## IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

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

## **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

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 Audi A4, 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.

## **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.

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## **EXHIBIT A**



# (12) United States Patent Patel

(10) Patent No.: US 6,324,463 B1

(45) **Date of Patent:** Nov. 27, 2001

#### (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,

(51) Int. Cl.<sup>7</sup> ...... G06F 7/00; B60K 31/00

(52) **U.S. Cl.** ...... **701/93**; 701/70; 180/170;

362/459; 362/489

345/30; 362/23, 482, 489, 459

#### (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 34	0/815.45

#### 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

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

\* cited by examiner

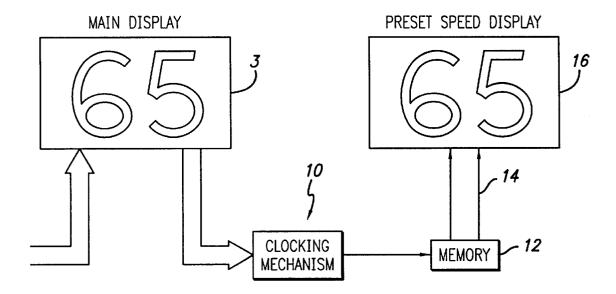
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

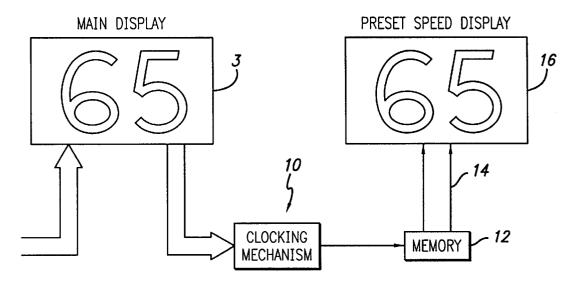


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FIG. 1



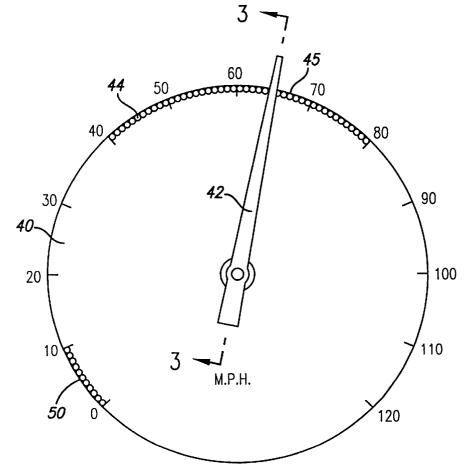
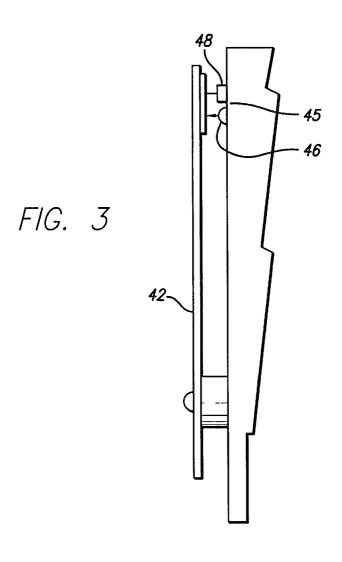
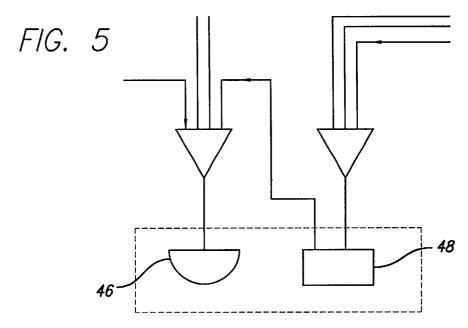


FIG. 2

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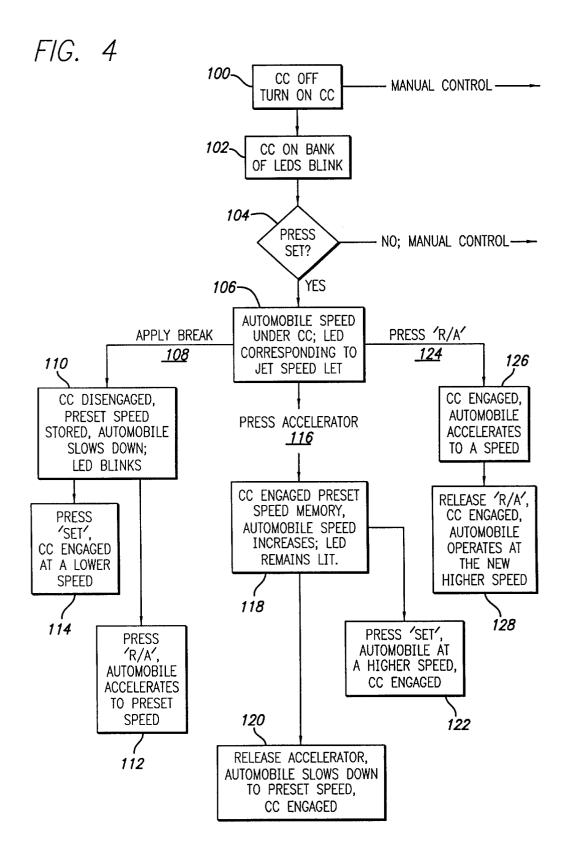




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#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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

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 5 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 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 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 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 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-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
  - 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 compris-

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; 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".

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- 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 compris
  - 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
- 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 compris-

setting the preset speed;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

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I.(a) PLAINTIFFS			DEFEN	DANTS			
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(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware		County Of	Residence Of First Listed Defenda	nt New Castle County	y, Delaware		
(c) Attorneys (Firm Name, A	Address And Telephone Numb	er)	Attorney	rs (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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## 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.

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

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 Patell 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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mfenster@raklaw.com

## **EXHIBIT A**



## (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

#### (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 34	0/815.45

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

\* cited by examiner

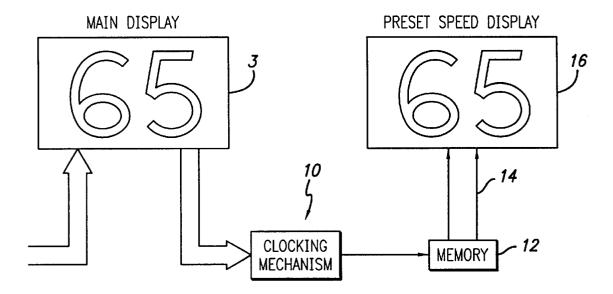
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

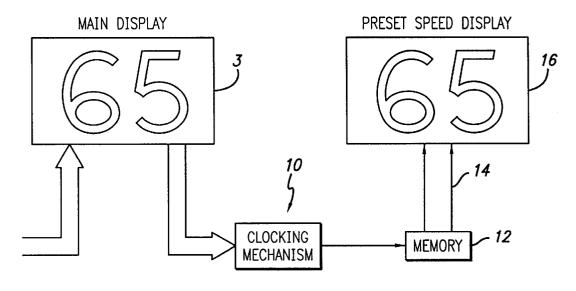


**U.S. Patent** 

Nov. 27, 2001

Sheet 1 of 3

FIG. 1



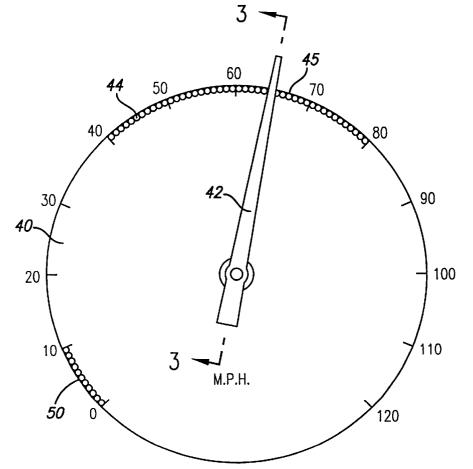
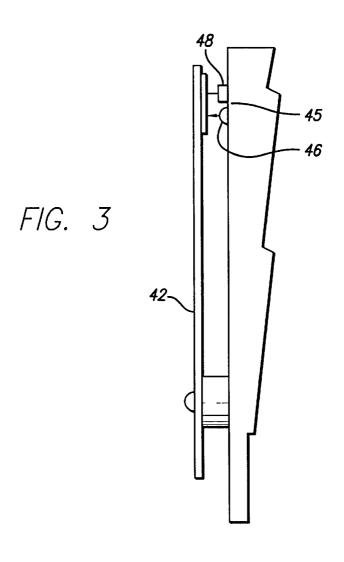
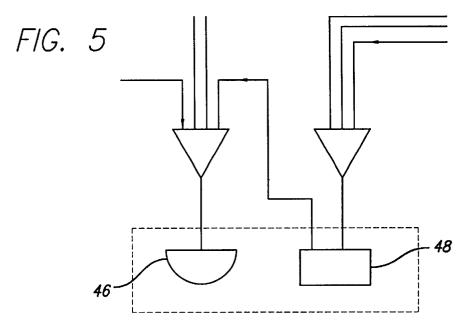


FIG. 2

**U.S. Patent** Nov. 27, 2001

Sheet 2 of 3

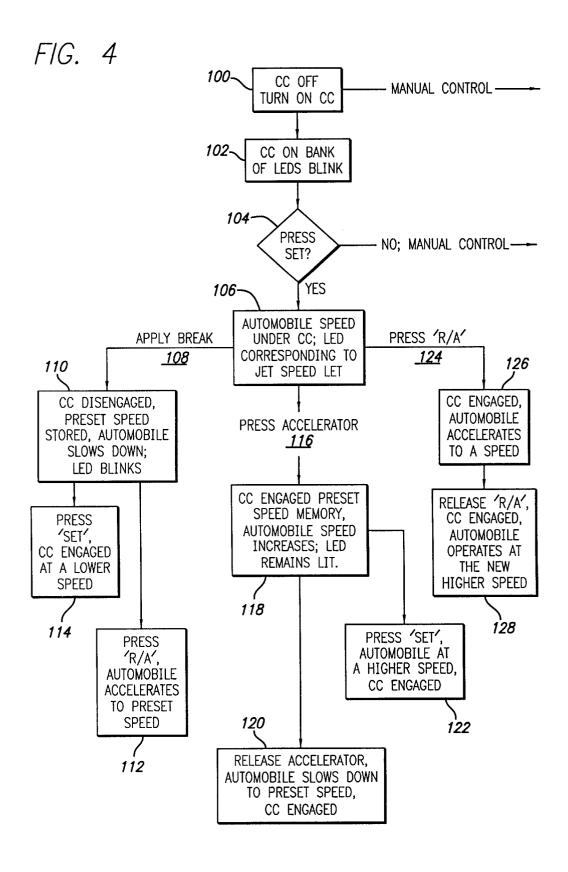




U.S. Patent

Nov. 27, 2001

Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

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

ing the cruise control system but before ing:

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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 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.
- **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.)

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(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware		County Of	Residence Of First Listed Defendation	nt New Castle County	y, Delaware	
(c) Attorneys (Firm Name, A	Address And Telephone Numb	er)	Attorney	s (If Known)		
Richard D. Kirk (No. Stephen Brauerman Bayard, P.A. 222 Delaware Avenu Wilmington, DE 198 (302) 655-5000	(No. 4952) ue, Suite 900					
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190 Other Contract	Product Liability	Product	Liability	Act 720 Labor/Mgmt Relations	862 Black Lung (923)	892 Economic Stabilization Act
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Cruise Control Technologies LLC v. General Motor Company			Unassigned Unassigned	Unassigned Filed on December 21		
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## IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

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

## **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.

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

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 Chrysler 300 vehicle, 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.

