IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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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Stephen B. Brauerman (#4952)
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EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

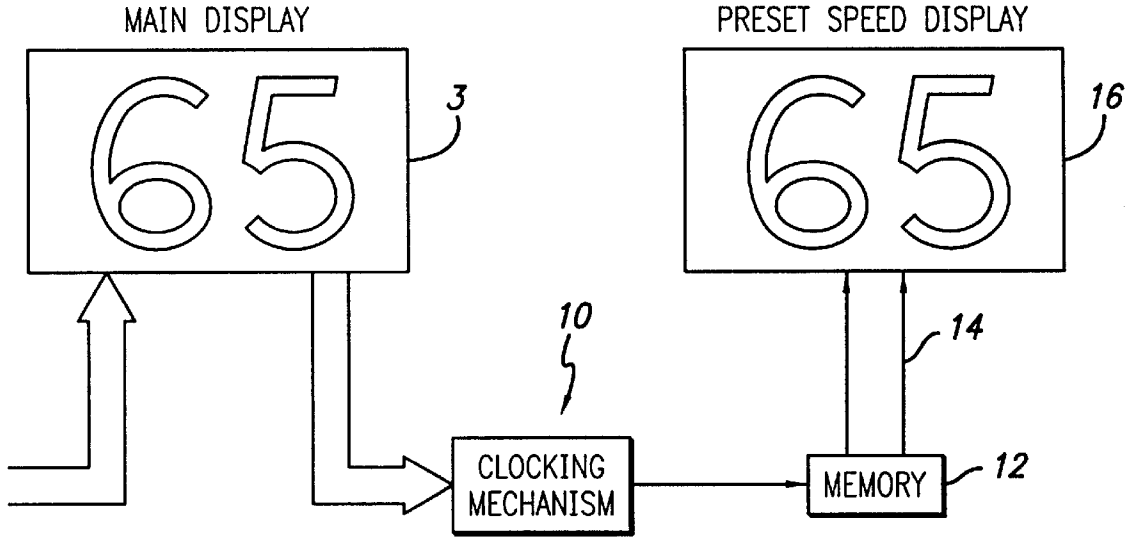
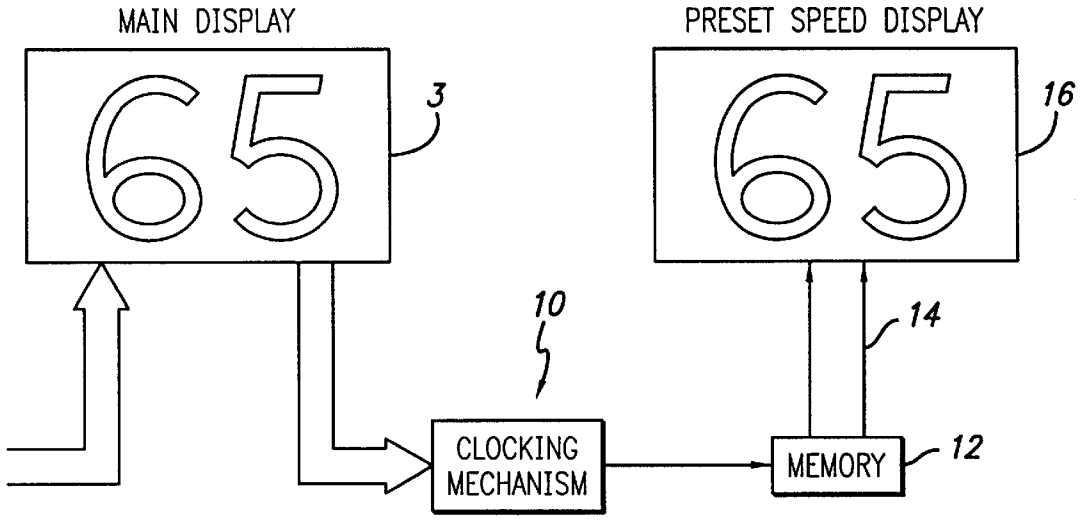


