Statem	ent Of Cause.	
Do Not Cite Jurisdictional Statutes Unless Diversity) Action for patent infringement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement							
VII. REQUESTED IN COMPLAINT CHECK IF THIS IS A CLASS ACTION DEMAND \$ CHECK YES only if demanded in complaint JURY DEMAND: UNDER F.R.CP. 23 VII. VII. VII. VII.							
VII. RELATED CASE(S) (See instructions) DOCKET See Addendum attached hereto. JUDGE NUMBERS							
DATE SIGNATURE OF ATTORNEY OF RECORD							
JANUARY 15, 2013 /s/ STEPHEN B. BRAUERMAN (SB4952)							
FOR OFFICE USE ONLY							
RECEIPT #	AMOUNT	APPLYING IFP	JUI	DGE	MAG. JUDGE		

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Toyota Motor North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Volkswagen Group of America, Inc.	Unassigned	Filed January 15, 2013

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,)
Plaintiff,)
v.)
NISSAN NORTH AMERICA, INC.,)
Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Nissan North America, Inc. ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a California corporation with its principal office at One Nissan Way, Franklin, Tennessee 37067. Defendant has appointed CSC – Lawyers Incorporating Service, 2710 Gateway Oaks Drive, Suite 150N, Sacramento, California 95833 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

<u>COUNT I</u>

INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to

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the operator of the vehicle. The infringing products and services include, for example, Defendant's "Intelligent Cruise Control" system, and various versions thereof.

10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;

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- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;
- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: January 15, 2013

Of Counsel:

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Attorneys for Plaintiff Cruise Control Technologies LLC

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Exhibit A

Case 1:13-cv-00085-GMS Document 1-1



(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

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(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

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Primary Examiner-William A. Cuchlinski, Jr.

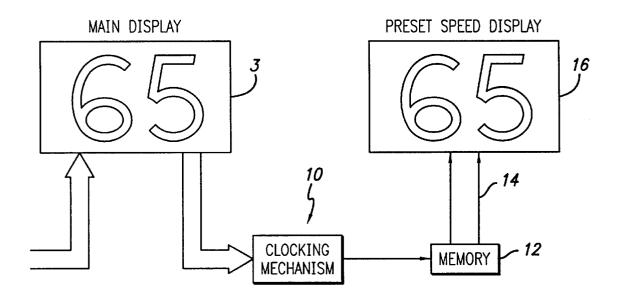
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

36 Claims, 3 Drawing Sheets



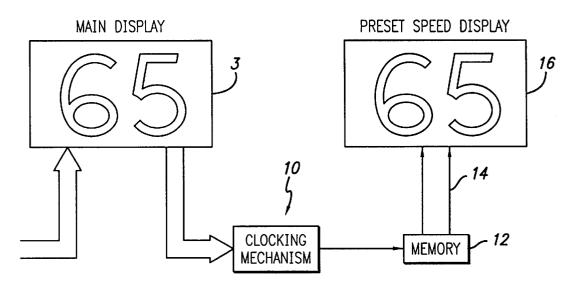
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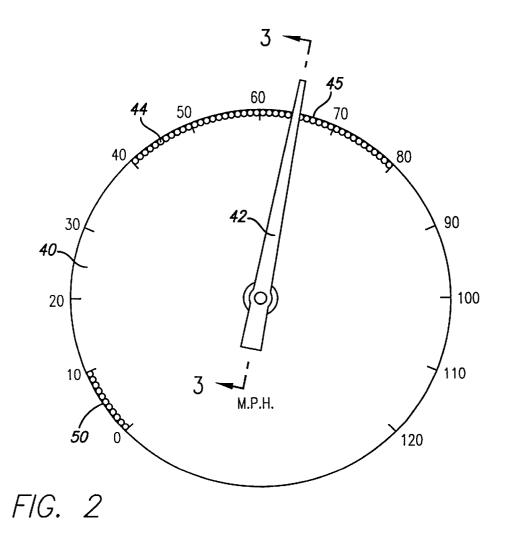
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Sheet 1 of 3

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FIG. 1





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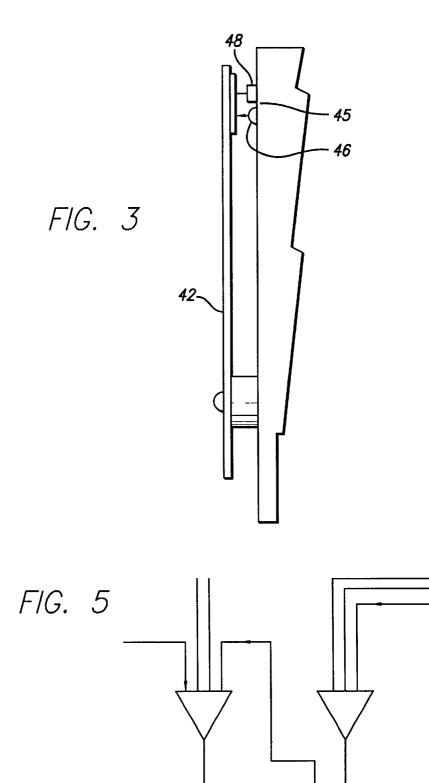
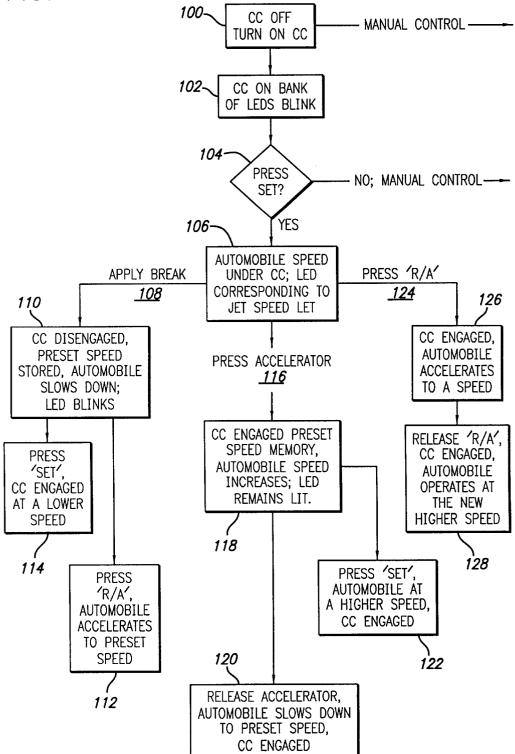




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of transportation means that could utilize a cruise control system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the $_{40}$ operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed. 15