# **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

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# **EXHIBIT A**

# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (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,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

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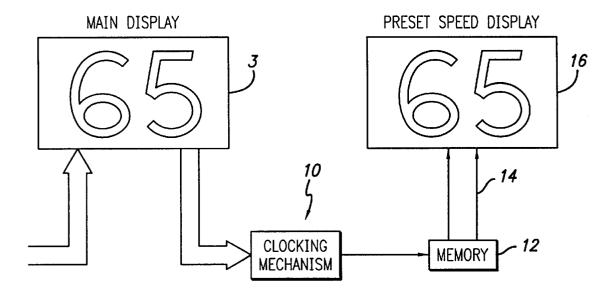
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

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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.

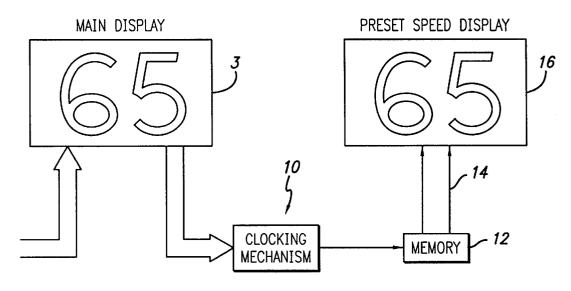
### 36 Claims, 3 Drawing Sheets



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FIG. 1



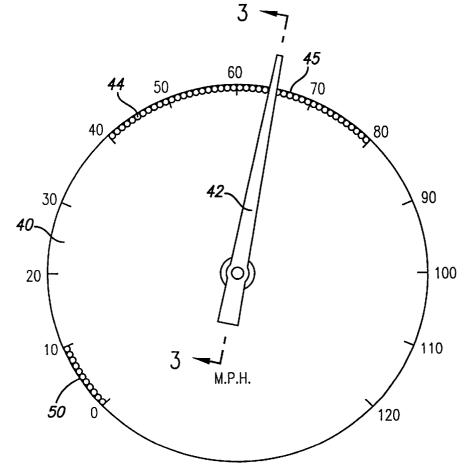
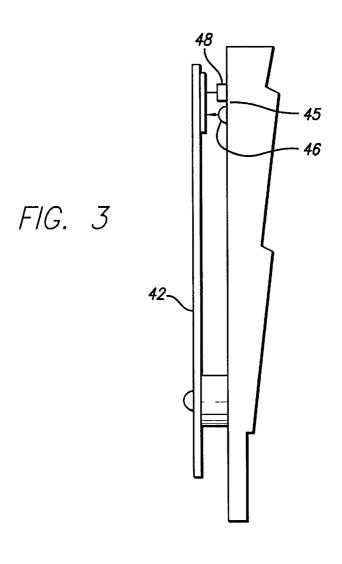
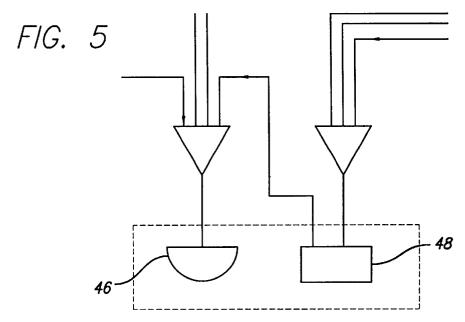


FIG. 2

**U.S. Patent** Nov. 27, 2001

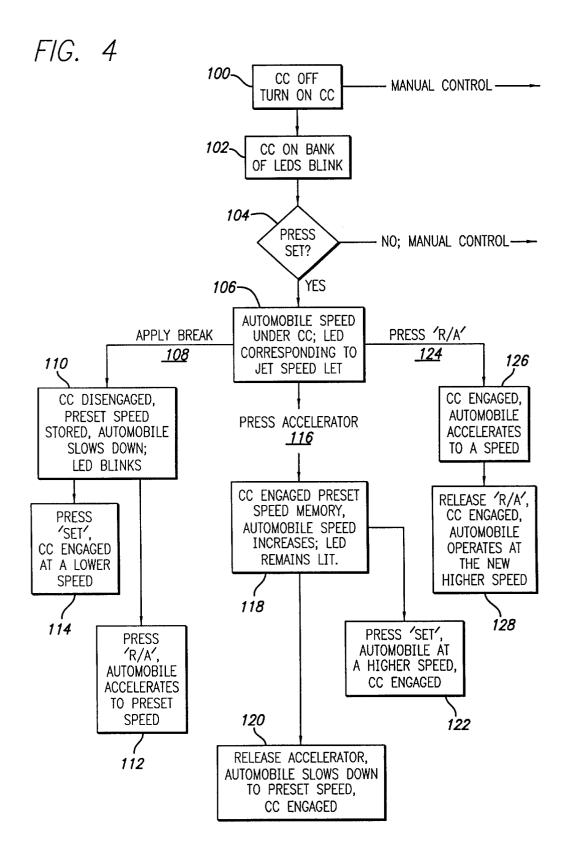
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#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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

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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

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I.(a) PLAINTIFFS			DEFENI	DANTS			
CRUISE CONTROL TECHNOLOGIES LLC				CHRYSLER GROUP LLC			
(b) County Of Residence Of Fire	st Listed Plaintiff New Castle	County, Delaware	County Of	Residence Of First Listed Defenda	nt New Castle County	y, Delaware	
(c) Attorneys (Firm Name, A	Address And Telephone Numb	er)	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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# IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

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

## **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.

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

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 Ford Explorer, 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.

# **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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#### Of Counsel:

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# **EXHIBIT A**



# (12) United States Patent Patel

(10) Patent No.: US 6,324,463 B1

(45) **Date of Patent:** Nov. 27, 2001

#### (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,

(51) Int. Cl.<sup>7</sup> ...... G06F 7/00; B60K 31/00

(52) U.S. Cl. ...... 701/93; 701/70; 180/170;

362/459; 362/489 ......701/93, 96, 70,

#### (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 34	0/815.45

#### 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

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

\* cited by examiner

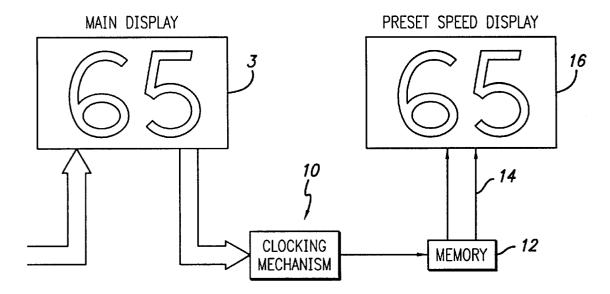
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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.

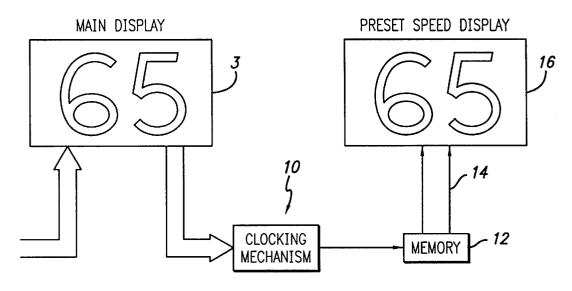
### 36 Claims, 3 Drawing Sheets



Nov. 27, 2001

Sheet 1 of 3

FIG. 1



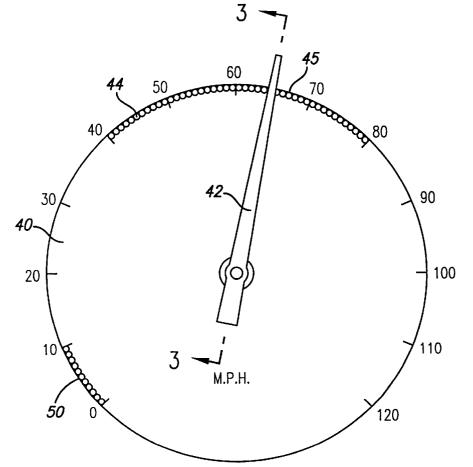
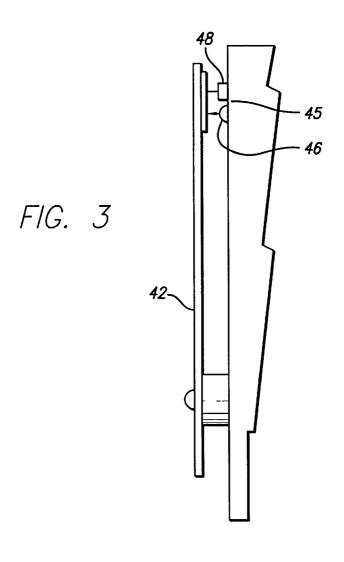
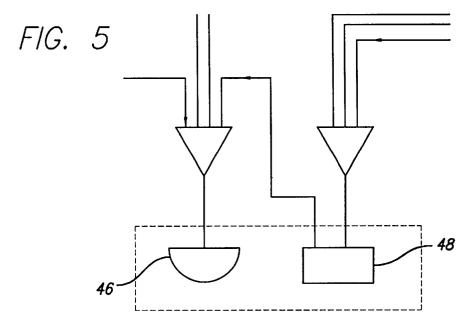


FIG. 2

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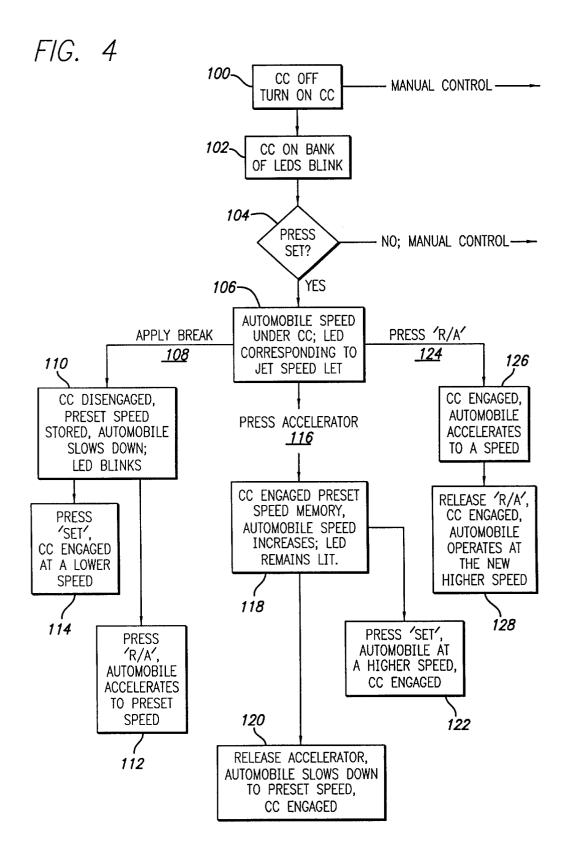
Sheet 2 of 3





Nov. 27, 2001

Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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

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 5 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 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 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 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 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-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
  - 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 compris-

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; 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".

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- 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 compris
  - 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
- 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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

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CRUISE CONTROL TECHNOLOGIES LLC				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, A	Address And Telephone Numb	er)	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							
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# IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

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

## **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.

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

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 Chevrolet Cruze, 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.

### **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**

### (12) United States Patent Patel

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(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

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Notice: Subject to any disclaimer, the term of this

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U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/310,527

(22)Filed: May 12, 1999

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(60)Provisional application No. 60/085,183, filed on May 12,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

362/459; 362/489

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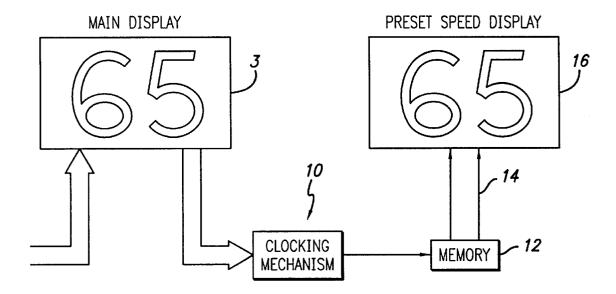
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#### (57)ABSTRACT

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.