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

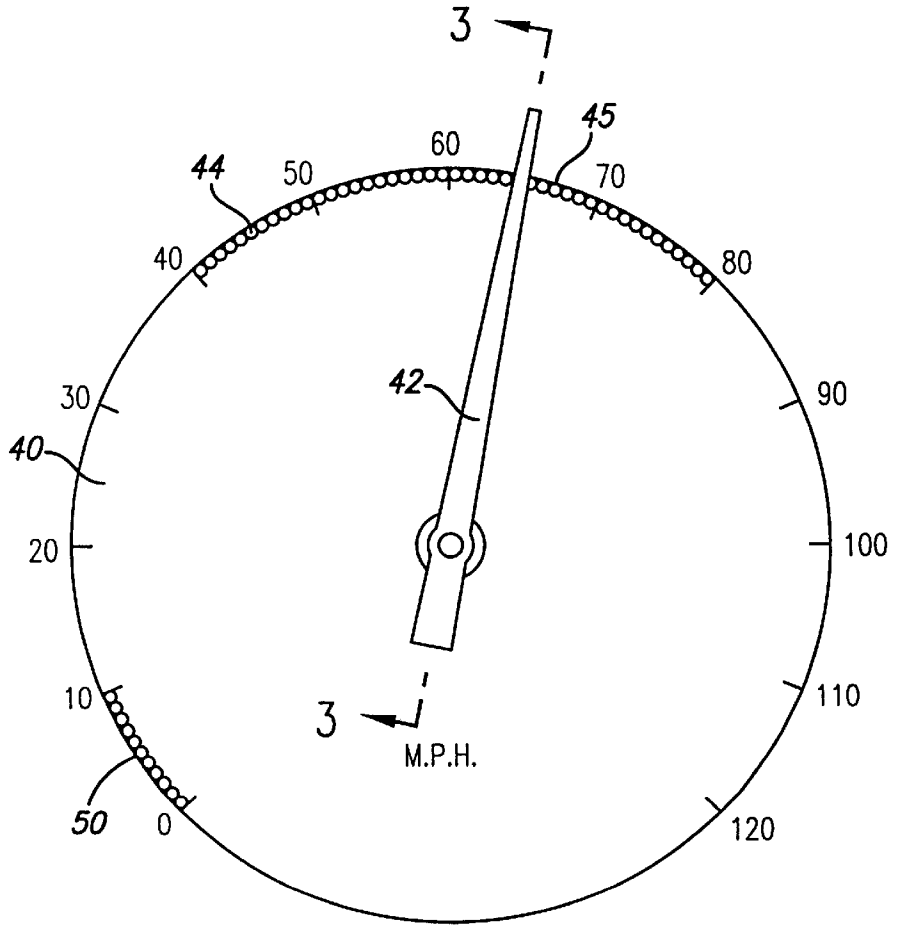

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

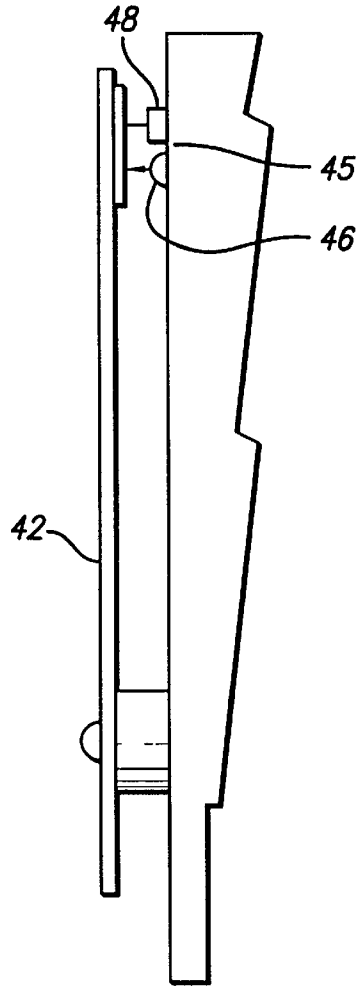


FIG. 5

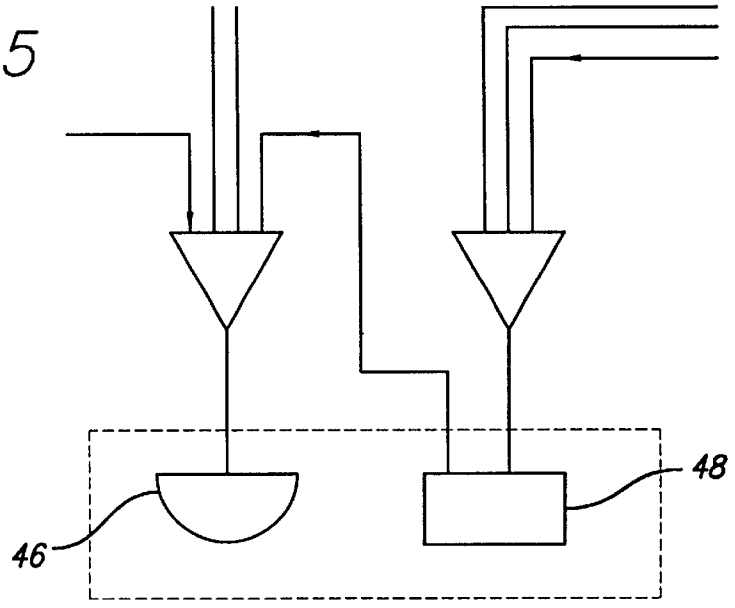
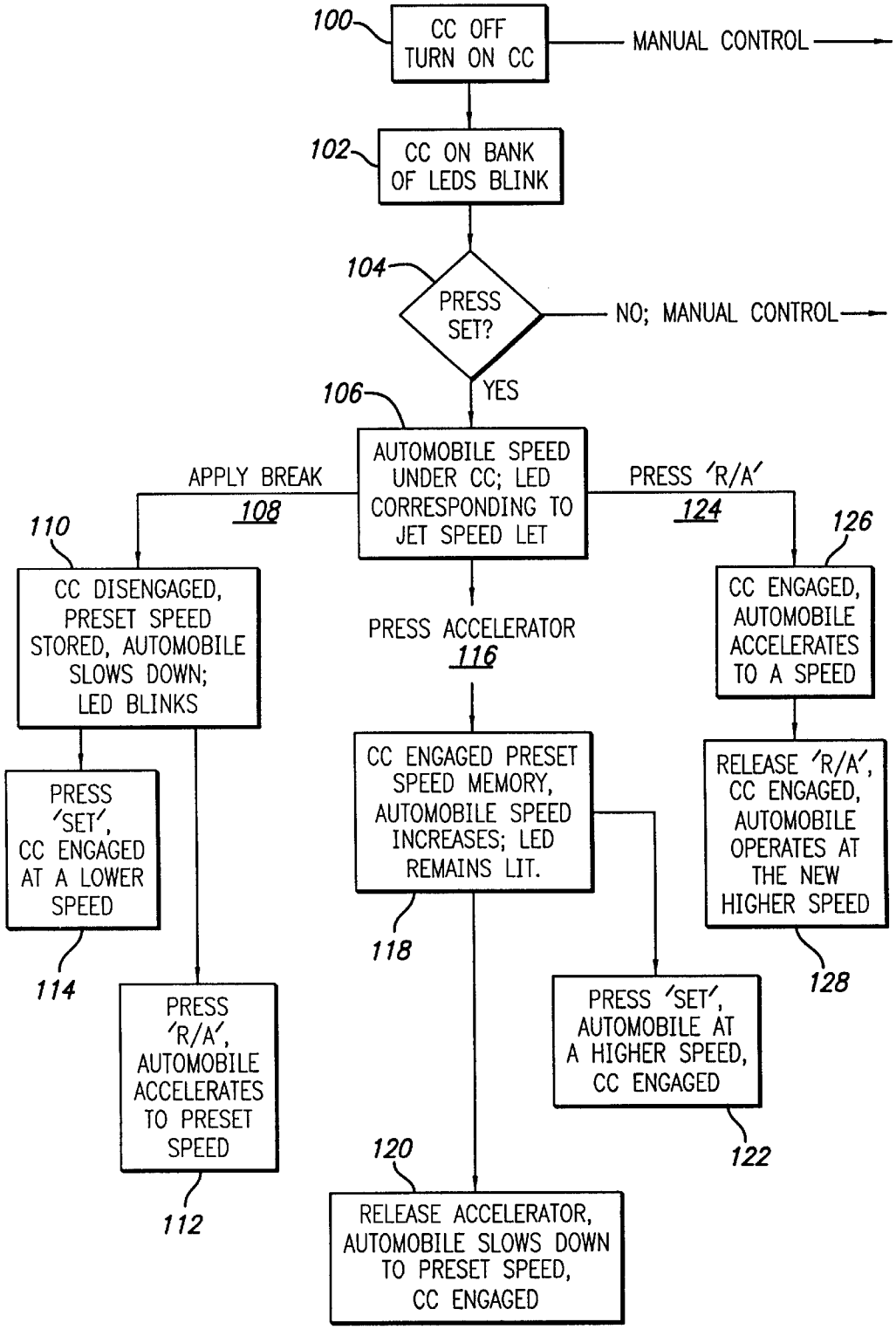


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
Bayard, P.A.
222 Delaware Avenue, Suite 900
Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

AUDI OF AMERICA, LLC

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. General Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE

DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD

/S/ RICHARD D. KIRK, ESQ. (RK0922)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. _____
	)	
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 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

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

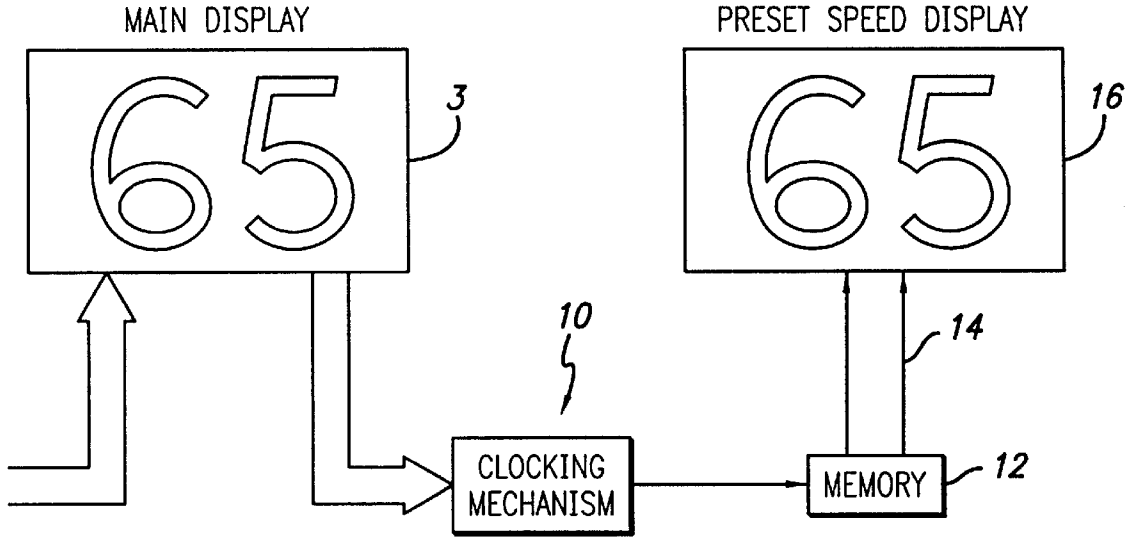
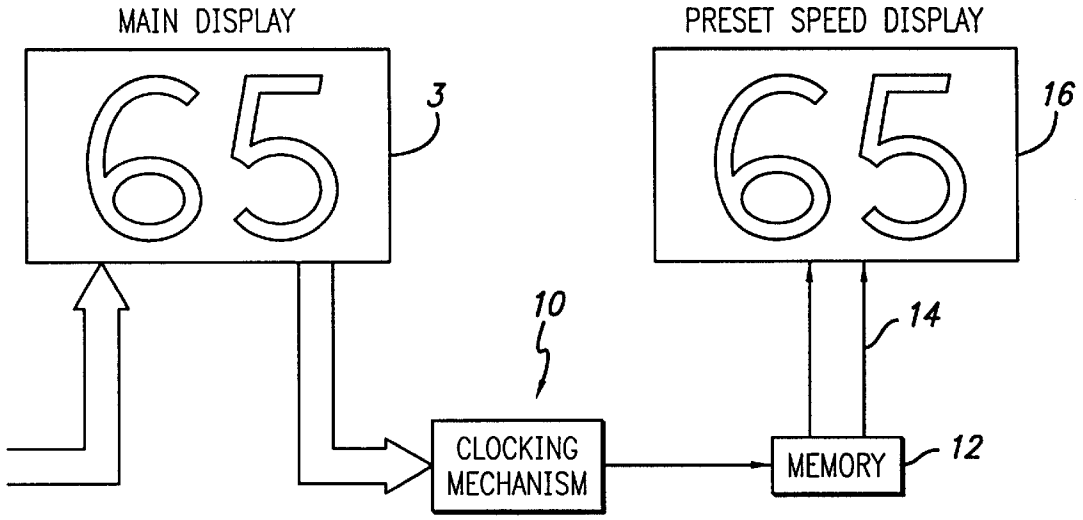