Alternatively, as shown in step **114**, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the ²⁰ detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step **116**, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step **118**, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator takes her/his foot off the accelerator, as in step **120**. For the ³⁰ operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the bank of LED assemblies **44** are located. Thus, the operator ³⁵ can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step **122**, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step **124** to accelerate the vehicle via the cruise control system, step **126**. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the needle to stay lit to indicate the new higher cruising speed, as shown in step **128**.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 6

above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim **2**, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:13-cv-00085-GMS Document 1-2 Filed 01/15/13 Page 1 of 2 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS		, , , , , , , , , , , , , , , , , , ,	DEFENI	DANTS	,	
CRUISE CONTROL TECHNOLOGIES LLC			NISSAN NORTH AMERICA, INC.			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of I	Residence Of First Listed Defer	idant Sacramento County	y, California
(c) Attorneys (Firm Name, A	Address And Telephone Number)		Attorneys	s (If Known)		
Richard D. Kirk (No. Stephen Brauerman Bayard, P.A. 222 Delaware Avenu Wilmington, DE 1989 (302) 655-5000	0922) (No. 4952) ie, Suite 900					
II. BASIS OF JURISDI		X" IN ONE BOX	III.CITIZ	EXENSHIP OF PRINCIP	AL PARTIES (Place An 'X' In	One Box For Plaintiff
	ONLY)			versity Cases Only)	And One Box F	,
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2 U.S. Government	4 Diversity		Citizen	of Another State 2	2 Incorporated <i>and</i> Princ of Business in Another	
Defendant	(Indicate Citizens in Item III)	hip of Parties		or Subject of a 3 [gn Country	3 Foreign Nation	
IV. NATURE OF SUIT	PLACE AN "X" IN ONE	E BOX ONLY)				•
CONTRACT	TOR'		NIT III	FORFEITURE/PENAL		OTHER STATUTES
 110 Insurance 120 Marine 130 Miller Act 140 Negotiable Instrument 150 Recovery of Overpayment & Enforcement of Judgment 151 Medicare Act 152 Recovery of Defaulted Student Loans (Excl. Veterans) 153 Recovery of Overpayment of Veteran's Benefits 160 Stockholders' Suits 190 Other Contract 195 Contract Property Liability REAL PROPERTY 210 Land Condemnation 220 Foreclosure 230 Rent Lease & Ejectment 240 Torts to Land 245 Tort Product Liability 290 All Other Real Property 	PERSONAL INJURY 310 Airplane 315 Airplane Product Liability 320 Assault, Libel & Slander 330 Federal Employers' Liability 340 Marine 345 Marine Product Liability 350 Motor Vehicle 955 Motor Vehicle Product Liability 360 Other Personal Injury CIVIL RIGHTS 441 Voting 442 Employment 443 Housing/ Accommodations 444 Welfare 440 Other Civil Rights	PERSONAL 362 Personal I Med. Ma 365 Personal I Product 1 370 Other Fran 370 Other Fran 370 Other Pere Property 380 Other Pere Property Product 1 PRISONER PI S10 Motions t S10 Motions t S150 General S35 Death Per S40 Mandamu S50 Civil Righ S55 Prison Co	Injury Ipractice Injury Liability Personal oduct Liability ROPERTY ud e.ending sonal Damage Damage Liability ETITIONS o Vacate ORPUS: alty is & Other its	□ 610 Agriculture □ 620 Other Food & Drug □ 620 Drug Related Seizure of Property 21 USC 8 □ 630 Liquor Laws □ 640 R & Truck □ 650 Airline Regs □ 660 Occupational Safety/Health 690 Other □ 710 Fair Labor Standards Act 720 Labor/Mgmt Relations □ 730 Labor/Mgmt Reporting & Disclosure Act □ 740 □ 740 Railway Labor Act □ 790 Cher Labor Litigation □ 791 Empl Ref Inc Security Act Security Act	PROPERTY RIGHTS 820 Copyrights 830 Patent 840 Trademark SOCIAL SECURITY 861 HIA (1395ff) 862 Black Lung (923) 863 DIWC/DIWW (405(g)) 865 RSI (405(g)	400 State Reapportionment 410 Antitrust 420 Banks and Banking 450 Commerce/ICC Rates/etc. 460 Deportation 470 Racketeer Influenced and Corrupt Organizations 810 Selective Service 850 Securities/Commodities/ Exchange 75 Customer Challenge 12 USC 3410 891 Agricultural Acts 892 Economic Stabilization Act 893 Environmental Matters 894 Energy Allocation Act 900 Appeal of Fee Determination Under Equal Access to Justice 950 Constitutionality of State Statutes 890 Other Statutory Actions Appeal to District
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VI. CAUSE OF ACTION				Under Which You Are F Statutes Unless Diversity	iling And Write Brief Staten	nent Of Cause.
Action for patent infringement und) ges for patent infringeme	nt
VII. REQUESTED IN COMPLAINT CHECK IF THIS IS A CLASS ACTION DEMAND \$ CHECK YES only if demanded in complaint JURY DEMAND: YES INO						
VII. RELATED CASE(S) (See instructions) DOCKET See Addendum attached hereto. JUDGE NUMBERS						
DATE		SI	GNATURE C	OF ATTORNEY OF RECORD		
JANUARY 15, 2013		/S/	STEPHEN I	B. BRAUERMAN (SB4952))	
FOR OFFICE USE ONLY				~ ~ ~		
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Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Toyota Motor North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Volkswagen Group of America, Inc.	Unassigned	Filed January 15, 2013

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,) Plaintiff,) v.) TOYOTA MOTOR NORTH AMERICA, INC.,) Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Toyota Motor North America, Inc. ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a California corporation with its principal office at 19001 South Western Avenue, Torrance, California 90501. Defendant has appointed CT Corporation System, 818 West Seventh Street, Los Angeles, California 90017 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

<u>COUNT I</u> INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Toyota Avalon, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

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others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: January 15, 2013

Of Counsel:

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/s/ Stephen B. Brauerman

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

Attorneys for Plaintiff Cruise Control Technologies LLC

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Exhibit A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,132,284	*	1/1979	Tomecek 180/179
5,376,917	*	12/1994	Yoshimoto et al 340/438
5,949,346	*	9/1999	Suzuki et al 340/815.45

OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

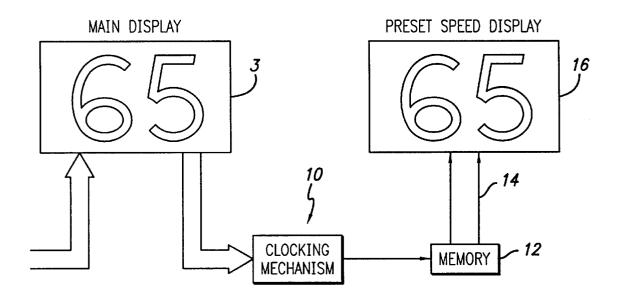
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