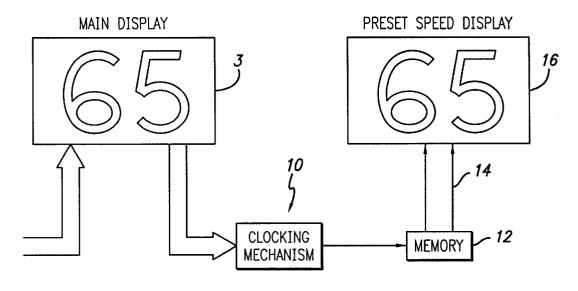
### 36 Claims, 3 Drawing Sheets



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FIG. 1



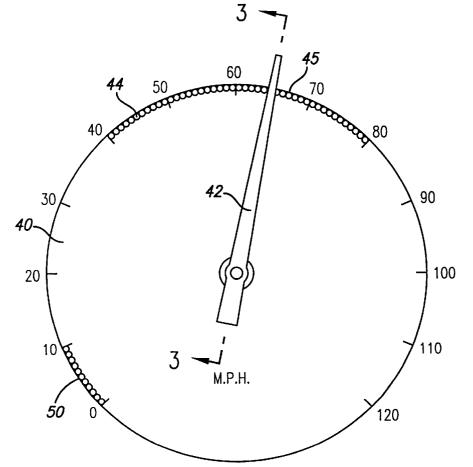
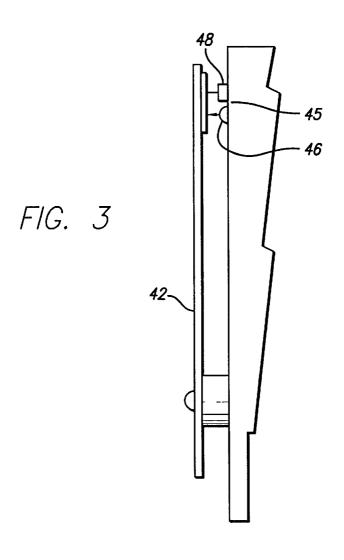
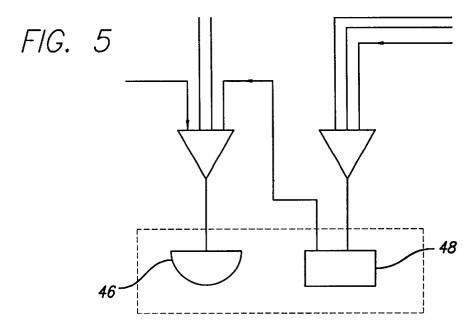


FIG. 2

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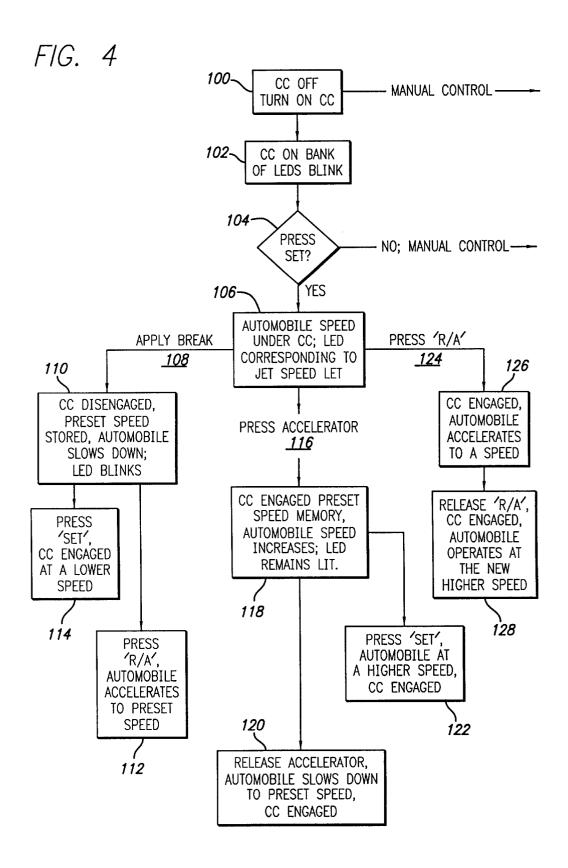
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#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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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 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

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 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

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 5 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 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 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 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 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-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.

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- 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 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;
- 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".

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- 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 comprising:

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
- 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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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;
  - 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.)

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(c) Attorneys (Firm Name, A	Address And Telephone Numb	per)	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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## 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.

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

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 Range Rover, 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 Patell 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/ Stephen B. Brauerman

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#### Of Counsel:

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mfenster@raklaw.com

## **EXHIBIT A**

### (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

(52)**U.S. Cl.** ...... **701/93**; 701/70; 180/170;

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

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 34	10/815.45

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

\* cited by examiner

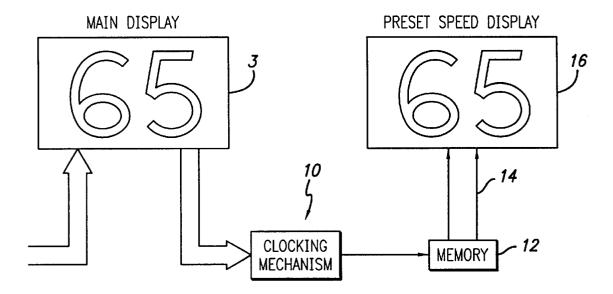
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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.

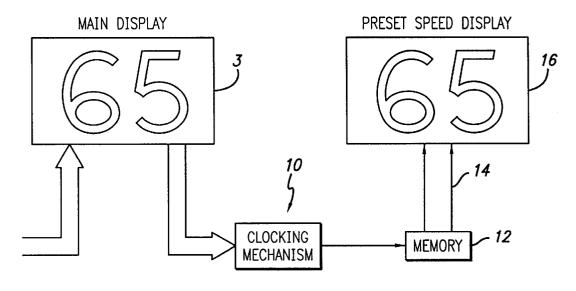
### 36 Claims, 3 Drawing Sheets



Nov. 27, 2001

Sheet 1 of 3

FIG. 1



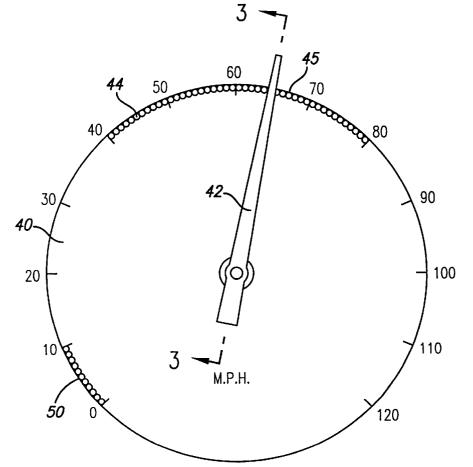
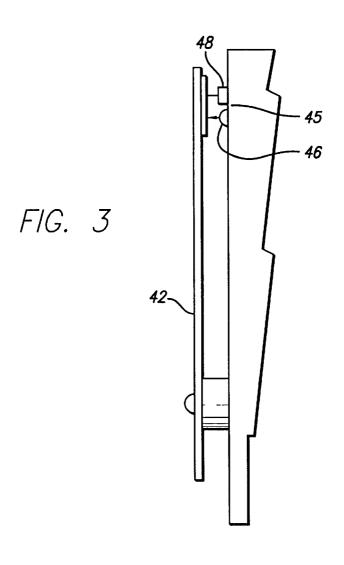
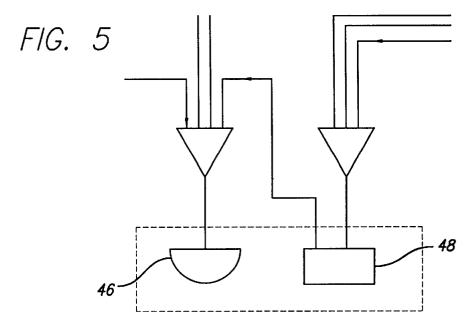


FIG. 2

**U.S. Patent** Nov. 27, 2001

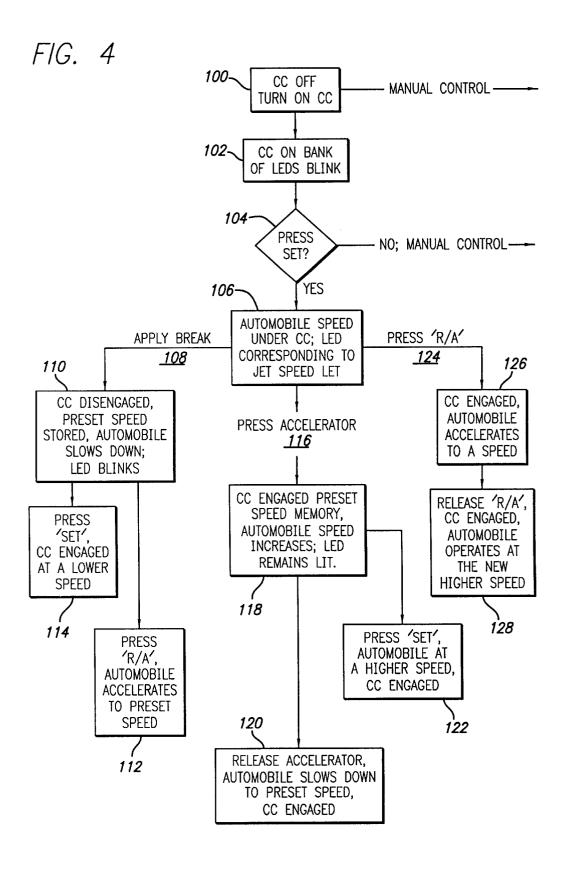
Sheet 2 of 3





Nov. 27, 2001

Sheet 3 of 3



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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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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

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-

-

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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

L(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 1	Residence Of First Listed Defend	lant 1	New Castle County	, Delaware
(6)		-	1			,	,
(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				Attorneys (If Known)			
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195 Contract Property Liability	360 Other Personal Injury	T		☐ 730 Labor/Mgmt Reporting	(405(g))	IWC/DIWW	893 Environmental Matters 894 Energy Allocation Act
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VIII. RELATEDCASE(S)	(See instruction						
Cruise Control Technologies LLC v. Audi o		,	Unassigned Unassigned			Filed on December	r 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 Filed on December	
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC			Unassigned			Filed on December	
Cruise Control Technologies LLC v. Porsche Cars North America, Inc. Cruise Control Technologies LLC v. Subaru of America, Inc.			Unassigned Unassigned			Filed on December Filed on December	
Cruise Control Technologies LLC v. Volvo	JUDGE	Unassigned Unassigned		DOCKET	Filed on December		
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## IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

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

### **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.

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

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.