FIG. 1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MEMORY
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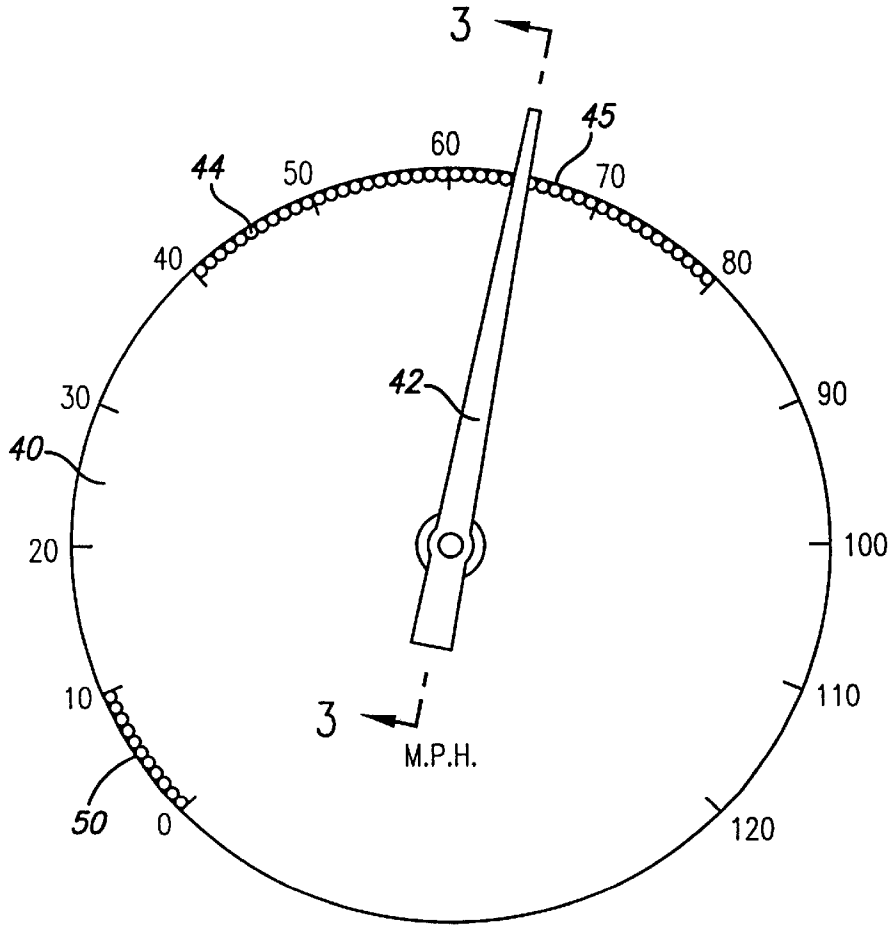
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FIG. 2

FIG. 3

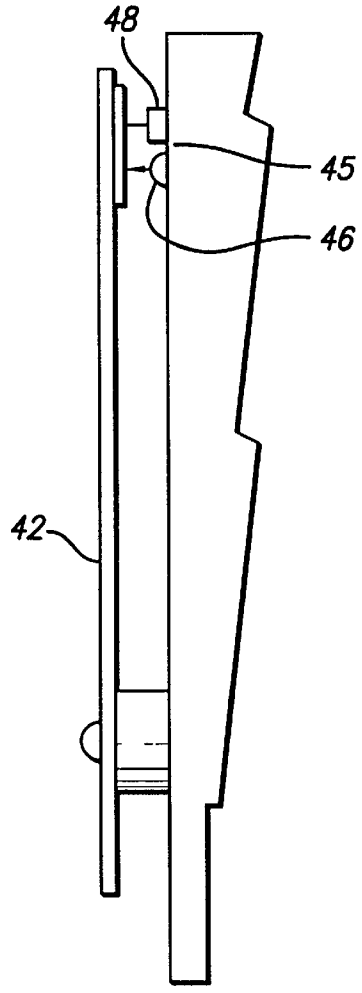


FIG. 5

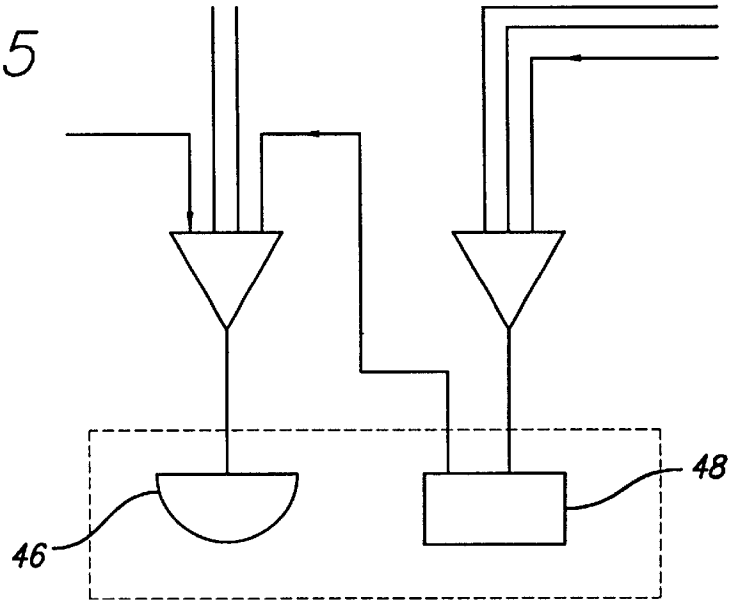
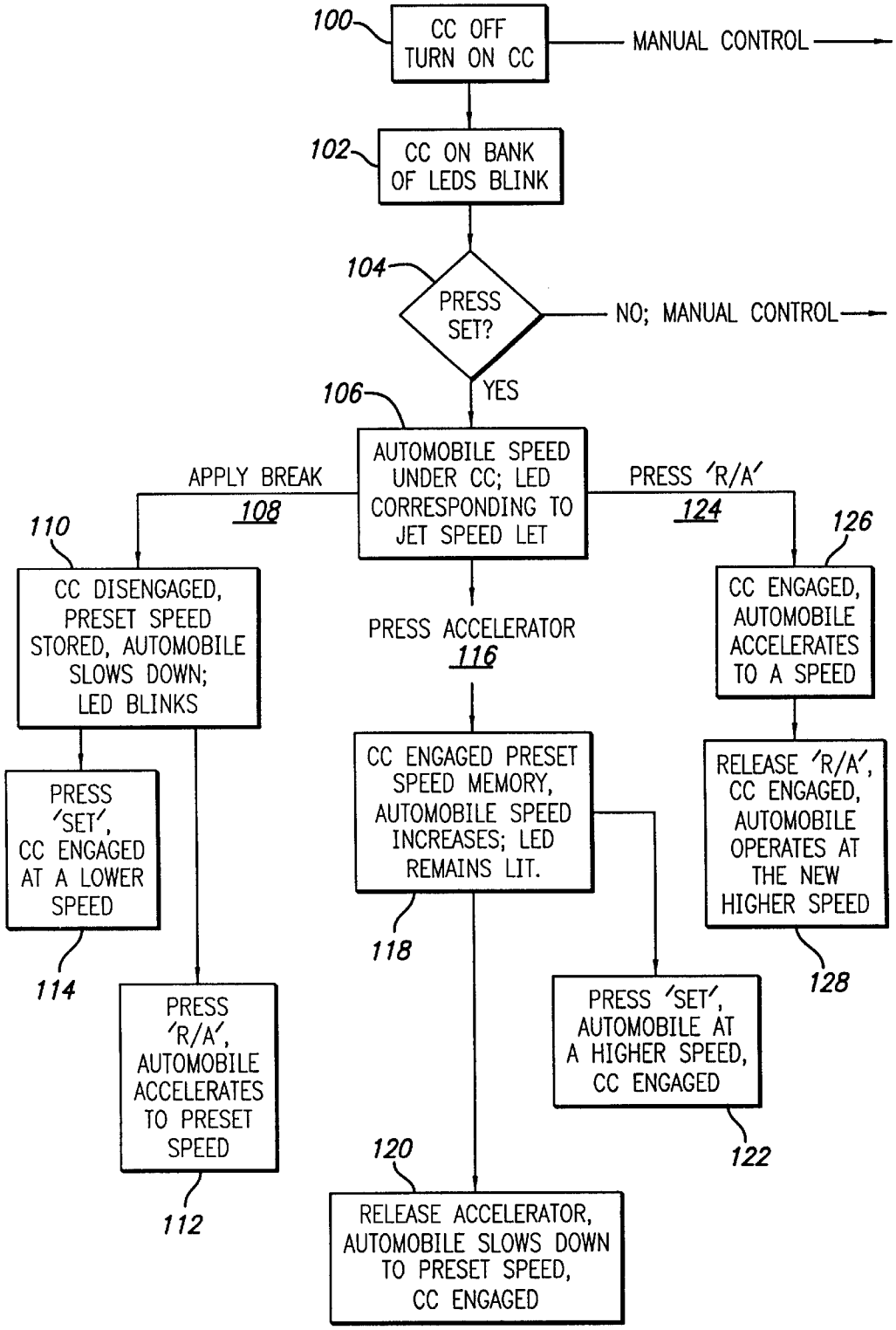


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

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County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
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	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
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REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. General Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE

DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD

/S/ RICHARD D. KIRK, ESQ. (RK0922)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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

BAYARD, P.A.