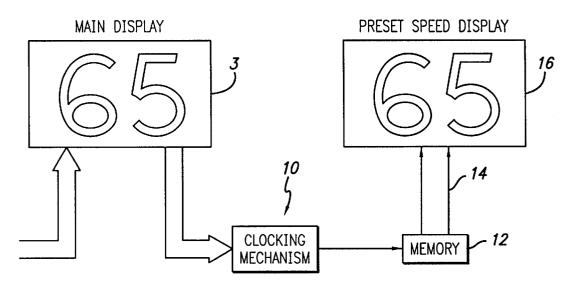
36 Claims, 3 Drawing Sheets

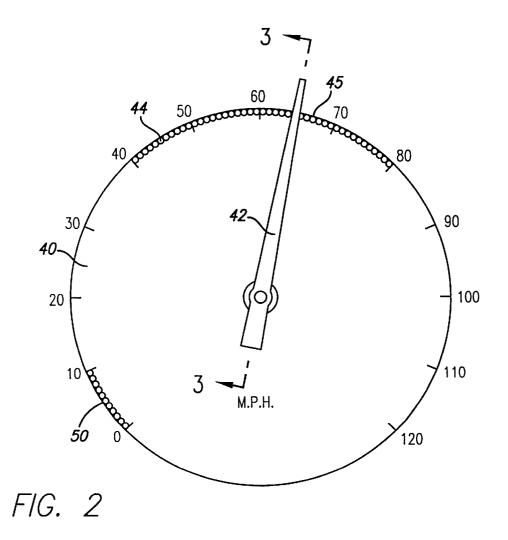


U.S. Patent

Sheet 1 of 3

FIG. 1







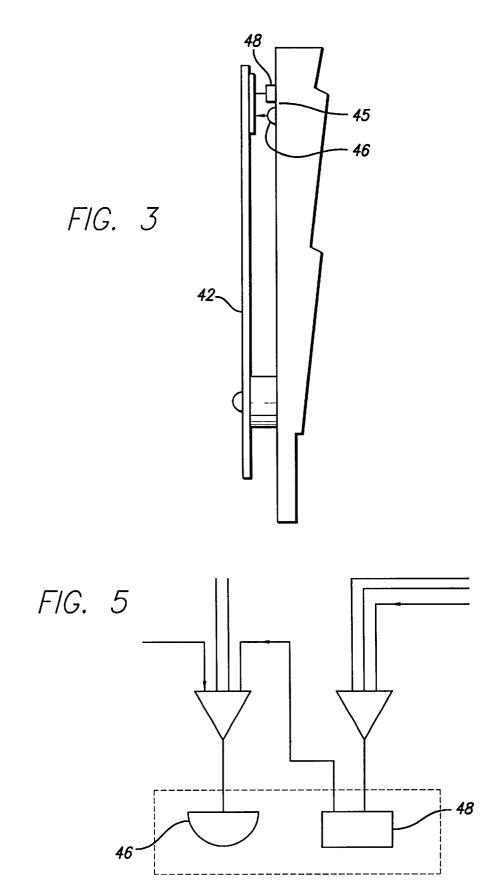
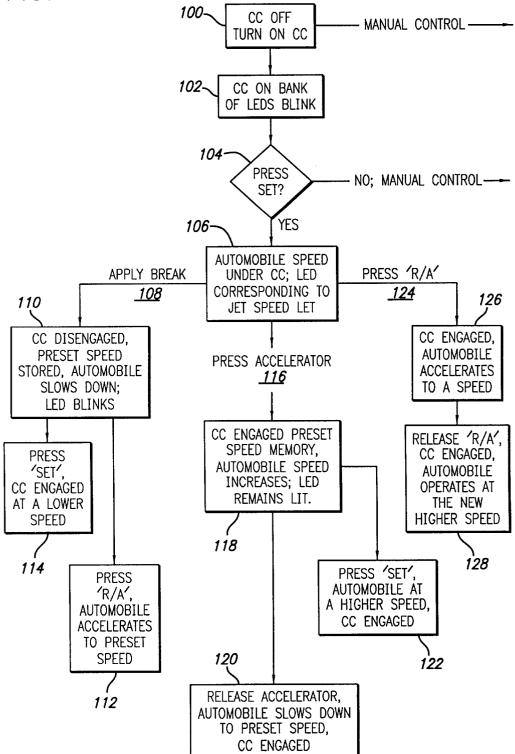




FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of transportation means that could utilize a cruise control system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the $_{40}$ operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

* * * * *

Case 1:13-cv-00086-GMS Document 1-2 Filed 01/15/13 Page 1 of 2 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS				DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC			TOYOTA MOTOR NORTH AMERICA, INC.				
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of Residence Of First Listed Defendant Los Angeles County, California				
(c) Attorneys (Firm Name, A	Address And Telephone Number)		Attorneys	s (If Known)			
Richard D. Kirk (No. Stephen Brauerman Bayard, P.A. 222 Delaware Avenu Wilmington, DE 198 (302) 655-5000	0922) (No. 4952) ue, Suite 900						
II. BASIS OF JURISDI		X" IN ONE BOX	III.CITIZ	EXENSHIP OF PRINCIPAL	PARTIES (Place An 'X' In	One Box For Plaintiff	
	ONLY)		(For Di	versity Cases Only) PTF DEF	And One Box Fe	or Defendant) PTF DEF	
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2 U.S. Government	4 Diversity		Citizen	of Another State 🗌 2 🔲	2 Incorporated <i>and</i> Princ of Business in Another		
Defendant	(Indicate Citizens in Item III)	hip of Parties		or Subject of a 3 gn Country	3 Foreign Nation		
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Proceeding		ate Court		(5)	pecify)	Litigation Magistrate Judgment	
VI. CAUSE OF ACTION				Under Which You Are Filin Statutes Unless Diversity)	g And Write Brief Statem	ient Of Cause.	
Do Not Cite Jurisdictional Statutes Unless Diversity) Action for patent infingement under 35 U.S.C. § 101, et seq. Injunctive and declaratory relief and for damages for patent infringement							
VII. REQUESTED IN COMPLAINT CHECK IF THIS IS A CLASS ACTION DEMAND \$ CHECK YES only if demanded in complaint JURY DEMAND: UNDER F.R.CP. 23 DEMAND \$ CHECK YES only if demanded in complaint JURY DEMAND:							
VIII. RELATEDCASE(S) See Addendum attached he	(See instructions) ereto.	JUDGE			DOCKET NUMBERS		
DATE		SIG	GNATURE C	F ATTORNEY OF RECORD			
JANUARY 15, 2013		/S/	STEPHEN I	B. BRAUERMAN (SB4952)			
FOR OFFICE USE ONLY							
RECEIPT #	AMOUNT	APPLYING IFP	JUI	DGE	MAG. JUDGE		

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Volkswagen Group of America, Inc.	Unassigned	Filed January 15, 2013

IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,) Plaintiff,) v.) VOLKSWAGEN GROUP OF AMERICA, INC.,) Defendant.)

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement in which Plaintiff Cruise Control Technologies LLC ("CCT") makes the following allegations against Defendant Volkswagen Group of America, Inc. ("Defendant"):

BACKGROUND

1. Professor C. Kumar N. Patel is an electrical engineer and the inventor of United States Patent No. 6,324,463 (the "463 Patent" or "Patel Patent"). In a distinguished career dedicated to engineering and technology, Professor Patel earned his doctoral degree in electrical engineering at Stanford in 1961 and has applied his inventive mind to various scientific problems, resulting in 36 U.S. Patents relating to lasers, optical sensors, and electronic control systems. He served as Vice Chancellor for Research at the University of California, Los Angeles (UCLA), is a member of the National Academy of Engineering and the National Academy of Science, and is a Fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Sciences, the American Physical Society, and the Institute of Electrical and Electronics Engineers. In 1996, Professor Patel was awarded the National Medal of Science by President Bill Clinton. He is currently a Professor of Physics and Adjunct Professor of Electrical Engineering at UCLA.

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2. In 1997, Professor Patel identified a potential problem in the available technology for implementing cruise control in vehicles, which he solved with the invention of the '463 Patent. Cruise control systems at the time included functionality for setting the speed of a vehicle for automatic speed control, but also allowed the vehicle to accelerate above the preset speed or to slow below the preset speed and later resume automatic speed control at the preset speed. In both cases, however, there is a potential safety issue when the cruise control resumes control at a preset speed that the vehicle operator may have forgotten. Professor Patel designed and developed a vehicle cruise control system that, among inventive features, provides useful, visual feedback indicative of a preset speed to vehicle operators. The technology of the Patel Patent provides, among other things, a significant safety and usability improvement, and the automotive industry has now widely adopted and implemented Professor Patel's invention.