### **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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agiza@raklaw.com mfenster@raklaw.com

# **EXHIBIT A**

# (12) United States Patent Patel

(10) Patent No.: US 6,324,463 B1

(45) **Date of Patent:** Nov. 27, 2001

#### (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,

(51) Int. Cl.<sup>7</sup> ...... G06F 7/00; B60K 31/00

(52) **U.S. Cl.** ...... **701/93**; 701/70; 180/170;

362/459; 362/489

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

\* cited by examiner

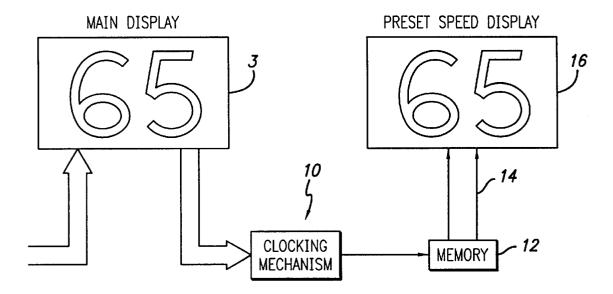
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

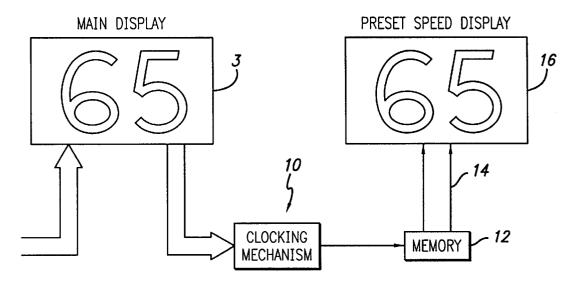


**U.S. Patent** 

Nov. 27, 2001

Sheet 1 of 3

FIG. 1



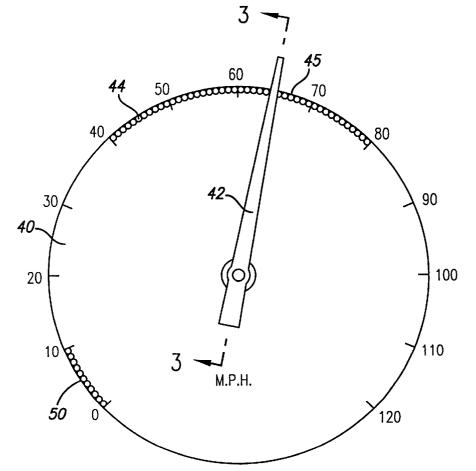
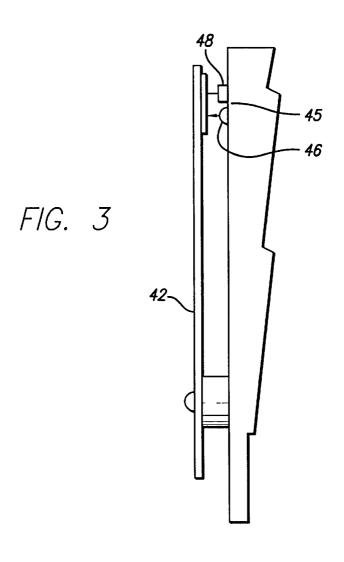
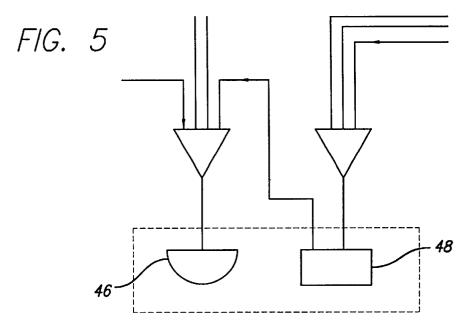


FIG. 2

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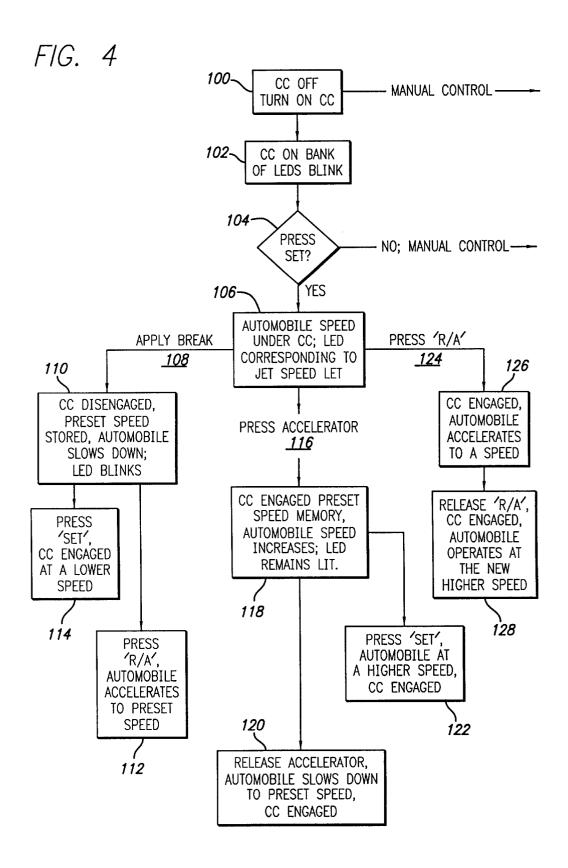




U.S. Patent

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Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- 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				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, A	Address And Telephone Numl	per)	Attorney	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							
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120 Marine	310 Airplane	362 Personal	Injury alpractice	620 Other Food & Drug	423 W	ithdrawal	410 Antitrust	
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150 Recovery of Overpayment	320 Assault, Libel &	Product 368 Asbestos		630 Liquor Laws		ERTY RIGHTS	460 Deportation	
& Enforcement of Judgment  151 Medicare Act	Slander 330 Federal Employers'	Injury Pr	roduct Liability	640 RR & Truck 650 Airline Regs	□ 820 Cc		470 Racketeer Influenced and Corrupt Organizations	
152 Recovery of Defaulted	Liability 340 Marine	PERSONAL P  370 Other Fra		660 Occupational	⊠ 830 Pa □ 840 Tr		810 Selective Service	
Student Loans (Excl. Veterans)	345 Marine Product	371 Truth in I	Lending	Safety/Health 690 Other			850 Securities/Commodities/ Exchange	
☐ 153 Recovery of Overpayment	Liability 350 Motor Vehicle	380 Other Per	rsonal Damage	LABOR	SOCIA	AL SECURITY	875 Customer Challenge	
of Veteran's Benefits  160 Stockholders' Suits	355 Motor Vehicle	☐ 385 Property	Damage	☐ 710 Fair Labor Standards	☐ 861 H	IIA (1395ff)	12 USC 3410 891 Agricultural Acts	
190 Other Contract	Product Liability  360 Other Personal Injury	Product	Liability	Act 720 Labor/Mgmt Relations		lack Lung (923) IWC/DIWW	892 Economic Stabilization Act	
195 Contract Property Liability				☐ 730 Labor/Mgmt Reporting		IWC/DIWW	893 Environmental Matters 894 Energy Allocation Act	
REAL PROPERTY  210 Land Condemnation	CIVIL RIGHTS  441 Voting	PRISONER P		& Disclosure Act  740 Railway Labor Act	864 SS	SID Title XVI	895 Freedom of I	
220 Foreclosure	441 Voting 442 Employment	Sentence	e	790 Other Labor Litigation		AL TAX SUITS	Information Act ☐ 900 Appeal of Fee Determination	
230 Rent Lease & Ejectment 240 Torts to Land	443 Housing/ Accommodations	HABEUS Co	ORPUS:	791 Empl Ref Inc Security Act		axes (U.S. Plaintiff	Under Equal Access to	
240 Torts to Land 245 Tort Product Liability	444 Welfare	535 Death Per	-	Security 1100		r Defendant)	Justice  950 Constitutionality of	
290 All Other Real Property	440 Other Civil Rights	540 Mandamu			☐ 871 IR	S Third Party	State Statutes	
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V. ORIGIN							Appeal to District	
□ 1 Original □ 2     Proceeding	Removed from 3	Remanded from State Court		Reinstated or 5 Reopened	Transferred fi another distric		Multidistrict 17 Judge from	
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VI. CAUSE OF ACTION				Under Which You Are Fill Statutes Unless Diversity)		rite Brief Statem	nent Of Cause.	
Action for patent infringement und	der 35 U.S.C. § 101, et seq.			ry relief and for damag		ent infringeme	nt	
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VII. REQUESTED IN	ACTION		DEMA	ND \$		YES only if dem E <b>MAND</b> : 🏻	nanded in complaint	
COMPLAINT	UNDER F.R.	CP. 23			JUKY DI	EMAND.	YES   NO	
VIII. RELATEDCASE(S)	(See instruction	ons)	Unassigned					
Cruise Control Technologies LLC v. Audi of Cruise Control Technologies LLC v. BMW			Unassigned			Filed on December		
Cruise Control Technologies LLC v. Chrysler Group LLC Cruise Control Technologies LLC v. Ford Motor Company			Unassigned Unassigned		Filed on December 21, 2012 Filed on December 21, 2012			
Cruise Control Technologies LLC v. General Motors Company			Unassigned			Filed on December	r 21, 2012	
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC Cruise Control Technologies LLC v. Porsche Cars North America, Inc.			Unassigned Unassigned			Filed on December Filed on December		
Cruise Control Technologies LLC v. Subaru of America, Inc.			Unassigned			Filed on December		
Cruise Control Technologies LLC v. Volvo	Cars of North America, LLC	JUDGE	Unassigned Unassigned		DOCKET NUMBERS	Filed on December		
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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

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).

- 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 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 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.

## **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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agiza@raklaw.com mfenster@raklaw.com

# **EXHIBIT A**



# (12) United States Patent Patel

(10) Patent No.: US 6,324,463 B1

(45) **Date of Patent:** Nov. 27, 2001

#### (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.<sup>7</sup> ...... 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 34	0/815.45

#### 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

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

\* cited by examiner

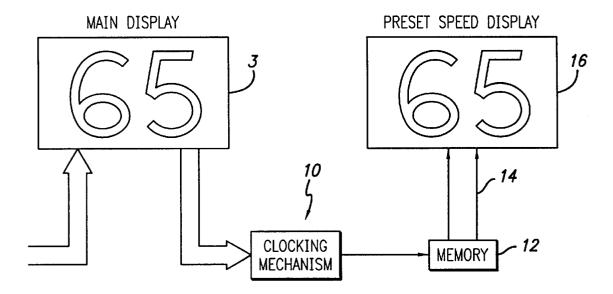
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

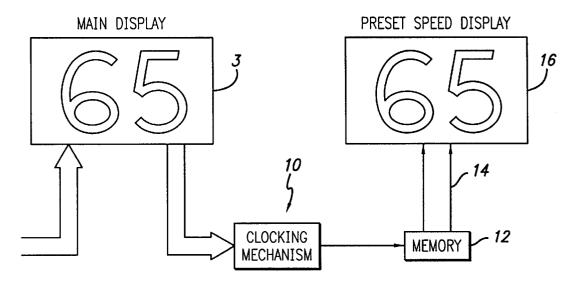


**U.S. Patent** 

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Sheet 1 of 3

FIG. 1



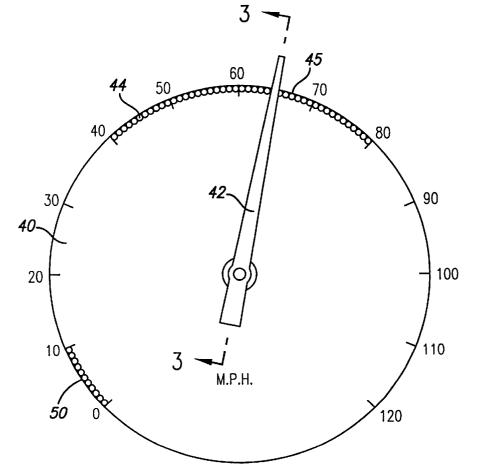
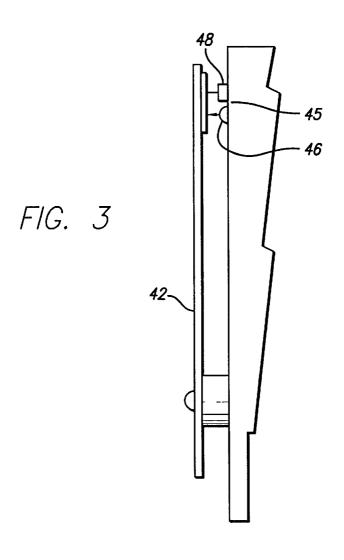
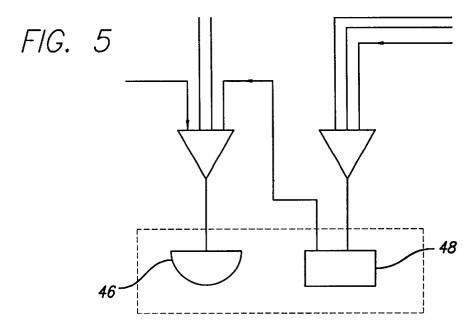