/s/ Richard D. Kirk

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Stephen B. Brauerman (#4952)
Vanessa R. Tiradentes (#5398)
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Los Angeles, California 90025
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Facsimile: (310) 826-6991
agiza@raklaw.com
mfenster@raklaw.com

EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

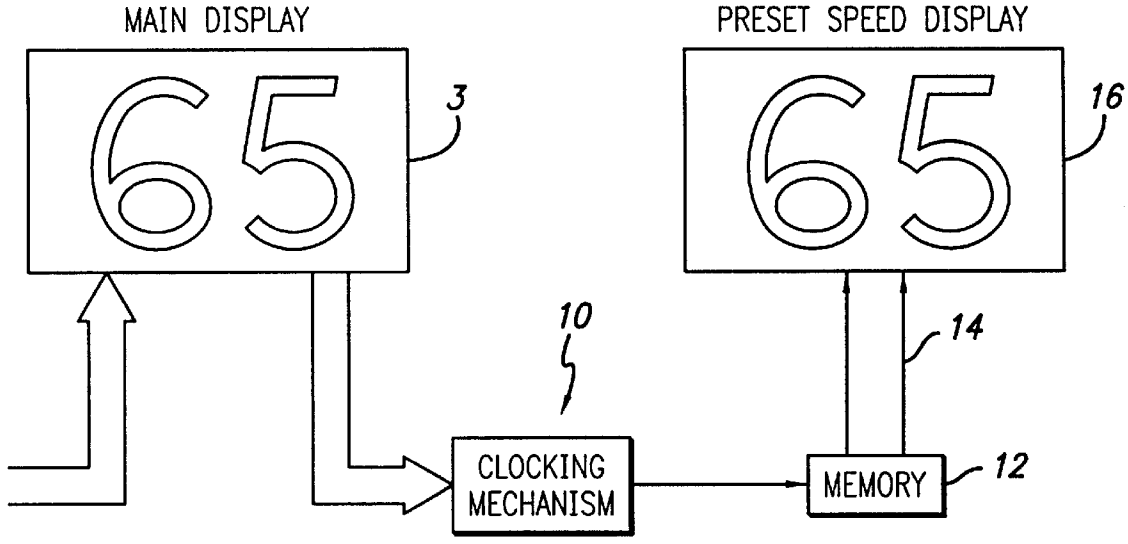
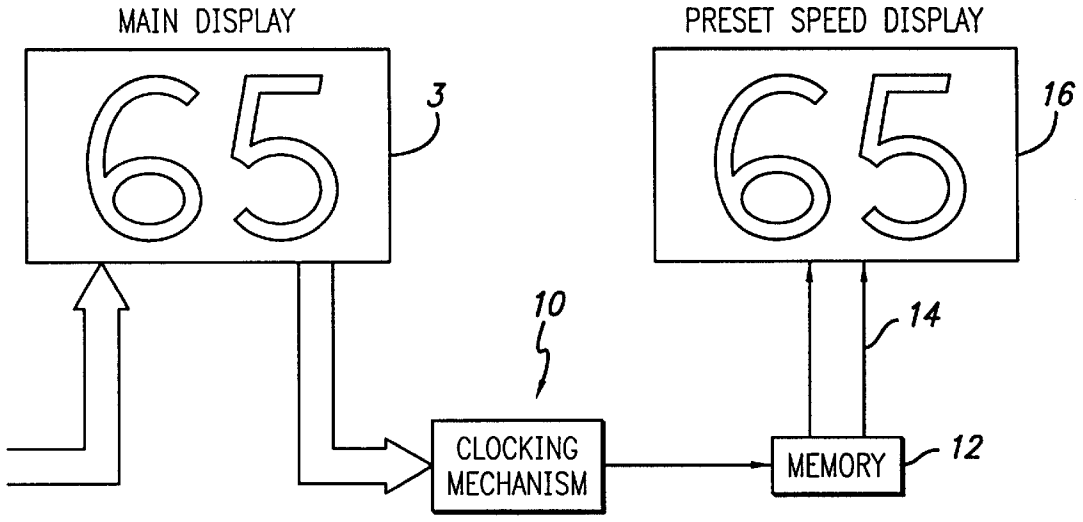