PARTIES

3. CCT is a Delaware limited liability company.

4. On information and belief, Defendant is a New Jersey corporation with its principal office at 2200 Ferdinand Porsche Drive, Herndon, Virginia 20171. Defendant has appointed Corporation Service Company, 2711 Centerville Road, Suite 400, Wilmington, Delaware 19808 as its agent for service of process.

JURISDICTION AND VENUE

5. This action arises under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*, including § 271. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. This Court has personal jurisdiction over Defendant because, among other reasons, Defendant has done business in this District, has committed and continues to commit

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acts of patent infringement in this District, and has harmed and continues to harm CCT in this District, by, among other things, using, selling, offering for sale, importing infringing products and/or services in this District.

7. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b) because, among other reasons, Defendant is subject to personal jurisdiction in this District, has committed and continues to commit acts of patent infringement in this District. On information and belief, for example, Defendant has used, sold, offered for sale, and imported infringing products and/or services in this District.

<u>COUNT I</u> INFRINGEMENT OF U.S. PATENT NO. 6,324,463

8. CCT is the owner by assignment of the Patel Patent, entitled "Cruise Control Indicator." The application for the Patel Patent was filed on May 12, 1999. The patent issued on November 27, 2001. A true and correct copy of the Patel Patent is attached as Exhibit A.

9. Defendant has been and now is directly infringing the Patel Patent, in this judicial District and elsewhere in the United States, by, among other things, making, using, importing, offering for sale, and/or selling vehicular cruise control products and/or services that include a cruise control system for a vehicle having a human operator, which includes a speed controller that automatically maintains the vehicle's speed at a preset speed; a switch associated with the speed controller which allows the vehicle operator to enable the system; a set speed input in communication with the speed controller for manually setting the speed of the vehicle at the preset speed; and a feedback system which communicates the stored preset speed information to the operator of the vehicle. The infringing products and services include, for example, Defendant's Volkswagen Beetle, and various versions thereof.

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10. By engaging in the conduct described herein, Defendant has injured CCT and is thus liable for infringement of the Patel Patent pursuant to 35 U.S.C. § 271.

11. Defendant has committed these acts of infringement without license or authorization.

12. To the extent that facts learned in discovery show that Defendant's infringement of the Patel Patent is or has been willful, CCT reserves the right to request such a finding at the time of trial.

13. As a result of Defendant's infringement of the Patel Patent, CCT has suffered monetary damages and is entitled to a money judgment in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court, and CCT will continue to suffer damages in the future unless Defendant's infringing activities are enjoined by this Court.

14. CCT has also suffered and will continue to suffer severe and irreparable harm unless this Court issues a permanent injunction prohibiting Defendant, its agents, servants, employees, representatives, and all others acting in active concert therewith from infringing the Patel Patent.

PRAYER FOR RELIEF

CCT respectfully requests that this Court enter:

- A. A judgment in favor of CCT that Defendant has infringed, directly and/or indirectly, the Patel Patent;
- B. A permanent injunction enjoining Defendant and its officers, directors, agents, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all

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others acting in active concert therewith from infringement of the Patel Patent, or such other equitable relief the Court determines is warranted;

- C. A judgment and order requiring Defendant to pay CCT its damages, costs, expenses, and prejudgment and post-judgment interest for Defendant's infringement of the Patel Patent as provided under 35 U.S.C. § 284;
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to CCT its reasonable attorneys' fees against Defendant;
- E. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to CCT, including without limitation, pre-judgment and post-judgment interest; and
- F. Any and all other relief to which CCT may be entitled.

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DEMAND FOR JURY TRIAL

CCT, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of

any issues so triable by right.

Dated: January 15, 2013

Of Counsel:

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/s/ Richard D. Kirk

Richard D. Kirk (#0922) Stephen B. Brauerman (#4952) Vanessa R. Tiradentes (#5398) 222 Delaware Avenue, Suite 900 P.O. Box 25130 Wilmington, DE 19899 (302) 655-5000 rkirk@bayardlaw.com sbrauerman@bayardlaw.com

Attorneys for Plaintiff Cruise Control Technologies LLC

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Exhibit A

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(12) United States Patent Patel

(54) CRUISE CONTROL INDICATOR

- (76) Inventor: C. Kumar N. Patel, 1171 Roberts La., Los Angeles, CA (US) 90077
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: 09/310,527
- (22) Filed: May 12, 1999

Related U.S. Application Data

- (60) Provisional application No. 60/085,183, filed on May 12, 1998.
- (51) Int. Cl.⁷ G06F 7/00; B60K 31/00
- (52) U.S. Cl. 701/93; 701/70; 180/170;
- 362/459; 362/489

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OTHER PUBLICATIONS

World Wide Web document: Andre, Anthony and Asaf Degani, "Do You Know What Mode You're In? An Analysis of Mode Error In Everyday Things," Interface Analysis

(10) Patent No.: US 6,324,463 B1 (45) Date of Patent: Nov. 27, 2001

Associates, San Jose, CA, San Jose State University, CA, posted at least as early as Jul. 30, 1996.

* cited by examiner

Primary Examiner-William A. Cuchlinski, Jr.

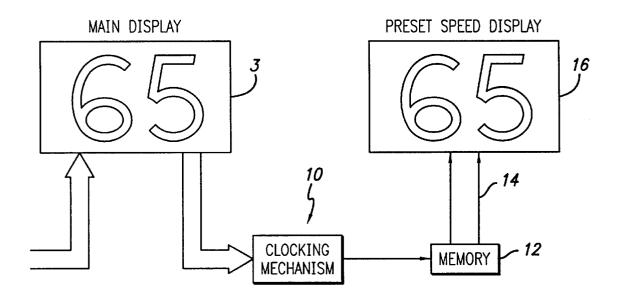
Assistant Examiner—Yonel Beaulieu

(74) Attorney, Agent, or Firm-Sidley Austin Brown & Wood

(57) **ABSTRACT**

A system for indicating the operational status and parameters of a cruise control system for use in a human operated vehicle. The system includes apparatus for storing and recalling a preset speed for the cruise control system. The system further includes apparatus for indicating this preset speed to the operator, along with apparatus configured to indicate to the user whether or not the cruise control system is engaged. One embodiment is a system for use with vehicles with digital speedometers. In this embodiment, the system includes digital memory for storing the preset speed, and a digital display configured to show the preset speed and the operational status of the cruise control system. Another embodiment is for use with vehicles having analog speedometers. The analog system includes an array of LEDs and detectors arranged around a speed indicating dial and under the speedometer needle. The LEDs and detectors are arranged so that a preset speed may be stored into the system by detection of light reflected from one of the LEDs off a reflective surface on the back side of the needle, and onto one of the detectors. The LEDs of the analog system are further configured to indicate the preset speed and the operational status of the system.