FIG. 2

**U.S. Patent** Nov. 27, 2001

Sheet 2 of 3

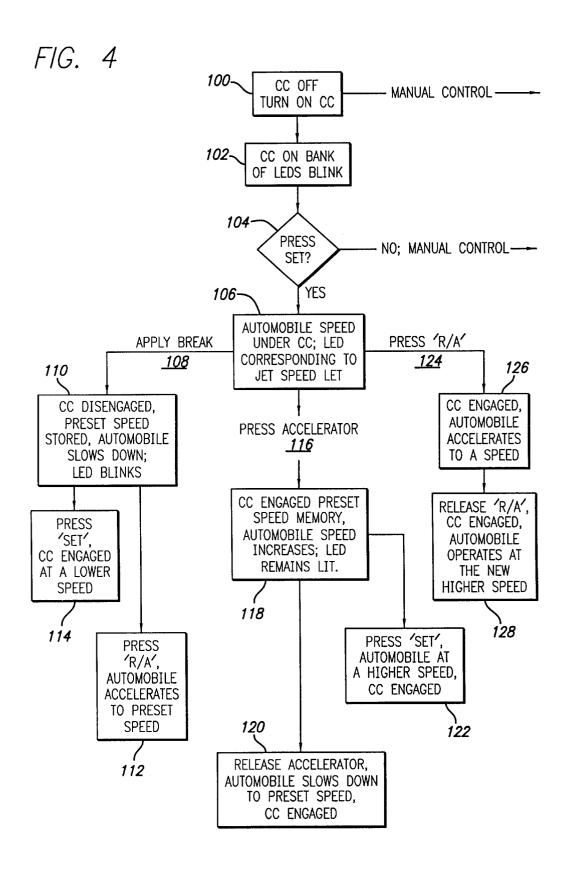




U.S. Patent

Nov. 27, 2001

Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

use of the Clerk of Court for the	e purpose of initiating the civi	docket sheet. (SEE)	INSTRUCTI	ONS ON THE REVERSE OF	THE FORM.)			
I.(a) PLAINTIFFS			DEFEN	DANTS				
CRUISE CONTROL TECHNOLOGIES LLC				PORSCHE CARS NORTH AMERICA, INC.				
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware				Residence Of First Listed Defenda	nt New Castle Count	y, Delaware		
(c) Attorneys (Firm Name, A	Address And Telephone Numb	per)	Attorney	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							
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120 Marine	310 Airplane	362 Personal		620 Other Food & Drug	423 Withdrawal	410 Antitrust		
130 Miller Act	315 Airplane Product Liability	Med. Ma  ☐ 365 Personal 1	alpractice	625 Drug Related Seizure	28 USC 157	420 Banks and Banking		
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& Enforcement of Judgment	Slander	368 Asbestos		640 RR & Truck 650 Airline Regs	820 Copyrights	470 Racketeer Influenced and		
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190 Other Contract	Product Liability	Product	Liability	Act 720 Labor/Mgmt Relations	862 Black Lung (923)	892 Economic Stabilization Act		
195 Contract Property Liability	360 Other Personal Injury	T		730 Labor/Mgmt Reporting	863 DIWC/DIWW (405(g))	893 Environmental Matters		
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230 Rent Lease & Ejectment	442 Employment 443 Housing/	HABEUS CO		791 Empl Ref Inc	FEDERAL TAX SUITS	900 Appeal of Fee Determination Under Equal Access to		
240 Torts to Land	Accommodations	530 General		Security Act	870 Taxes (U.S. Plaintiff	Justice Justice		
245 Tort Product Liability	444 Welfare	535 Death Per			or Defendant)	950 Constitutionality of		
290 All Other Real Property	440 Other Civil Rights	550 Civil Righ			☐ 871 IRS Third Party	State Statutes  890 Other Statutory Actions		
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VI. CAUSE OF ACTION		(Cite The U.S. Ci	vil Statute	Under Which You Are Fili				
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Cruise Control Technologies LLC v. BMW Cruise Control Technologies LLC v. Chrys			Unassigned		Filed on December			
Cruise Control Technologies LLC v. Ford Motor Company					Filed on December 21, 2012			
Cruise Control Technologies LLC v. General Motors Company Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC					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					Filed on Decembe	er 21, 2012		
Cruise Control Technologies LLC v. Subaru of America, Inc.					Filed on Decembe			
Cruise Control Technologies LLC v. Volvo	Cars of North America, LLC	JUDGE	Unassigned Unassigned		Filed on December			
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DECEMBER 21, 2012		/s/	STEPHEN 1	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

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

## **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.

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

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 2013 Legacy vehicle, 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.

## **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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mfenster@raklaw.com

# **EXHIBIT A**



## (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

#### (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 34	0/815.45

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

\* cited by examiner

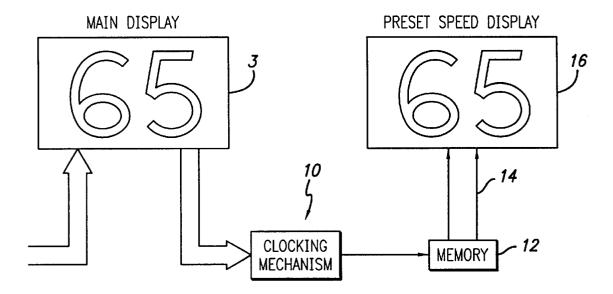
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

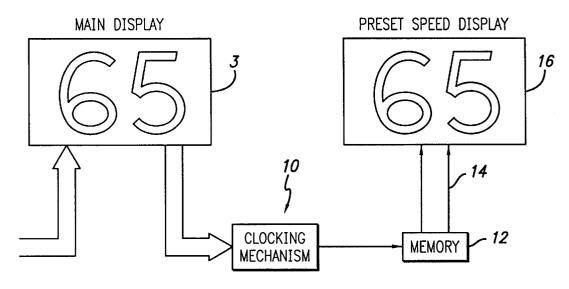


**U.S. Patent** 

Nov. 27, 2001

Sheet 1 of 3

FIG. 1



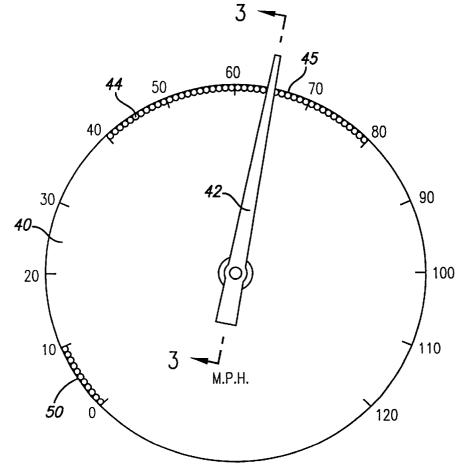
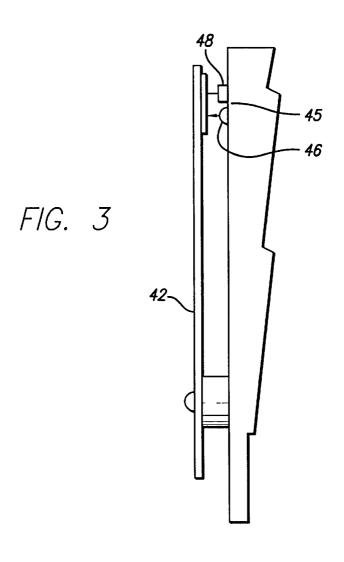
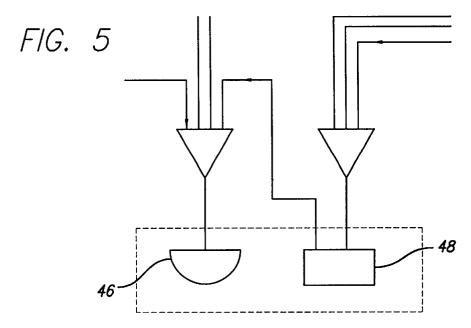


FIG. 2

**U.S. Patent** Nov. 27, 2001

Sheet 2 of 3

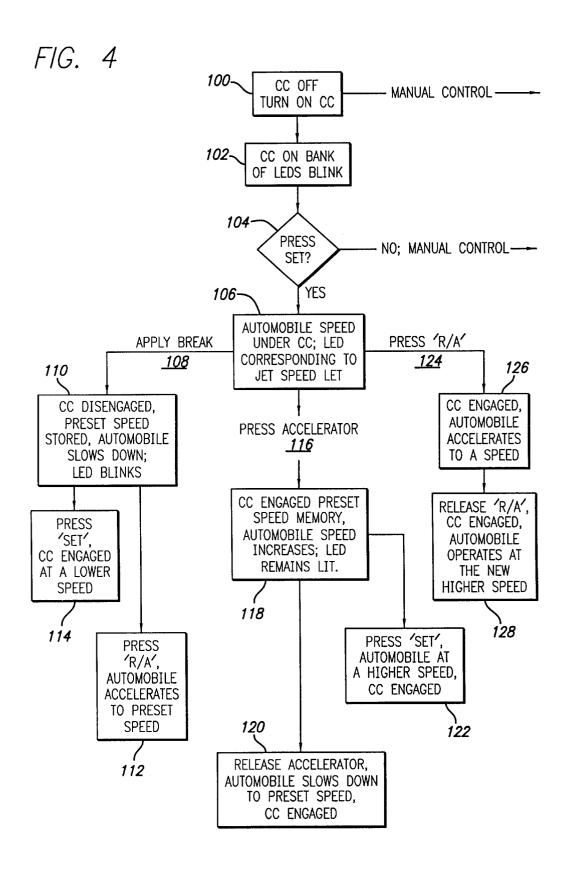




U.S. Patent

Nov. 27, 2001

Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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

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 5 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 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 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 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 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-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.

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- 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 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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;
  - 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.)

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(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of	Residence Of First Listed Defendar	nt New Castle County	y, Delaware	
(c) Attorneys (Firm Name, A	Address And Telephone Numb	er)	Attorney	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	,					
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Cruise Control Technologies LLC v. Ford Motor Company Cruise Control Technologies LLC v. General Motors Company			Unassigned		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 21, 2012 Filed on December 21, 2012		
Cruise Control Technologies LLC v. Mercedes-Berlz USA, LLC Cruise Control Technologies LLC v. Porsche Cars North America, Inc.			Unassigned		Filed on December	r 21, 2012	
Cruise Control Technologies LLC v. Volvo	Cars of North America, LLC	JUDGE	Unassigned Unassigned		Filed on December Filed on December		
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DECEMBER 21, 2012 FOR OFFICE USE ONLY		/8/	STEPHEN I	B. Brauerman (sb4952)			
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
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.

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

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 Volvo S60, 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 Patell 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.