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

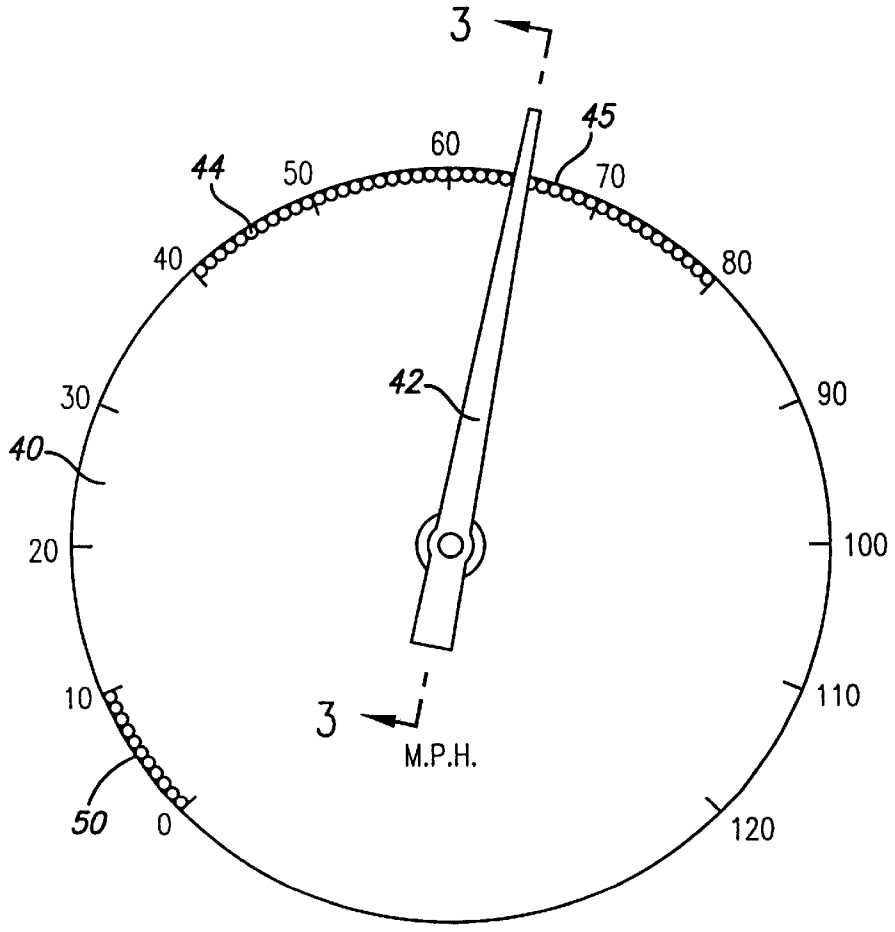

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

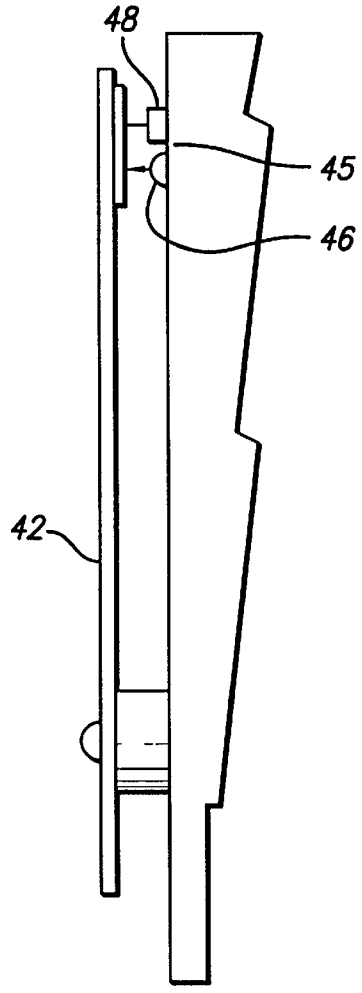


FIG. 5

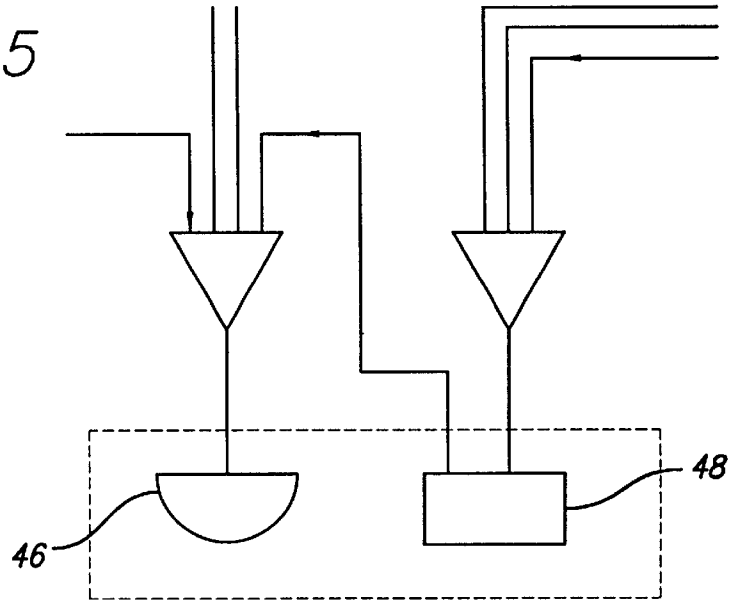
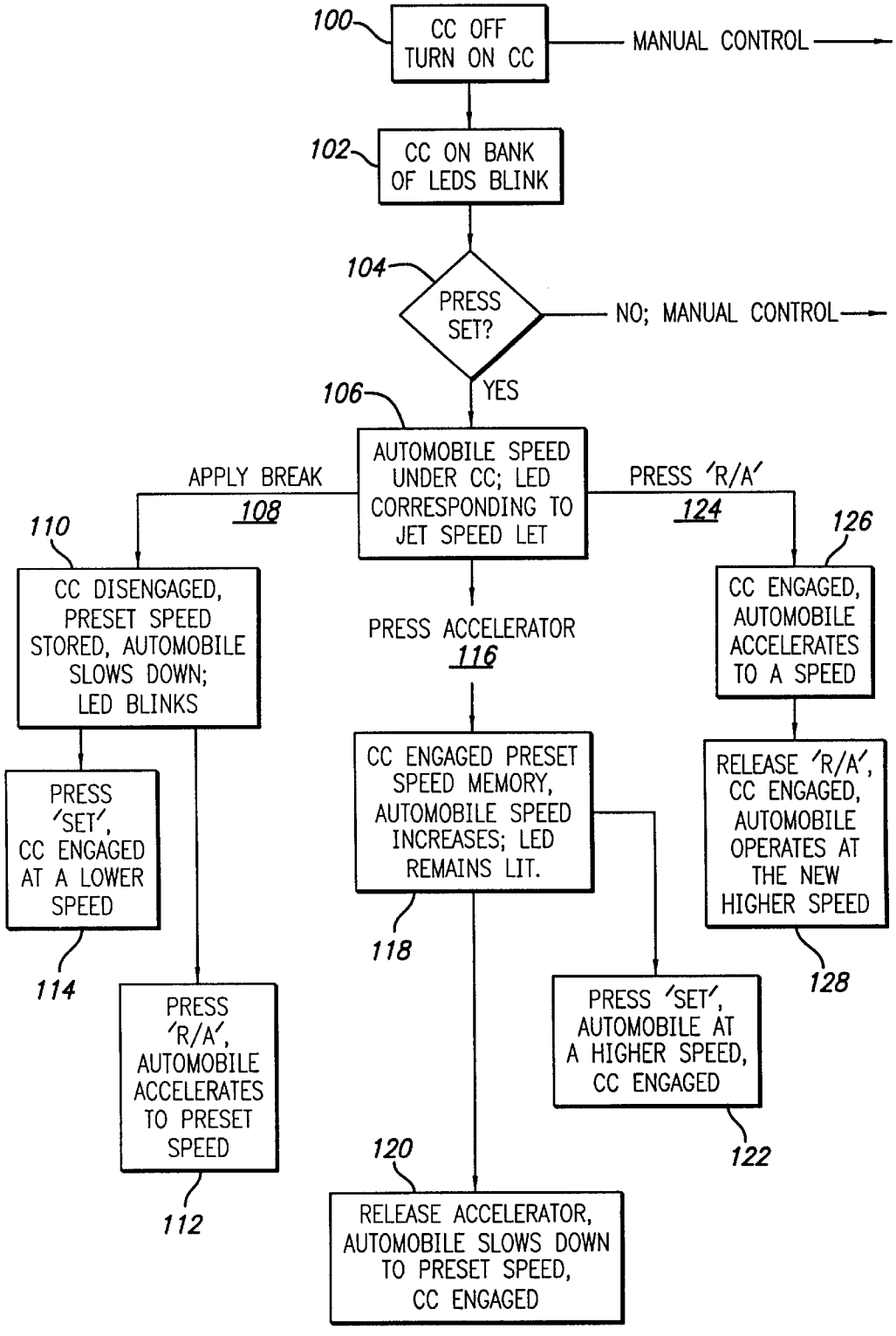


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
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(302) 655-5000

DEFENDANTS

CHRYSLER GROUP LLC

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. General Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE: DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD: /S/ RICHARD D. KIRK, ESQ. (RK0922)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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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EXHIBIT A

US006324463B1

(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

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

(58) **Field of Search** 701/93, 96, 70, 701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

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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

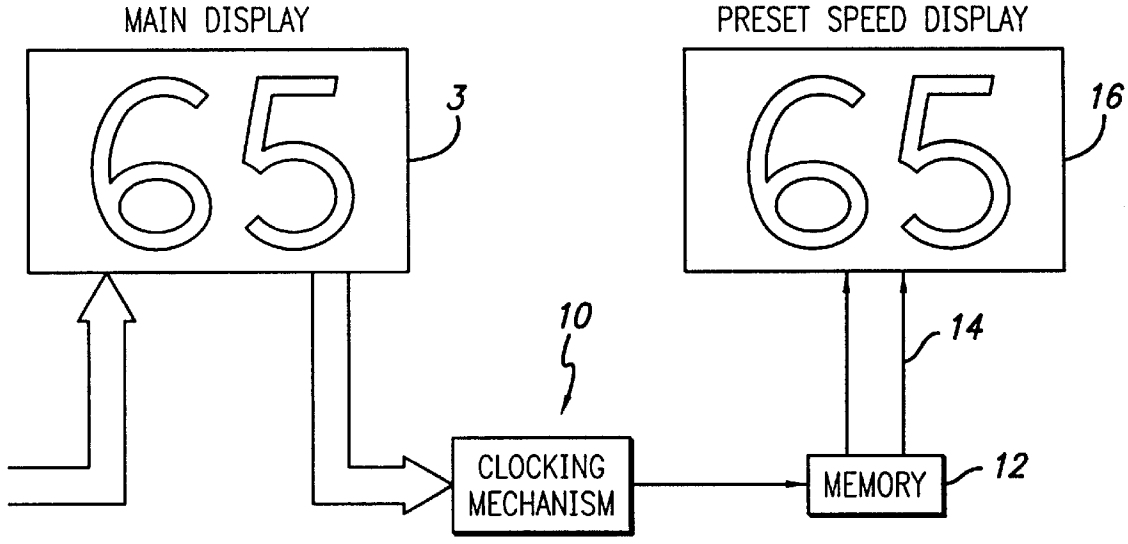
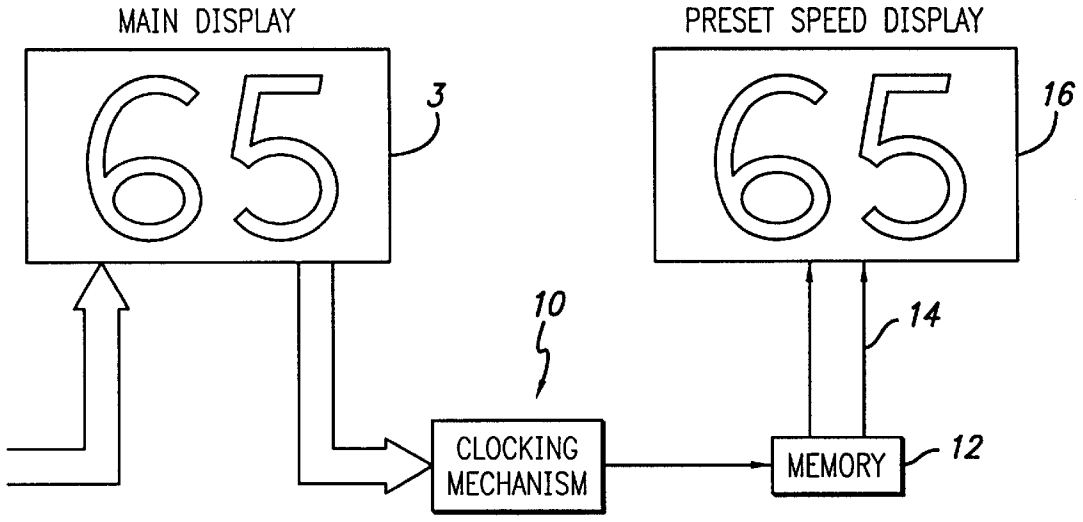