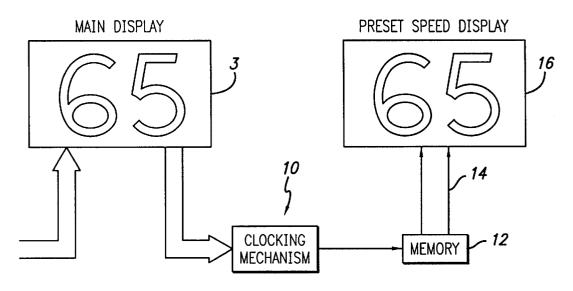
36 Claims, 3 Drawing Sheets

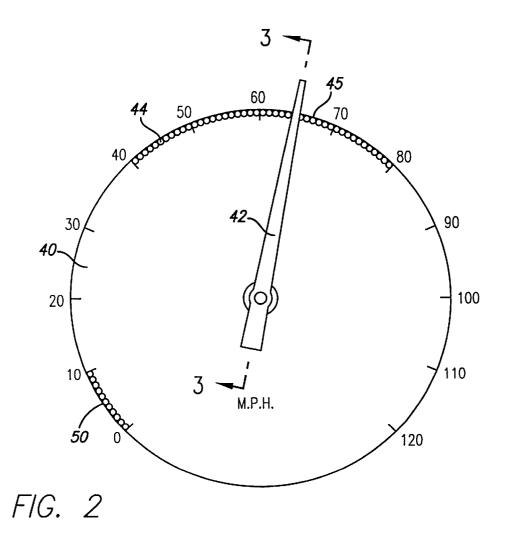


U.S. Patent

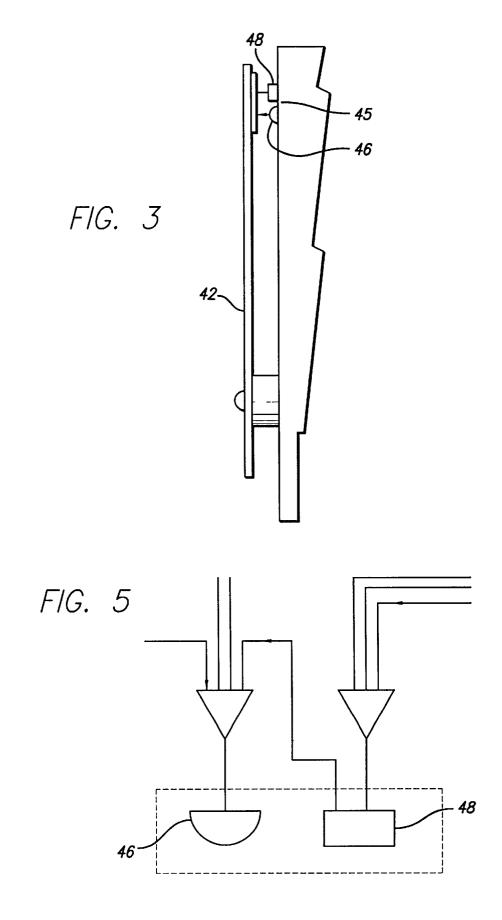
Sheet 1 of 3

FIG. 1





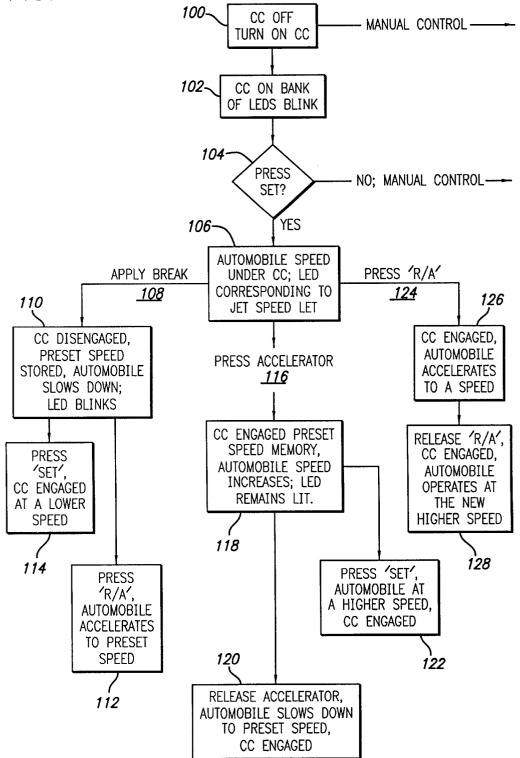






Sheet 3 of 3

FIG. 4



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CRUISE CONTROL INDICATOR

This application claims the benefit of U.S. Provisional Application No. 60/085,183, filed on May 12, 1998.

FIELD OF THE INVENTION

This invention relates to cruise control systems and more particularly to automotive cruise control systems which display preset speed information.

BACKGROUND OF THE INVENTION

The cruise control accessory found in many automobiles today can be characterized as a human-machine system. That is, while the cruise control feature offers the operator of a vehicle the benefit of speed control (machine) automation, it also requires significant human interface for its proper and safe operation. In particular, conventional cruise control systems require the operator to (1) turn on the cruise control system (by depressing or rocking a button on the steering wheel or dashboard), (2) achieve the desired cruising speed (by controlling the deflection of the accelerator), and then (3) engage, or set, the cruise control (by pressing another button typically located on the steering wheel or cruise control stalk shift).

Further, the conventional cruise control system is provided with a memory function that stores the set control speed. Thus, applying the brakes to temporarily slow down temporarily disengages the cruise control function. However, re-engaging the cruise control by depressing the $_{30}$ "resume" button returns the automobile to the preset, memorized speed. Similarly, temporarily accelerating while the cruise control is engaged, as is done, for example, when passing other vehicles, does not disengage the system. Rather, when the accelerator is released, the automobile slows down until it returns to its set cruising speed and continues at that speed. In fact, the preset, memorized speed is typically canceled only if the cruise control system is turned off (by either depressing the system button or turning memory.

Thus, the conventional cruise control system can be characterized as existing in any one of five modes. Those modes are: (1) cruise control system off-the car's speed is controlled manually; (2) system on, but not engaged-the 45 control conditions. car's speed is still controlled manually; (3) system on and engaged at a set speed-the car's speed is automatically controlled at the memorized speed; (4) system on and engaged at a set speed but the accelerator is depressed thus increasing the speed of the car-the car's speed is no longer 50 controlled automatically. However, the moment the speed of the vehicle drops to the set speed due to the operator releasing the accelerator, the system jumps back to mode 3; and (5) system on and engaged but the brakes are depressed-the car's speed is no longer controlled automati- 55 until a new set speed is input or the system is disabled. cally but the set speed is still stored in memory and will re-engage to automatic mode 3 upon depressing the "resume" button. It is also apparent that the system is dynamic in that it can jump from mode to mode based on human or machine intervention.

The operator may know which mode the automobile is in at any given moment, but this may not always be the case. While most systems provide visual feedback indicating whether the cruise control system is enabled (identifying if it is in mode 1), typically via a light located within the cruise 65 control button or on the dashboard, this information is of some but minimal value to the operator. They do not,

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however, inform the operator which mode the automobile is in when the system is enabled (i.e. mode 2, 3, 4, or 5). While no feedback is obviously needed to identify when the system is in mode 3 because the cruise control is automatically controlling the speed, conventional systems do not inform the operator whether they are in fully manual mode 2 or in one of the temporarily manual modes 4 or 5. The operator must rely on his or her memory to know whether the speed at which the vehicle is traveling is only a temporary override of the automatic speed control to be resumed upon releasing the accelerator or depressing the resume button, as the case may be, or is a function of being in fully manual mode 2.