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# **EXHIBIT A**

# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

(52)**U.S. Cl.** ...... **701/93**; 701/70; 180/170;

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

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

\* cited by examiner

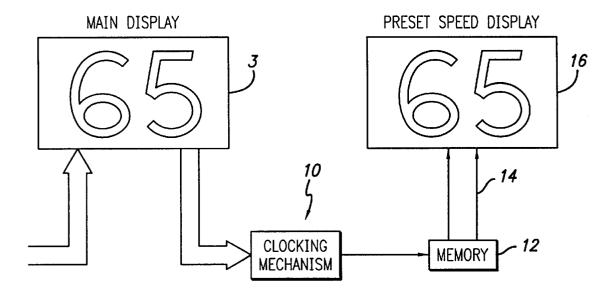
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

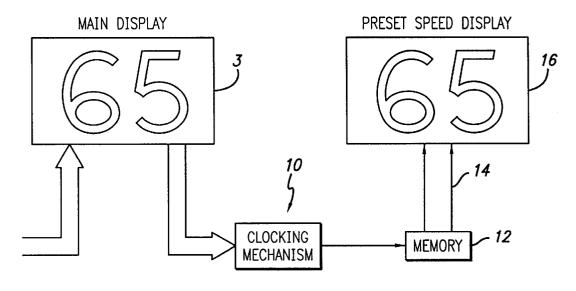


**U.S. Patent** 

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FIG. 1



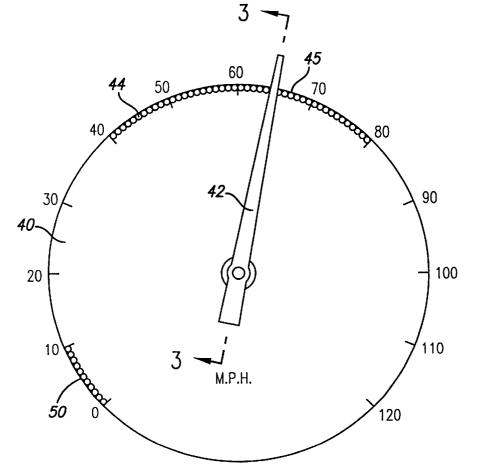
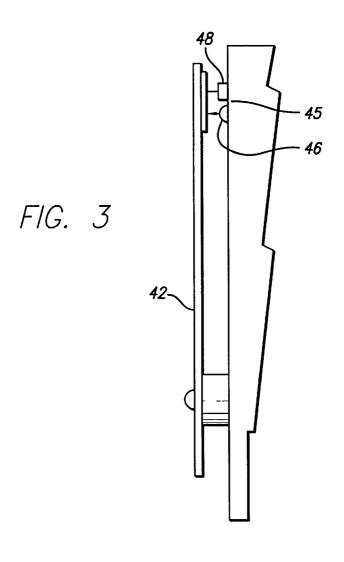
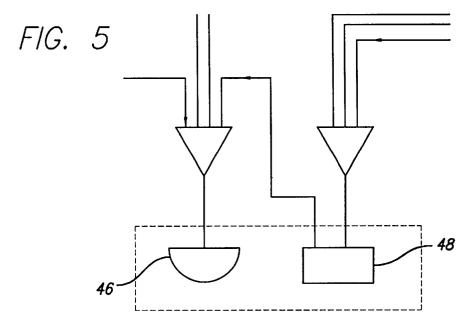


FIG. 2

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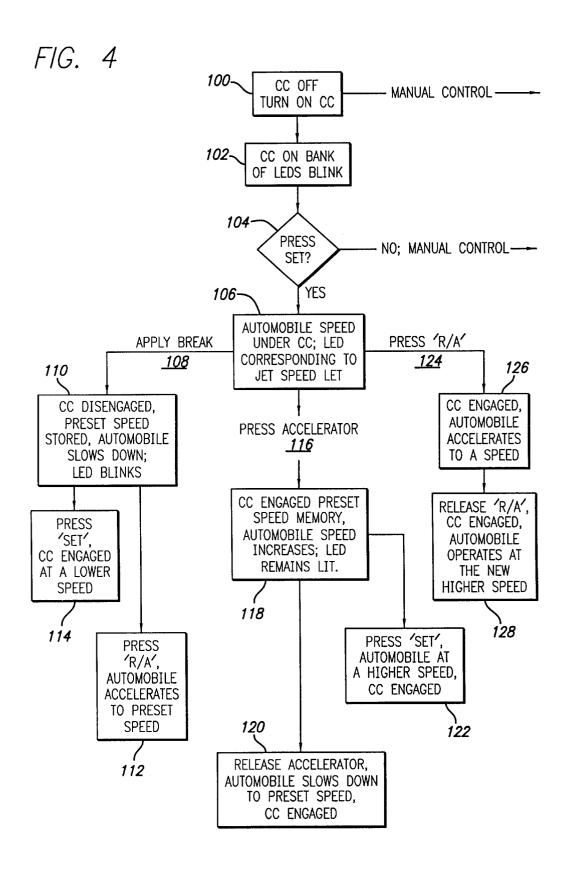




U.S. Patent

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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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

use of the Clerk of Court for the	e purpose of initiating the civi	l docket sheet. (SEE l	INSTRUCTI	IONS ON THE REVERSE OF	THE FORM.)		
I.(a) PLAINTIFFS			DEFEN	DANTS			
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(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of	Residence Of First Listed Defenda	nnt New Castle Count	y, Delaware	
(c) Attorneys (Firm Name, A	Address And Telephone Numb	per)	Attorney	s (If Known)			
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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.

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

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 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;

- 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: January 15, 2013

Of Counsel:

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Attorneys for Plaintiff Cruise Control Technologies LLC

# Exhibit A

# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

(52)**U.S. Cl.** ...... **701/93**; 701/70; 180/170;

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

(56)References Cited

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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 34	0/815.45

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

\* cited by examiner

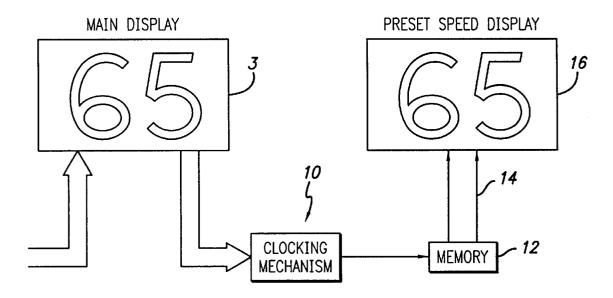
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

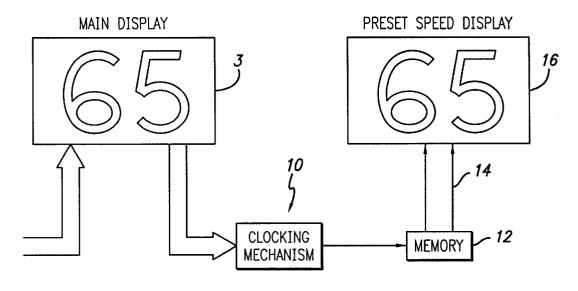


U.S. Patent

Nov. 27, 2001

Sheet 1 of 3

FIG. 1



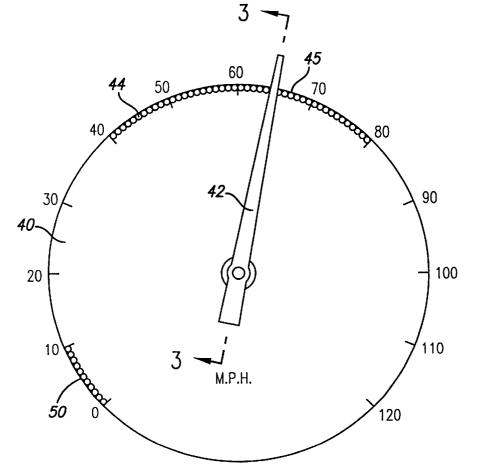
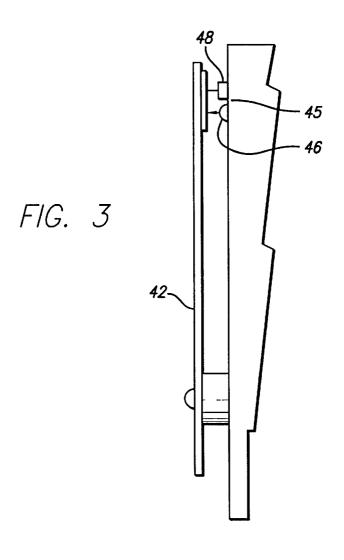
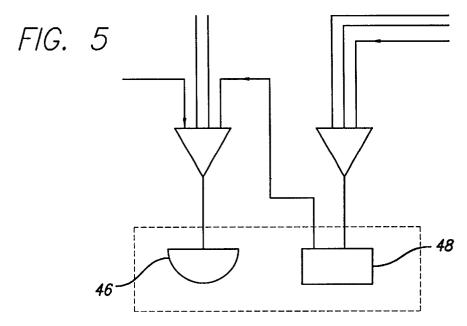


FIG. 2

**U.S. Patent** Nov. 27, 2001

Sheet 2 of 3

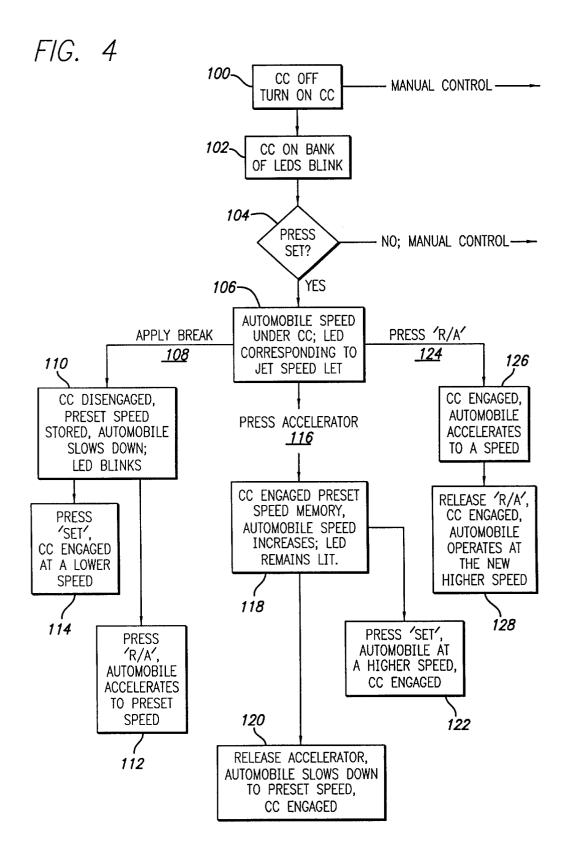




U.S. Patent

Nov. 27, 2001

Sheet 3 of 3



### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

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(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of I	Residence Of First Listed Defenda	nnt Los Angeles Count	ty, California	
(c) Attorneys (Firm Name,	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							
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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. 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

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).

- 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

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.

# **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

# Exhibit A

# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

#### (56)References Cited

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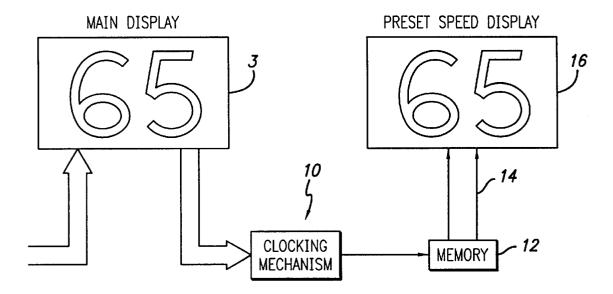
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

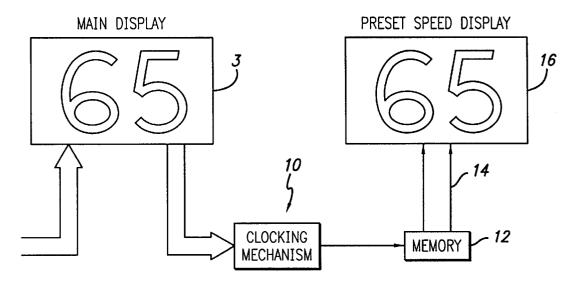


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FIG. 1



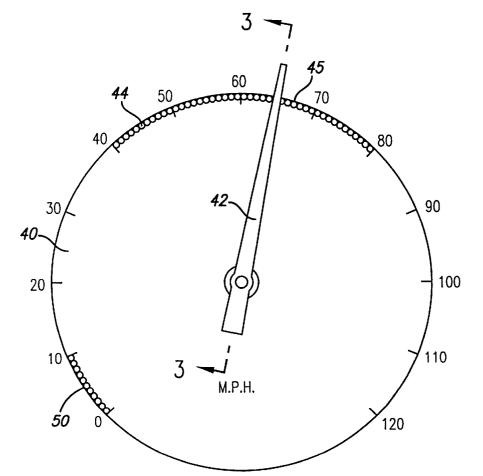
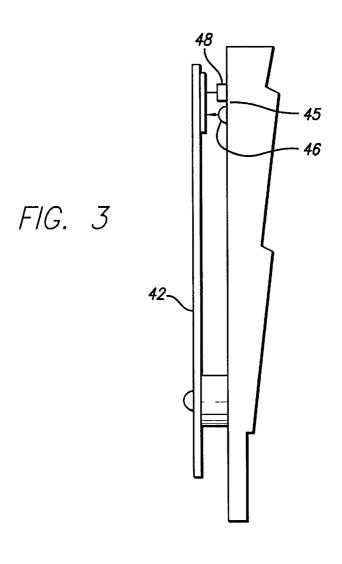
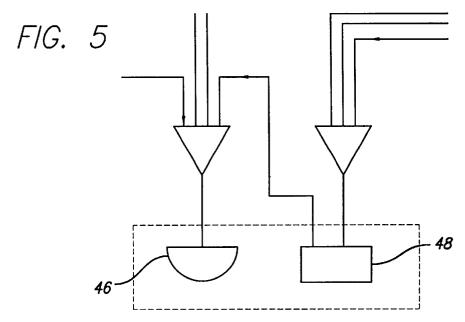