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

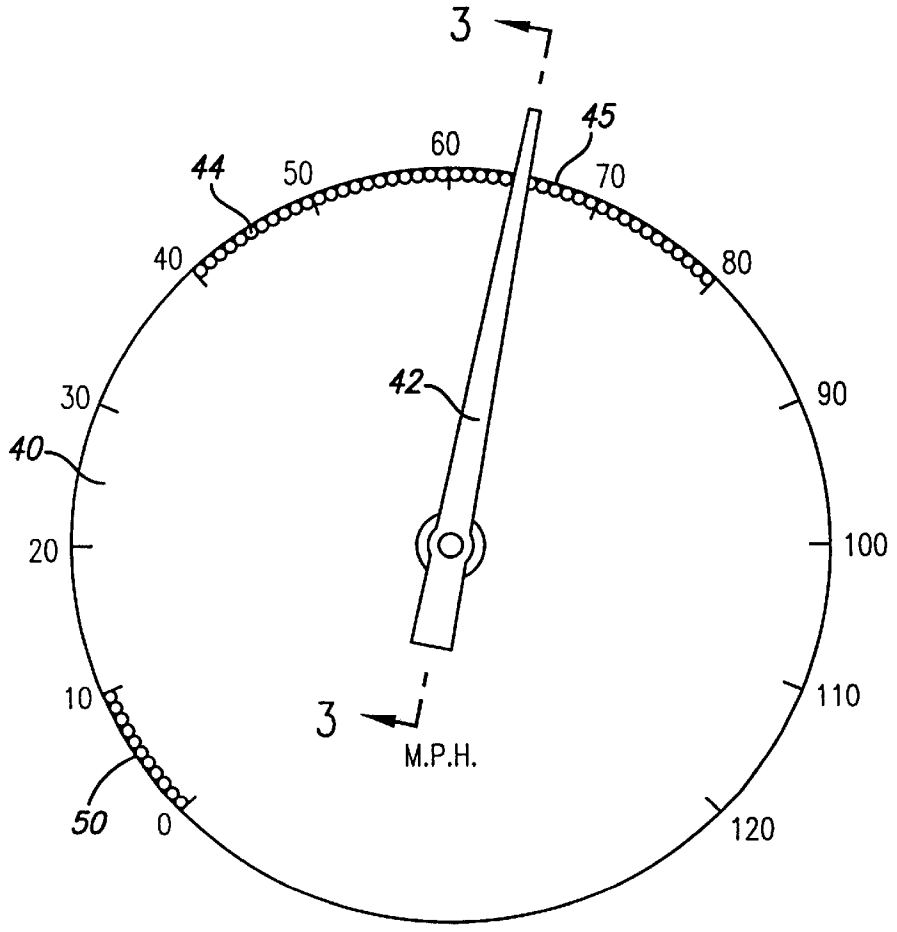

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

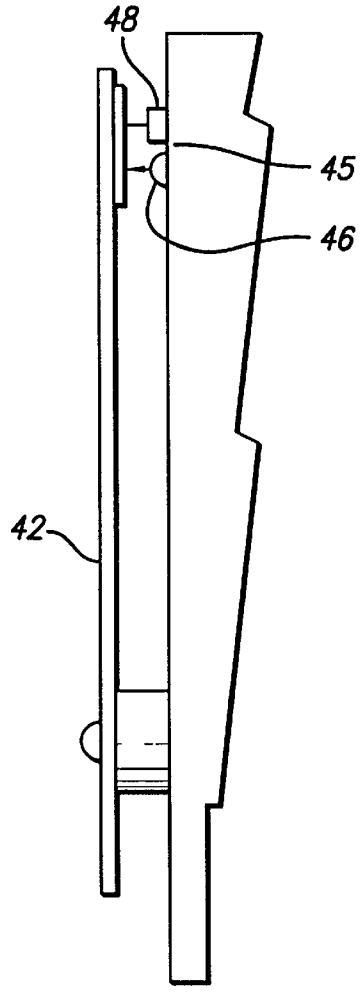


FIG. 5

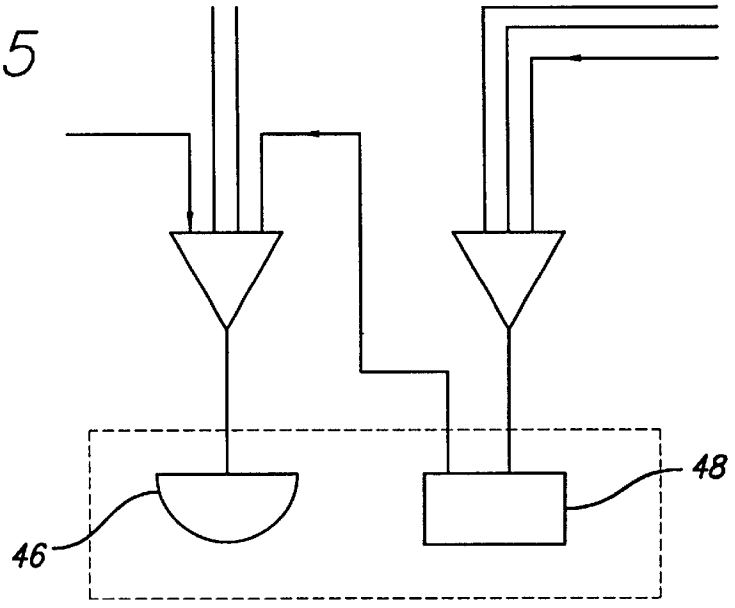
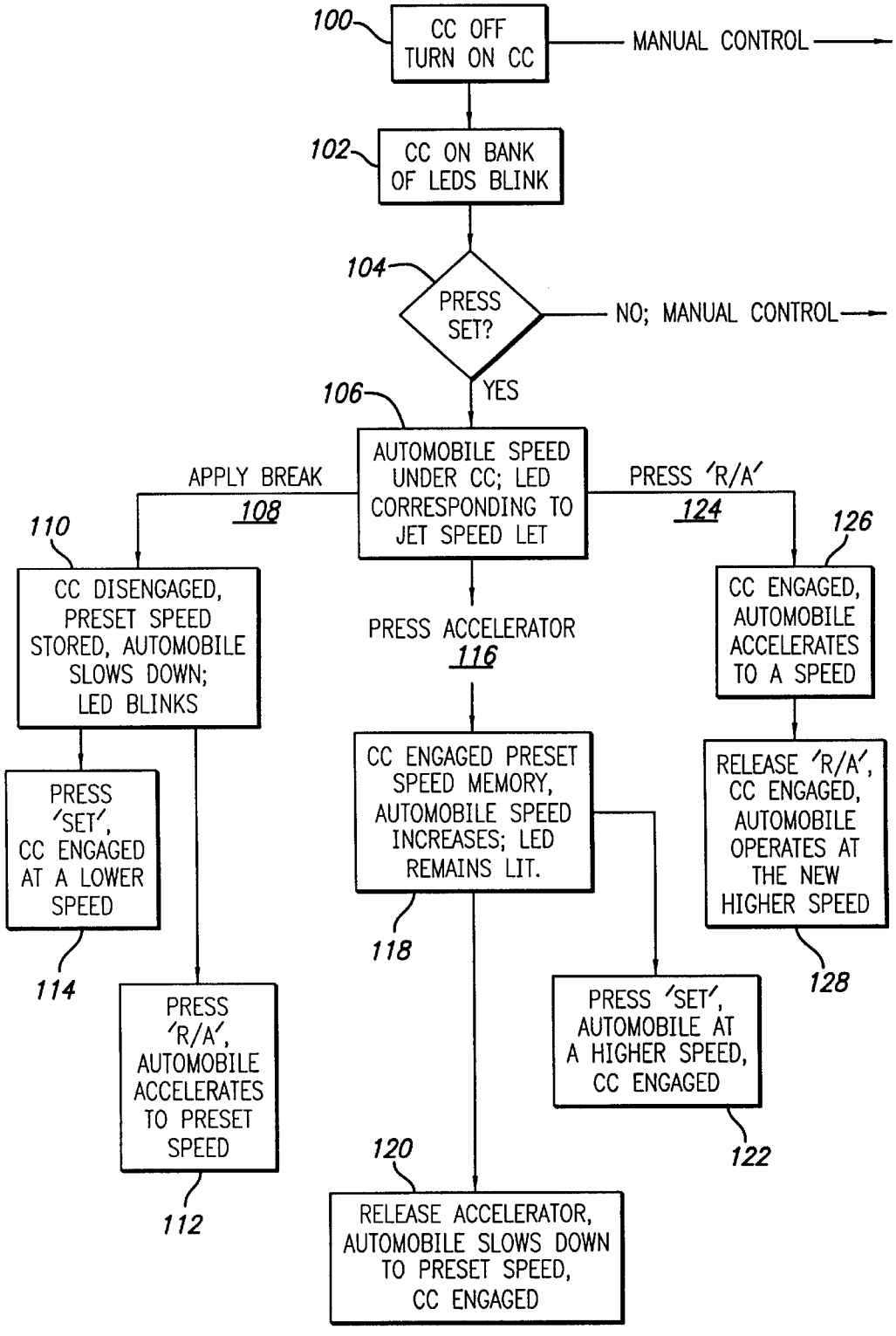