Lacking this knowledge poses potential safety hazards. This can be illustrated by way of several examples. Example 1: The operator was on fully automatic cruise (mode 3) at 60 miles per hour (mph), but then accelerated to 75 mph (mode 4) and kept his/her foot on the accelerator to maintain this speed for several miles. Then, the operator had a need to gradually slow the vehicle down to below 60 mph, say 40 mph, because of a new driving condition, such as heavy traffic, reduced speed limit or exiting the highway. However, by this time, the operator forgot that cruise control was still set for 60 mph, and merely released the accelerator, expecting the vehicle to continue to slow down to 40 mph. This, course, did not happen. The operator's momentary lack of speed control could lead to an accident. Example 2: The operator was in fully automatic cruise control mode (mode 3) but had to step on the brakes to temporarily slow down, thereby disengaging the cruise control (mode 5). Some time elapsed and the operator forgot the preset speed before pressing the resume button. The acceleration to the preset speed may come as a surprise and lead to another hazardous situation.

In sum, there is a definite safety driven need to provide useful, visual feedback to operators of automobiles with 35 cruise control of the preset speeds at which they are set.

SUMMARY OF THE INVENTION

The present invention addresses this need by providing the operator of a vehicle with information about the preset off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accomplished by equipping the vehicle with a visual feedback system that continuously provides the preset speed memorized by the cruise control system. This invention will tend to enhance the safe operation of a vehicle under cruise

> In particular, a cruise control system for a vehicle is provided with a speed controller that automatically maintains the vehicle speed at a desired preset speed, an enable switch that enables the system, a set speed input in communication with the controller to manually set the speed of the vehicle to that at which it is traveling at the moment of input, a memory for temporarily storing the speed of the vehicle at the set speed, and a feedback system for displaying the set speed information to the operator of the vehicle

> In one more detailed aspect of the invention, the feedback system of a vehicle designed with a digital speed display, or speedometer, is a second digital display that provides the preset cruise control speed, when the cruise control is enabled and active. In another more detailed embodiment, the feedback system of a vehicle having an analog speedometer includes a plurality of light emitting diodes (LED's) located at various speed intervals on the speedometer dial. The LED corresponding to the speed at which the vehicle was traveling when the cruise control system was set illuminates and remains lit (or blinks) for the benefit of the operator.

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Other features and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is schematic of a digital speed display of one embodiment of the present invention;

FIG. 2 is a plan view of another embodiment of the present invention, wherein an analog speedometer incorporating a bank of LED detector assemblies is shown;

FIG. 3 is a partial side view of the analog speedometer taken along line 3-3 of FIG. 2, wherein an LED detector 15 assembly and speedometer needle are further illustrated;

FIG. 4 is a flow chart detailing the various operations of the analog cruise control feedback system shown in FIG. 2; and

FIG. 5 is a schematic of the LED detector assembly 20 shown in FIGS. 2 and 3.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention summarized above and defined by the enumerated claims may be better understood by referring to the following detailed description, which should be read in conjunction with the accompanying drawings. This detailed description of a particular preferred embodiment, set out 30 below to enable one to build and use one particular implementation of the invention, is not intended to limit the enumerated claims, but to serve as a particular example thereof. The particular example set out below is one preferred specific implementation of an improved cruise control 35 system for an automobile, namely, one that provides continuous visual feedback of the preset speed of the system for the convenience of the operator and for improved safety. The invention, however, may also be applied to other types of transportation means that could utilize a cruise control system.

Automobiles currently provide one of two types of speed displays, namely, the analog display, typically in the form of the traditional speedometer, and the digital display. Accordingly, as detailed below, the present invention pro- 45 vides cruise control speed-indicating solutions for both types of displays. The digital display embodiment is described first

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 50 coded decimal (BCD). As shown in the schematic of FIG. 1, a main speed display 3 displays in digital format the current speed at which the vehicle is operating. A clocking mechanism 10, such as an array of logic gates, is provided to write the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only vehicle is traveling when the set button is pressed, that is, when the cruise control is engaged, into a digital memory 12, such as a DRAM. Output lines 14 from the memory 12 activate a second smaller and distinctive digital display 16 indicating the preset speed. In the preferred embodiment, the 60 present speed remains continuously lit on the second display 16 from the moment the cruise control is engaged until it is either overridden or shut off. When the cruise control is disengaged by stepping on the brake, for example, to temporarily slow down the vehicle to accommodate a heavy 65 traffic load or a reduced highway speed, the preset display retains the present speed information and blinks at fixed

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intervals, say, twice per second. This gives the operator a clear indication of the speed to which the vehicle will return when the command to resume speed is applied.

When the cruise control system is first activated, the preset display 16 will blink the number zero indicating an "unset" state of cruise control. Further, if in the engaged state, the operator steps on the accelerator to momentarily (or longer) increase vehicular speed (for passing another vehicle or any other reason), the cruise control will remain 10 engaged as is true of all systems today. However, the operator will always have a clear indication of the speed to which the vehicle will return upon removing the foot from the accelerator, obviating the need to rely on the memory of the operator to know the cruise control speed.

Referring now to automobiles with analog speed displays, since digitized speed information is not typically available for easy storage, as was described above, a very different approach is used to achieve the same results as in the digital embodiment. As shown in FIG. 2, the preset speed information is displayed right on the analog speed dial, or speedometer 40, itself. In particular, the analog dial 40 which has speed markings thereon, is also provided with a bank 44 of individual light emitting diode (LED) assemblies 45 embedded at the periphery of the dial at every 1 mile per hour (mph) interval. It is understood that other intervals may be used if desired. The bank 44 extends for a portion of the dial corresponding to an expected potential range of cruising speeds, such as from 40 mph to 80 or 90 mph. Referring momentarily to FIG. 3, each LED assembly 45 is comprised of an LED 46 and a detector 48. These assemblies 45, assembled individually or as an entire bank 44, can be easily fabricated on a few semiconductor chips.

The operation of the analog embodiment of the present invention is now illustrated with reference to the flow chart shown in FIG. 4, in conjunction with FIGS. 2, 3 and 5.

When the operator starts the vehicle and commences driving, the cruise control (indicated as "CC" in FIG. 4) is off and the automobile is under manual control. When the $_{40}$ operator turns on the cruise control in step 100, all of the detectors 48 are off, and the display of the entire bank of LEDs 44 simultaneously blink once (or a small number of present times) to inform the operator that the cruise control is now enabled, step 102. Further, the LED 50, corresponding to the 0 mph mark, remains lit to indicate the cruise control status (i.e. "system on"). At this point, the driver can either continue to operate the automobile under manual control or press the "set speed" button when the desired automobile speed is reached. Pressing the "set speed" button, step 104, activates all of the detectors and all of the LED's momentarily light up. Referring again to FIGS. 2 and 3, the back side of the speed indicator needle 42 is partially reflective for the portion of the needle that sweeps over the bank of LED assemblies 44. Thus, the momentary activation that detector 48 over which the partially reflecting needle 42 is located, and only this detector is activated. As shown in FIG. 5, the electrical signal from this detector is then used to activate the corresponding LED which remains lit as long as the cruise control is engaged, step 106. The electronic circuitry needed to maintain the LED lit after the momentary firing of LED and activation of the corresponding detector by a pulse of light is well understood in the art. The vehicle is now operating at a speed controlled by the cruise control.