FIG. 2

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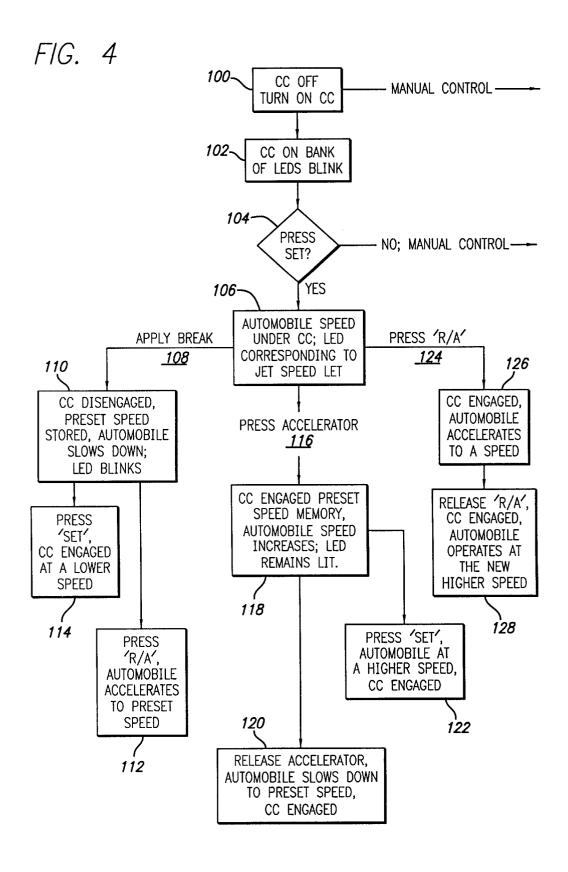




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### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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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 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

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 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

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 5 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 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 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 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 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-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.

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- 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 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

	e purpose of initiating the civil doc	1			TIL TORINI.)	
I.(a) PLAINTIFFS			DEFENDANTS			
CRUISE CONTROL TECHNOLOGIES LLC			HYUNDAI MOTOR AMERICA			
(b) County Of Residence Of I	(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			Residence Of First Listed Defendar	ot Orange County, Ca	llifornia
(c) Attorneys (Firm Name,	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						
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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	PERSONAL II  362 Personal Inj Med. Malp Add. Malp Product Li 368 Asbestos Pe Injury Proc PERSONAL PRO 370 Other Frauc 371 Truth in Let 380 Other Perso Property D Product Li  PRISONER PE  510 Motions to Sentence HABEUS COR 530 General 535 Death Pena 540 Mandamus 550 Civil Rights 555 Prison Cond	jury practice jury practice jury lability ersonal duct Liability OPERTY d nding ponal Damage pamage pability  TITIONS  Vacate  RPUS:  lty & Other s	G10 Agriculture   G20 Other Food & Drug   G25 Drug Related Seizure of Property 21 USC 881   G30 Liquor Laws   G40 RR & 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   Security Act   740 Railway Labor Act   750 Empl Ref Inc Security Act   750 Empl Ref Inc Security Act   750 Drug Results   750 Empl Ref Inc Security Act   750 Drug Results   750 Empl Ref Inc Security Act   750 Drug Results   750 Empl Ref Inc Security Act   750 Drug Results   750 Drug Resul	42Appal28USC18   423 Withdrawal	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   875 Customer Challenge   12 USC 3410   891 Agricultural Acts   892 Economic Stabilization Act   893 Environmental Matters   894 Energy Allocation Act   895 Freedom of 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	0001111	
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  COMPLAINT  CHECK IF THIS IS A CLASS ACTION  DEMAND \$  CHECK YES only if demanded in complaint JURY DEMAND:   YES □ NO						
VII. RELATEDCASE(S)     (See instructions)     DOCKET       See Addendum attached hereto.     JUDGE     NUMBERS						
DATE		SIG	NATURE C	OF ATTORNEY OF RECORD		
JANUARY 15, 2013 FOR OFFICE USE ONLY				B. Brauerman (sb4952)		
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.

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

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 "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;

- 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: January 15, 2013

Of Counsel:

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Attorneys for Plaintiff Cruise Control Technologies LLC

# Exhibit A



# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

362/459; 362/489 

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

#### (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 34	10/815.45

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

\* cited by examiner

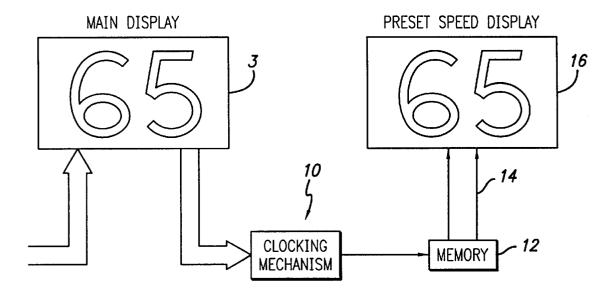
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

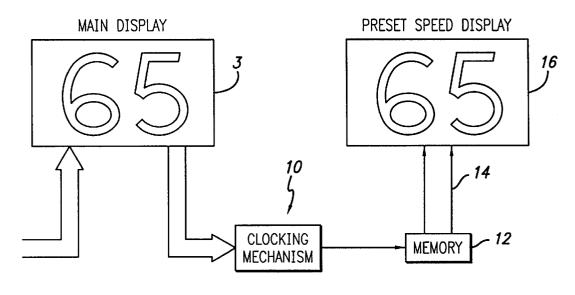


**U.S. Patent** 

Nov. 27, 2001

Sheet 1 of 3

FIG. 1



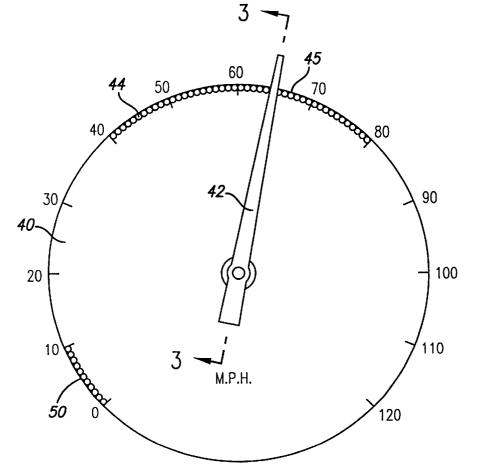
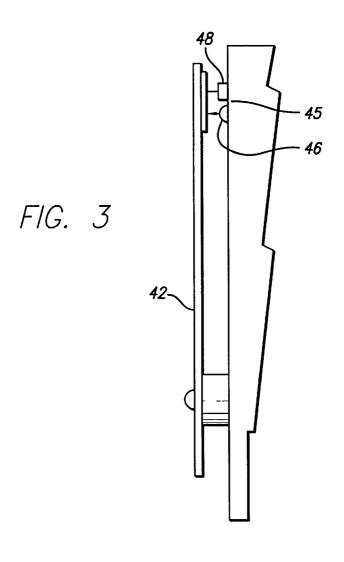
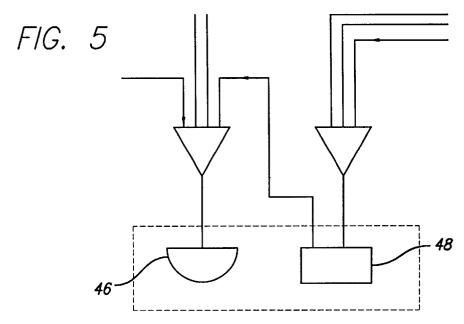


FIG. 2

**U.S. Patent** Nov. 27, 2001

Sheet 2 of 3

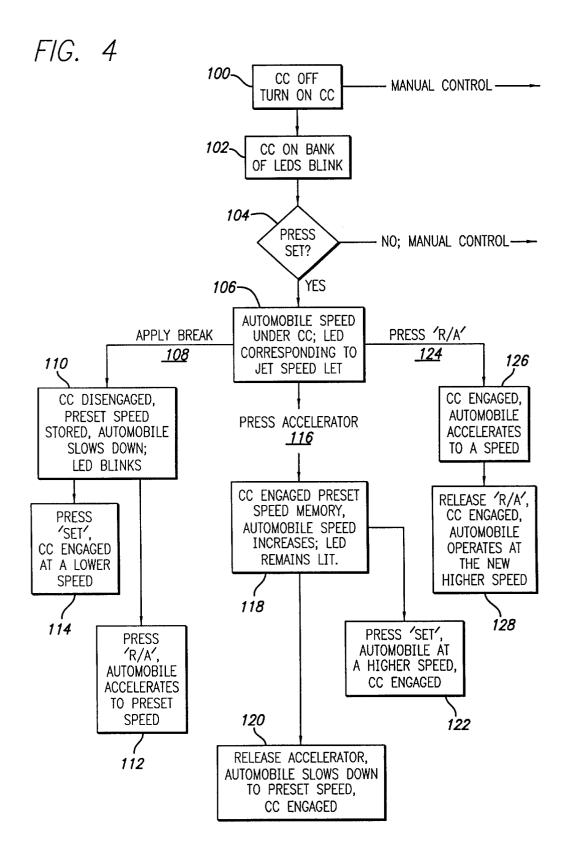




U.S. Patent

Nov. 27, 2001

Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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 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

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 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

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 5 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 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 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 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 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-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.

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- 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 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

	e purpose of initiating the civil doc	oket sheet. (BLL II			THE TORWI.)	
I.(a) PLAINTIFFS			DEFENI	DANTS		
CRUISE CONTROL	TECHNOLOGIES LLC		NISSAI	N NORTH AMERICA, INC	C.	
(b) County Of Residence Of I	First Listed Plaintiff New Castle Co	unty, Delaware	County Of I	Residence Of First Listed Defendar	nt Sacramento County	, California
(c) Attorneys (Firm Name,	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					
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VI. CAUSE OF ACTION				Under Which You Are Filir	ng And Write Brief Statem	nent Of Cause.
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  VIII. RELATEDCASE(S)	CHECK IF THIS  ACTION  UNDER F.R.CP  (See instructions)		DEMAN		CHECK YES only if dem JURY DEMAND:	
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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.

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

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 Toyota Avalon, 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.