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
Bayard, P.A.
222 Delaware Avenue, Suite 900
Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

FORD MOTOR COMPANY

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. General Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE

DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD

/S/ RICHARD D. KIRK, ESQ. (RK0922)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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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Stephen B. Brauerman (#4952)
Vanessa R. Tiradentes (#5398)
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(302) 655-5000
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sbrauerman@bayardlaw.com
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Of Counsel:

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Telephone: (310) 826-7474
Facsimile: (310) 826-6991
agiza@raklaw.com
mfenster@raklaw.com

EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

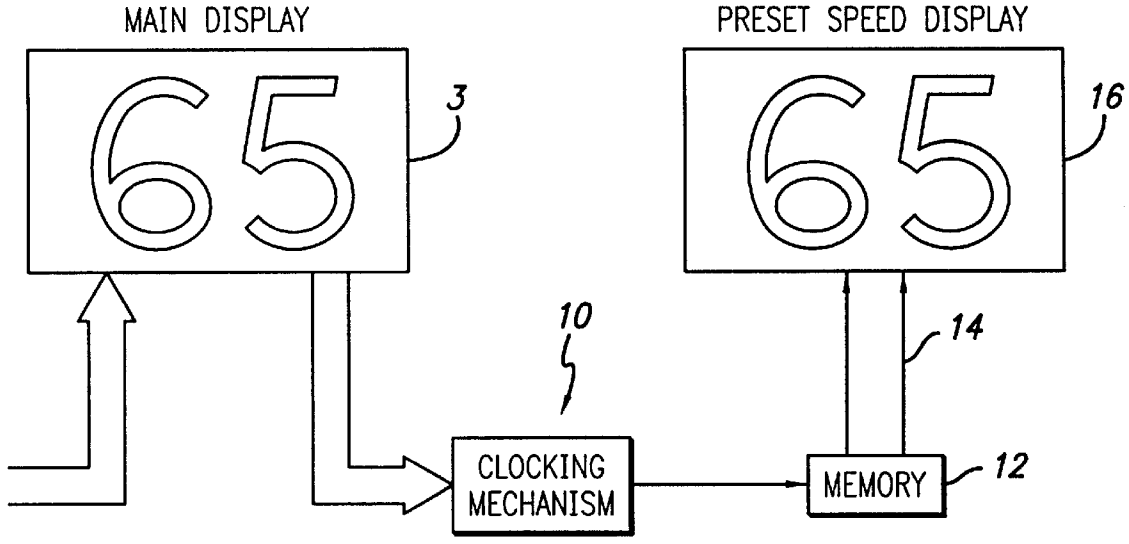
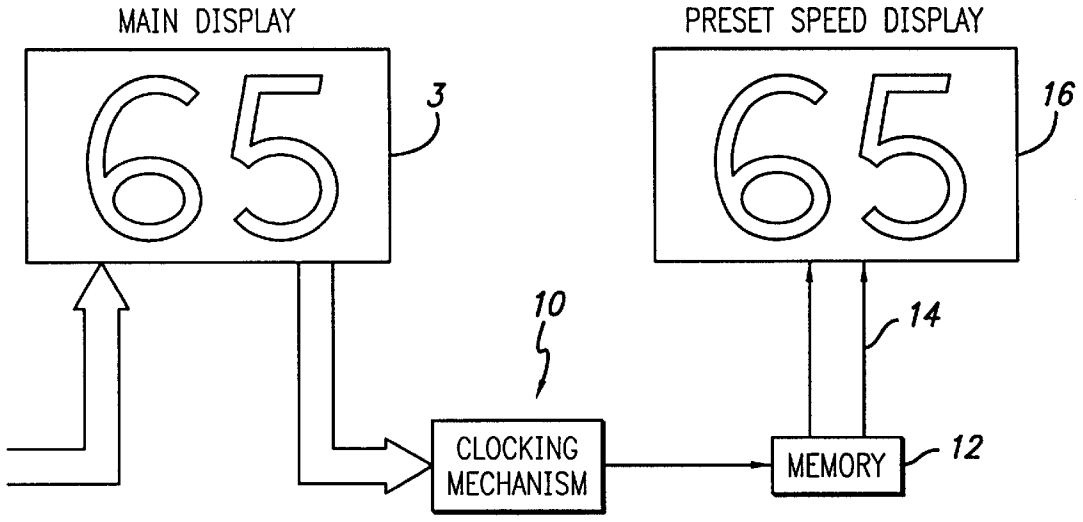


FIG. 1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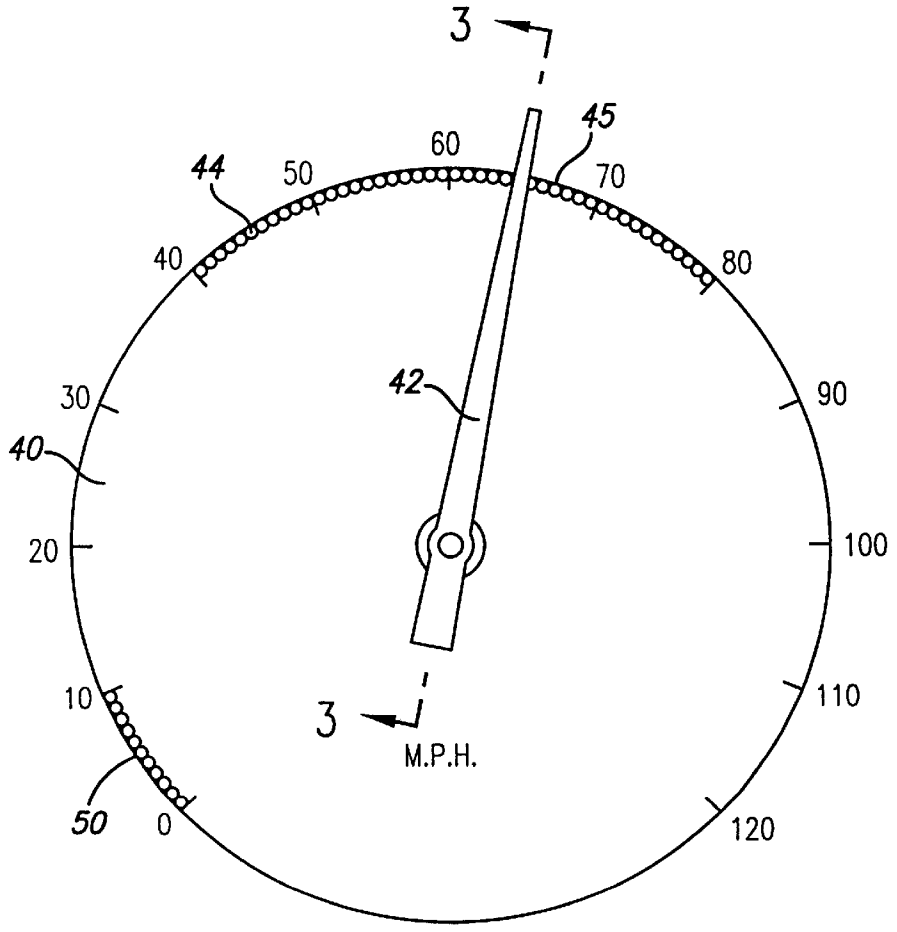
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12


3
45
44
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60
70
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110
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M.P.H.
50
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120