At this point, there are at least three scenarios that obtain. The first is that the operator steps on the brake, step 108. When the operator steps on the brake for temporary reduc-

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tion of the vehicular speed on the highway, the cruise control disengages, step 110, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial 40. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 10 operator presses the "Resume/Accelerate (R/A)" button, step 112, he or she knows the speed to which the vehicle will return. At this point, of course, cruise control is engaged, the LED is steadily lit, and the automobile accelerates to the preset speed.

Alternatively, as shown in step 114, the operator may choose to continue to travel at the new (and now slower) speed. In this case, he or she may press the SET button to re-engage the cruise control. All of the LED's will blink momentarily, all the detectors will be turned on, and only the 20detector under the new position of the speedometer needle having received the reflected light will be activated. The LED corresponding to the new cruising speed will now remain lit as described earlier.

The second scenario entails the operator stepping on the ²⁵ accelerator, step 116, to increase the vehicular speed in order to pass another vehicle (or any other reason). As shown in step 118, the LED remains lit continuously to indicate the speed to which the vehicle will return once the operator 30 takes her/his foot off the accelerator, as in step 120. For the operator to be able to see the set speed when cruise control is engaged and when the vehicle is moving at the preset speed, this embodiment includes a speedometer indicator needle which is semitransparent over the region where the 35 bank of LED assemblies 44 are located. Thus, the operator can see the continuously lit LED and know that the cruise control is engaged.

Alternatively, as shown in step 122, if desired, the operator can select a new, higher cruising speed by pressing the "set speed" button. In this case, the earlier sequence will repeat, a new LED will be lit, and the automobile speed will be set at a higher speed.

Finally, the third scenario envisions the operator depressing the "Reset/Accelerate" or "R/A" button in step 124 to 45 accelerate the vehicle via the cruise control system, step 126. Following the earlier sequences, the new speed will be set to that which the vehicle was traveling when the "R/A" button was released. This will sequence all of the LED's to blink, all detectors to be activated, and then the LED under the $_{50}$ needle to stay lit to indicate the new higher cruising speed, as shown in step 128.

As shown, deployment of the present invention in all vehicles equipped with cruise control will tend to contribute significantly towards safer driving.

Having thus described the basic principles and exemplary embodiments of the invention, it will be apparent that further variations, alterations, modifications, and improvements will also occur to those skilled in the art. For example, it is understood that a vehicle equipped with an analog speed- 60 ometer may be designed with a digital preset speed indicator. Further, it will be apparent that the present invention is not limited to use in automobiles. It is applicable to any operator-controlled vehicle that may use a human-machine, mobile cruise control system, such as motorcycles, trolleys, 65 water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned

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above, are nonetheless intended and implied to be within the spirit and scope of the invention. Accordingly, the foregoing discussion is intended to be illustrative only; the invention is limited and defined only by the various following claims and equivalents thereto.

What is claimed is:

1. A cruise control system for vehicle having a human operator, comprising:

- a speed controller that automatically maintains the vehicle speed at a preset speed;
- an enable switch associated with said controller for enabling the system;
- a set speed input in communication with said controller for manually setting the speed of the vehicle at said preset speed, thereby engaging the system;
- a memory which stores information indicative of said preset speed; and
- a feedback system for communicating said information in said memory to the operator of the vehicle.

2. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) a memory that stores information representative of the selected cruising speed; and
- (e) a feedback system that substantially continuously communicates the selected cruising speed information to the operator of the vehicle until either the operator selects a subsequent cruising speed or the controller is disabled.

3. The cruise control system of claim 2, wherein the 40 feedback system includes a digital display.

4. The cruise control system of claim 3, wherein the digital display displays a predetermined signal when the controller is initially enabled to indicate the state of the controller.

5. The cruise control system of claim 3, wherein the digital display displays information indicative of the selected cruising speed of the vehicle.

6. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant cruising speed selected by the operator;
- (b) a cruise control enable switch associated with the controller for enabling and disabling the controller;
- (c) a operator-controlled, set speed input in communication with the controller for selecting the cruising speed of the vehicle when the controller is enabled;
- (d) an analog speedometer having a speed dial with speed markers and a rotating speed indicating needle on the dial; and
- (e) a feedback system that detects the position of the speed indicating needle when the cruising speed of the vehicle is selected and that substantially continuously communicates the position of the needle corresponding to that cruising speed until either the operator selects a new cruising speed or the controller is disabled.

7. The cruise control system of claim 6, wherein the feedback system further comprises a bank of light emitting diodes arranged along a portion of the speed dial, each diode positioned to correspond to a given speed indication on the dial, and wherein one of the diodes in the bank emits light 5 corresponding to the selected cruising speed.

8. The cruise control system of claim 7, wherein the feedback system further includes one light emitting diode detector arranged adjacent to each diode in the bank of light emitting diodes, and a light reflective surface on a portion of 10 the side of the speed indicating needle that faces the bank of diodes and that sweeps over the bank of diodes.

9. The cruise control system of claim **8**, wherein said feedback system determines the relative position of the speed indicating needle when the cruising speed is selected 15 by detecting reflections from one of the light emitting diodes off the reflective surface of the needle received by an adjacent light emitting diode detector.

10. The cruise control system of claim **8** wherein the bank of light emiting diodes is activated when the enable switch 20 is initially enabled.

11. The cruise control system of claim 9 wherein the feedback system activates one of the light emitting diodes closest to the needle when said enable switch is enabled.

12. A method for visually communicating to the human 25 operator of a vehicle having a cruise control system a cruising speed at which the vehicle is set, comprising:

- determining the speed at which the vehicle is traveling; activating the cruise control system at a desired cruising speed;
- displaying a symbol indicative of the speed at which the cruise control system is activated;
- maintaining the activated cruise control speed symbol upon temporary acceleration or deceleration of the vehicle;
- removing said symbol when the cruise control system is deactivated or a new cruising speed is selected.

13. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for $_{40}$ which the cruise control system is set, the method comprising:

- setting the preset speed;
- displaying to the operator a symbol indicative of the preset speed; 45
- maintaining the display of the symbol indicative of the preset speed; and
- discontinuing display of the symbol indicative of the preset when the cruise control system is deactivated or a new preset speed is selected.
- 14. The method of claim 13, further comprising:
- displaying a second symbol upon the selection of a new preset speed, said second symbol indicative of the new preset speed.

15. The method of claim 13, further comprising:

- before setting the preset speed, activating the cruise control system; and
- after activating the cruise control system, but before setting the preset speed, indicating to the operator the unset status of the preset speed.

16. The method of claim 15,

wherein indicating the unset status of the preset speed includes displaying a visual symbol to the operator.

17. The method of claim 16,

wherein the visual symbol indicating the unset status of the preset speed comprises a blinking "0". 8

18. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed while maintaining the vehicle speed at substantially the preset speed;
- maintaining the display of the symbol indicative of the preset speed;

braking the vehicle;

- upon braking the vehicle, discontinuing maintaining the vehicle speed at substantially the preset speed while keeping data corresponding to the preset speed in a memory device; and
- at a time after braking and during which time the vehicle is not being maintained at substantially the preset speed, displaying to the operator a symbol indicative of the preset speed.

19. The method of claim 18, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed, is distinguishable by the operator from the symbol indicative of the preset speed while the vehicle is being maintained at substantially the preset speed.

20. The method of claim **19**, wherein the symbol indicative of the preset speed displayed at the time after braking and during which time the vehicle is not being maintained at substantially the preset speed is in the form of a blinking numerical indicator.

21. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method compris-35 ing:

engaging the cruise control system;

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- maintaining the display of the symbol indicative of the preset speed;
- discontinuing display of the symbol indicative of the preset speed after the cruise control system is deactivated or a new preset speed is selected; and
- after the cruise control system is deactivated, displaying a symbol indicative of an unset state of the preset speed.

22. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a "0".

23. The method of claim 21, wherein the symbol indicative of the unset state of the preset speed is a blinking numerical indicator.

24. The method of claim **22**, wherein the "0" is a blinking "0".

25. A method for indicating to a human operator of a vehicle having a cruise control system a preset speed for which the cruise control system is set, the method comprising:

setting the preset speed;

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- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed; and
- maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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26. A cruise control system for a variable speed vehicle controlled by a human operator, comprising:

- a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- a set speed input in communication with the controller for selecting the preset speed;
- a memory device operable to store information representative of the preset speed;
- first visual display apparatus operable to display the $_{10}$ indicative of the actual speed of the vehicle; and
- second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus 15 includes visual information indicative of the preset speed.

27. The cruise control system of claim 26, wherein the visual information displayed by the second visual display apparatus includes information reflecting whether the speed 20 controller is operating to maintain the vehicle at the cruising speed at the time the display is made.

28. The cruise control system of claim **26**, wherein the second visual display apparatus comprises a digital numerical indicator.

29. The cruise control system of claim 26,

- wherein the first visual display apparatus comprises an analog speedometer including a speed indicator operably disposed adjacent an indicator dial; and
- wherein the second visual display apparatus comprises a ³⁰ plurality of individual visual indicators, wherein each of said individual visual indicators is associated with a particular vehicle speed, and wherein each of said individual visual indicators is operable between and "on" condition and an "off" condition. ³⁵

30. The cruise control system of claim **29**, wherein the individual visual indicators include a plurality of LEDs.

31. The cruise control system of claim **29**, wherein the individual visual indicators are disposed on the indicator dial of the analog speedometer.

32. The cruise control system of claim **31**, further comprising:

at least one detector operable to detect the position of the speed indicator at a predetermined time; and

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a memory device operable to store information indicative of the position of the speed indicator at the predetermined time.

33. The cruise control system of claim **32**, further comprising:

reflective material disposed on the speed indicator and configured to reflect light emitted by at least one of the individual visual indicators onto at least one of the detectors.

34. A method for providing an operator of a vehicle equipped with a cruise control device with information reflecting the operating status of the cruise control device, comprising:

providing a cruise control device including:

- (a) a speed controller for automatically maintaining the vehicle at a substantially constant preset speed;
- (b) a set speed input in communication with the controller for selecting the preset speed;
- (c) a memory device operable to store information representative of the preset speed;
- (d) first visual display apparatus operable to display the indicative of the actual speed of the vehicle; and
- (e) second visual display apparatus operable to display the visual information indicative of an operation status of the speed controller, wherein the visual information displayable by the second visual display apparatus includes visual information indicative of the preset speed; activating the cruise control device; and
- operating the second visual display apparatus to indicate the active status of the cruise control device.
- **35**. The method of claim **34**, further comprising:
- operating the second visual display apparatus to display visual information indicative of the preset speed.
- **36**. The method of claim **35**, further comprising:
- operating the cruise control device to change the preset speed from a first preset speed to a second preset speed;
- operating the second visual display apparatus to display visual information indicative of the second preset speed.

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Case 1:13-cv-00087-GMS Document 1-2 Filed 01/15/13 Page 1 of 2 PageID #: 17 CIVIL COVER SHEET

The JS-44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I.(a) PLAINTIFFS			DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC			VOLKSWAGEN GROUP OF AMERICA, INC.			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of Residence Of First Listed Defendant New Castle County, Delaware			
(c) Attorneys (Firm Name, A	Address And Telephone Number)		Attorneys	s (If Known)		
Richard D. Kirk (No. Stephen Brauerman Bayard, P.A. 222 Delaware Avenu Wilmington, DE 198 (302) 655-5000	0922) (No. 4952) ie, Suite 900					
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CONTRACT	TOR			FORFEITURE/PENALTY		OTHER STATUTES
 110 Insurance 120 Marine 130 Miller Act 140 Negotiable Instrument 150 Recovery of Overpayment & Enforcement of Judgment 151 Medicare Act 152 Recovery of Defaulted Student Loans (Excl. Veterans) 153 Recovery of Overpayment of Veteran's Benefits 160 Stockholders' Suits 190 Other Contract 195 Contract Property Liability REAL PROPERTY 210 Land Condemnation 220 Foreclosure 230 Rent Lease & Ejectment 240 Torts to Land 245 Tort Product Liability V. ORIGIN 	PERSONAL INJURY 310 Airplane 315 Airplane Product Liability 320 Assault, Libel & Slander 330 Federal Employers' Liability 340 Marine 345 Marine Product Liability 350 Motor Vehicle 955 Motor Vehicle Product Liability 360 Other Personal Injury CIVIL RIGHTS 441 Voting 442 Employment 443 Welfare 440 Other Civil Rights	PERSONAL 362 Personal I Med. Ma 365 Personal I Product I 368 Asbestos I Injury Pr PERSONAL PI 370 Other Fra 370 Other Fra 370 Other Per Property 385 Property 700 the Sentence HABEUS CC 530 General 535 Death Per 540 Mandamu 550 Civil Righ 555 Prison Co	Injury Ipractice Injury Liability Personal oduct Liability ROPERTY ud e.ending sonal Damage Damage Liability ETITIONS o Vacate ORPUS: alty is & Other its	 610 Agriculture 620 Other Food & Drug 625 Drug Related Seizure of Property 21 USC 881 630 Liquor Laws 640 RR & Truck 650 Airline Regs 660 Occupational safety/Health 690 Other LABOR 710 Fair Labor Standards Act 720 Labor/Mgmt Relations 730 Labor/Mgmt Reporting & Disclosure Act 740 Railway Labor Act 790 Other Litigation 791 Empl Ref Inc Security Act 	422 Apad28USC158 423 Withdrawal 28 USC 157 PROPERTY RIGHTS 820 Copyrights 830 Patent 840 Trademark SOCIAL SECURITY 861 HIA (1395ff) 862 Black Lung (923) 863 DIWC/DIWW (405(g)) 864 SSID Title XVI 865 RSI (405(g) FEDERAL TAX SUITS 870 Taxes (U.S. Plaintiff or Defendant) 871 IRS Third Party 26 USC 7609	↓ 400 State Reapportionment ↓ 410 Antitrust ↓ 420 Banks and Banking ↓ 450 Commerce/ICC Rates/etc. ↓ 450 Deportation ↓ 470 Racketeer Influenced and Corrupt Organizations □ 810 Selective Service □ 850 Securities/Commodities/ Exchange □ 875 Customer Challenge 12 USC 3410 □ 891 Agricultural Acts □ 892 Economic Stabilization Act □ 893 Environmental Matters ■ 894 Energy Allocation Act □ 895 Freedom of I Information Act □ 900 Appeal of Fee Determination Under Equal Access to Justice □ 950 Constitutionality of State Statutes □ 890 Other Statutory Actions
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VIII. RELATEDCASE(S) See Addendum attached he	(See instructions) ereto.	JUDGE			DOCKET NUMBERS	
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Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Toyota Motor North America, Inc.	Unassigned	Filed January 15, 2013