## **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

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# Exhibit A

# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (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,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170;

345/30; 362/23, 482, 489, 459

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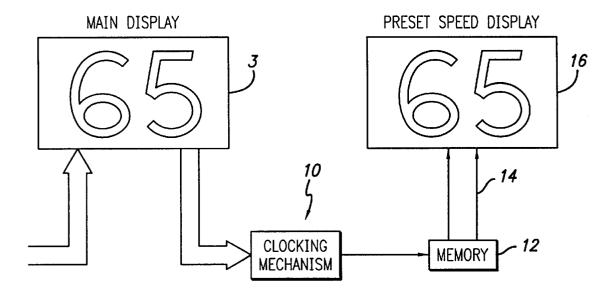
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

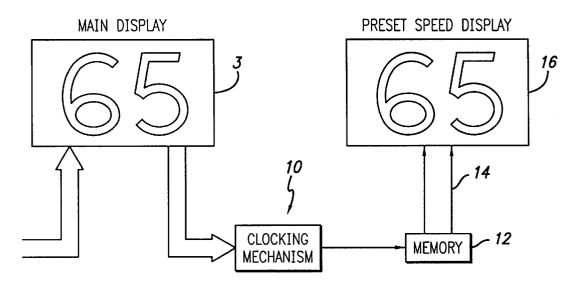


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FIG. 1



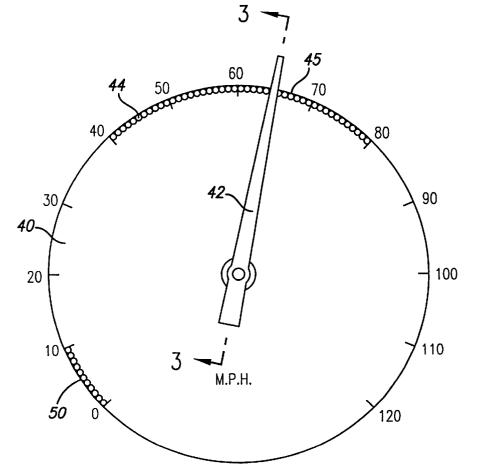
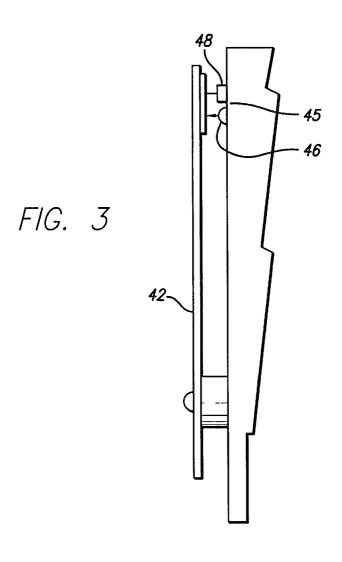
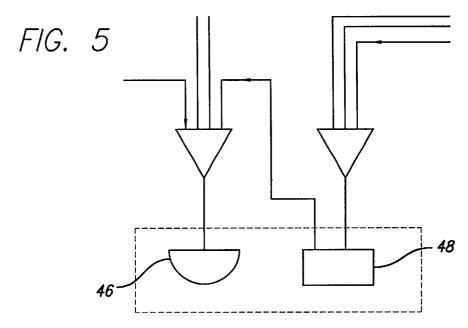


FIG. 2

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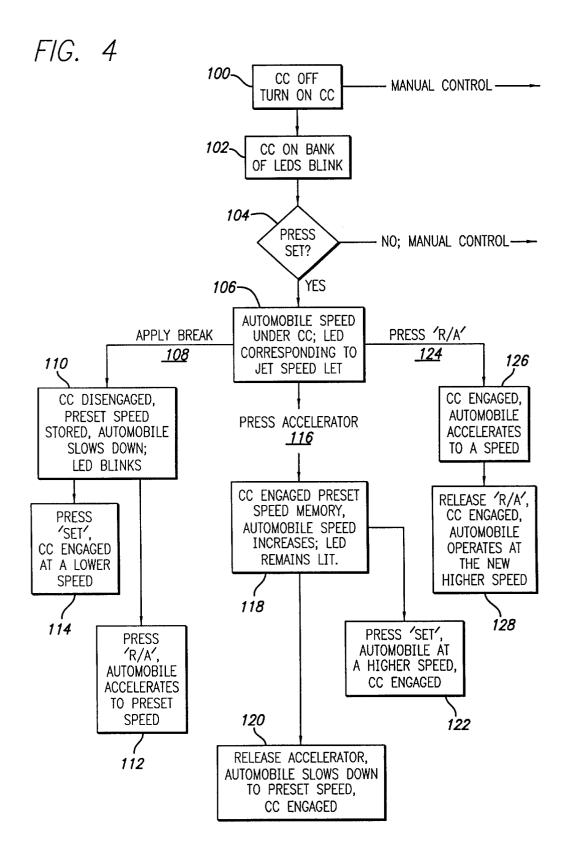




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#### 1

#### 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

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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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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.)

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I.(a) PLAINTIFFS		1	DEFENI	DANIS		
CRUISE CONTROL	TECHNOLOGIES LLC		TOYOTA MOTOR NORTH AMERICA, INC.			
(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware			County Of I	Residence Of First Listed Defendar	t Los Angeles Count	y, California
(c) Attorneys (Firm Name,	Address And Telephone Number)		Attorneys	s (If Known)		
Richard D. Kirk (No Stephen Brauermar Bayard, P.A. 222 Delaware Aven Wilmington, DE 198 (302) 655-5000	. 0922) n (No. 4952) ue, Suite 900					
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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  VII. RELATEDCASE(S)	CHECK IF THIS  ACTION  ☐ UNDER F.R.CP  (See instructions)		DEMAN		CHECK YES only if dem JURY DEMAND:	
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JANUARY 15, 2013 FOR OFFICE USE ONLY		/s/ S	STEPHEN I	B. Brauerman (sb4952)		
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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. 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.

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

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 Volkswagen Beetle, 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.

## **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

# Exhibit A



# (12) United States Patent Patel

US 6,324,463 B1 (10) Patent No.:

(45) Date of Patent: Nov. 27, 2001

#### (54) CRUISE CONTROL INDICATOR

C. Kumar N. Patel, 1171 Roberts La., Inventor:

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

(56)

(22)Filed: May 12, 1999

#### Related U.S. Application Data

(60)Provisional application No. 60/085,183, filed on May 12,

(51)

**U.S. Cl.** ...... **701/93**; 701/70; 180/170; (52)

362/459; 362/489

701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

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 34	0/815.45

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

\* cited by examiner

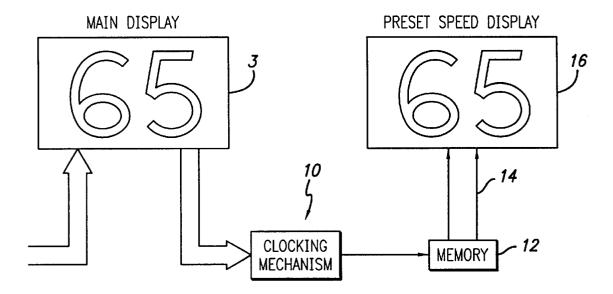
Primary Examiner—William A. Cuchlinski, Jr. Assistant Examiner—Yonel Beaulieu

(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

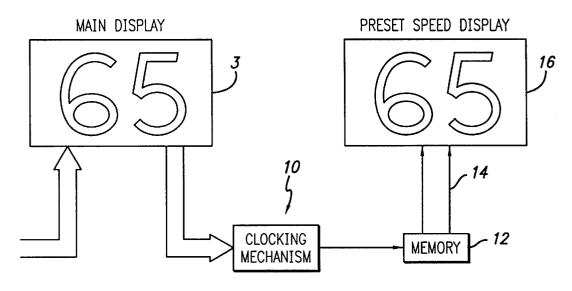


**U.S. Patent** 

Nov. 27, 2001

Sheet 1 of 3

FIG. 1



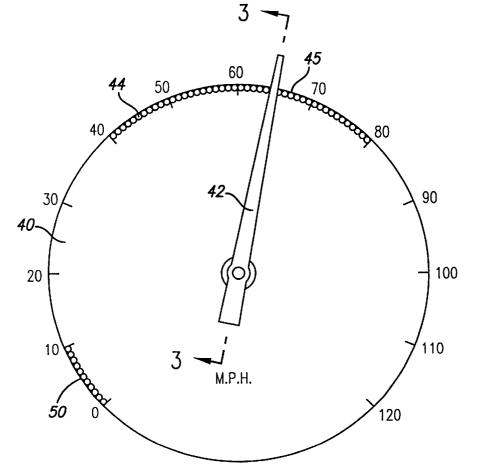
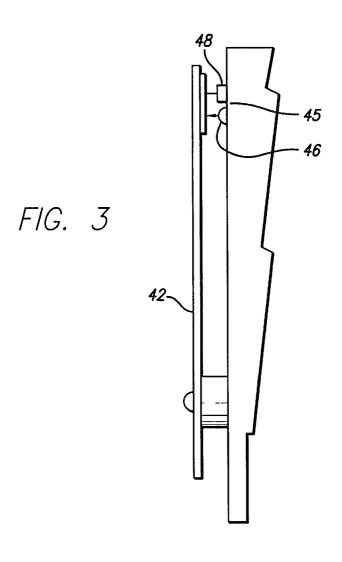
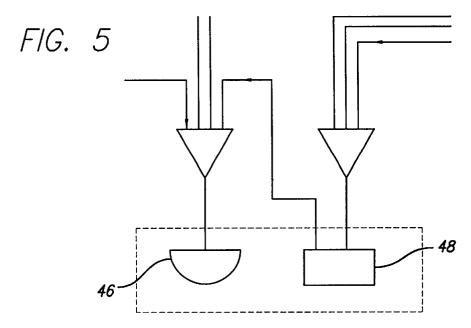


FIG. 2

**U.S. Patent** Nov. 27, 2001

Sheet 2 of 3

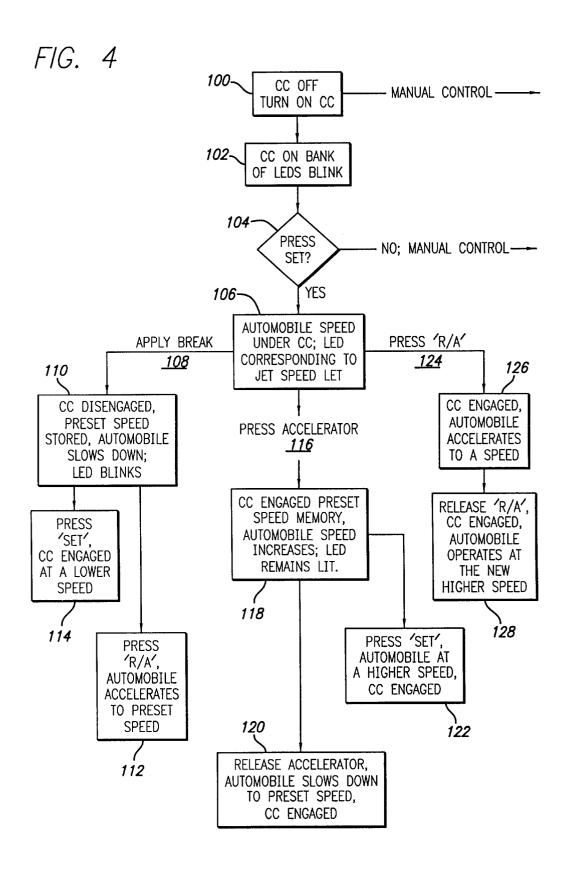




U.S. Patent

Nov. 27, 2001

Sheet 3 of 3



#### 1

#### 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 off the automobile) or if another speed is set into the 40 speed of an enabled cruise control system. This is accommemory.

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 plished 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

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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 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

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 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 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

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 the digitized information regarding the speed at which the 55 of all LED's results in the LED light reflected back into only 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 5 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 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 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 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 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-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.

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- 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 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;
- 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".

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- 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 comprising:

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;

- displaying to the operator a symbol indicative of the preset speed;
- accelerating the vehicle to a speed above the preset speed;
- 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 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.
- **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-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.)

	e purpose of initiating the civil doc	CRECISINEEL. (BLL II	DEFENI		THE FORM.)	
I.(a) PLAINTIFFS			DEFENI	DANIS		
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,	Address And Telephone Number)		Attorney	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					
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140 Negotiable Instrument	Liability	365 Personal II		of Property 21 USC 881		450 Commerce/ICC Rates/etc.
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190 Other Contract	Product Liability	Product I	Liability	Act	862 Black Lung (923)	892 Economic Stabilization Act
195 Contract Property Liability	360 Other Personal Injury	1		☐ 720 Labor/Mgmt Relations ☐ 730 Labor/Mgmt Reporting	863 DIWC/DIWW (405(g))	893 Environmental Matters
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230 Rent Lease & Ejectment	443 Housing/	HABEUS CO		☐ 791 Empl Ref Inc	FEDERAL TAX SUITS	900 Appeal of Fee Determination Under Equal Access to
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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