FIG. 2

FIG. 3

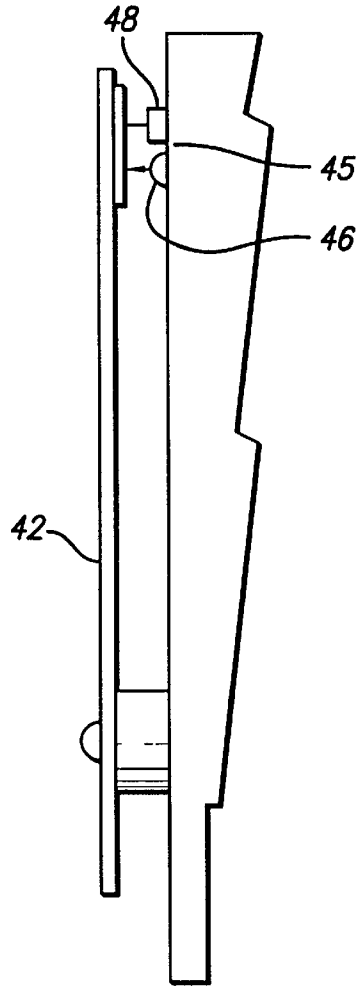


FIG. 5

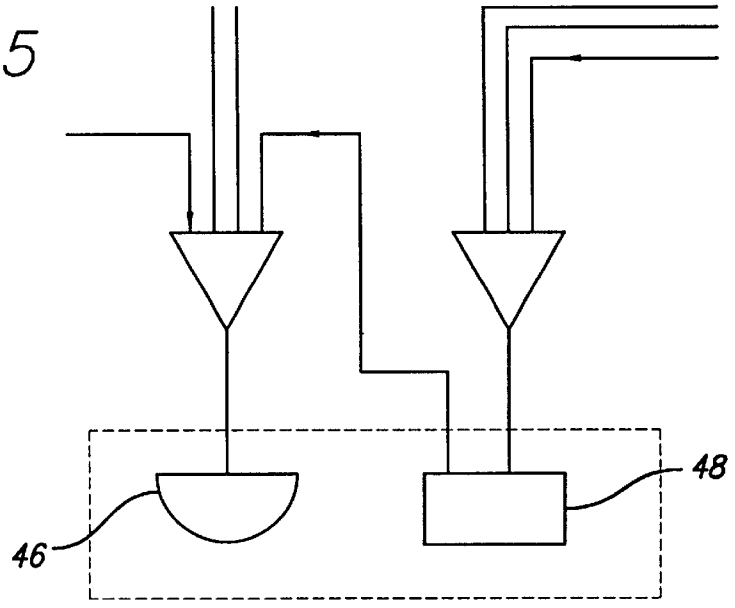
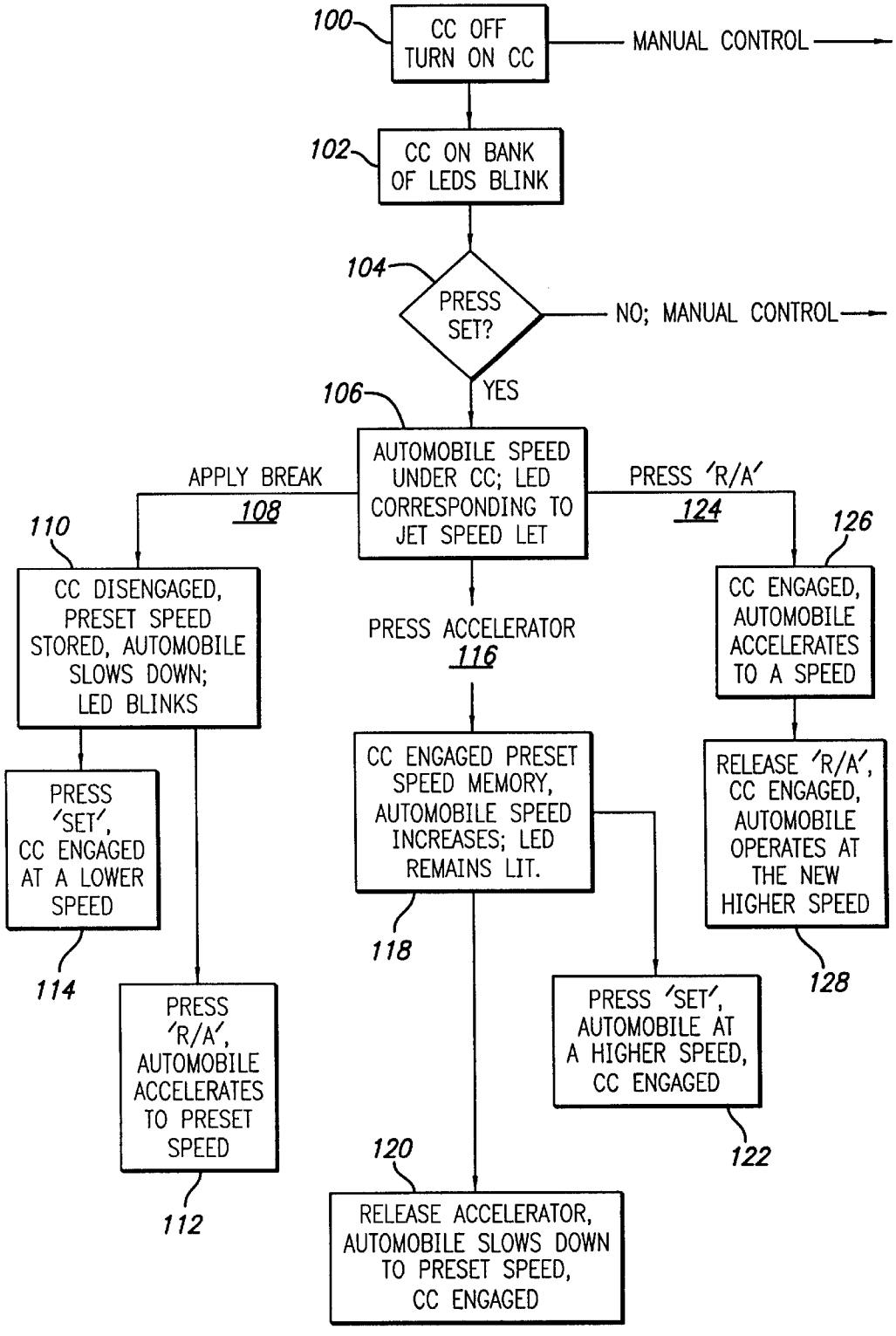


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
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Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

GENERAL MOTORS COMPANY

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE

DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD

/S/ RICHARD D. KIRK, ESQ. (RK0922)

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RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. _____
	)	
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 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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EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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

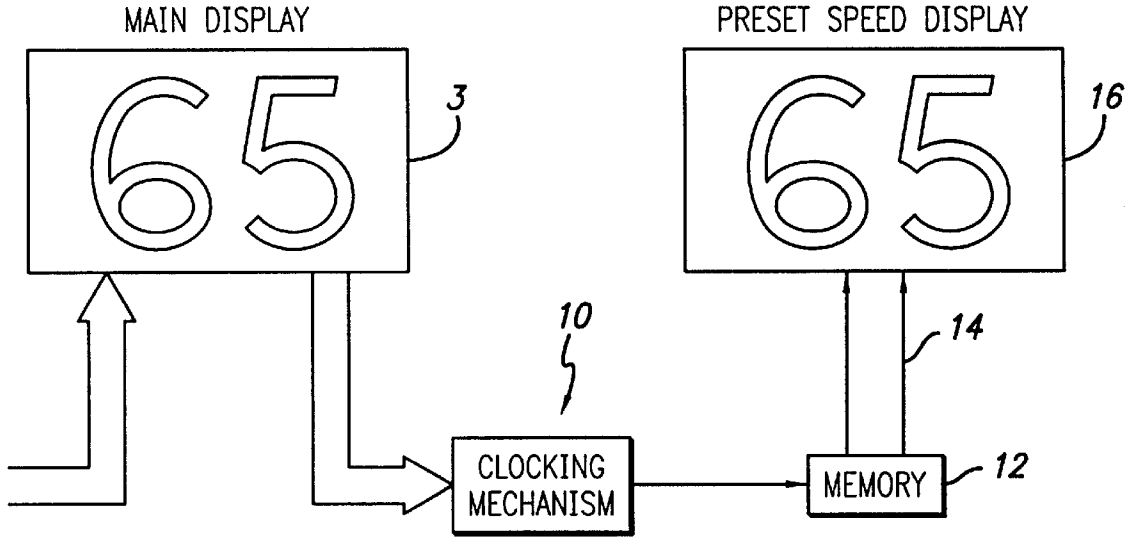
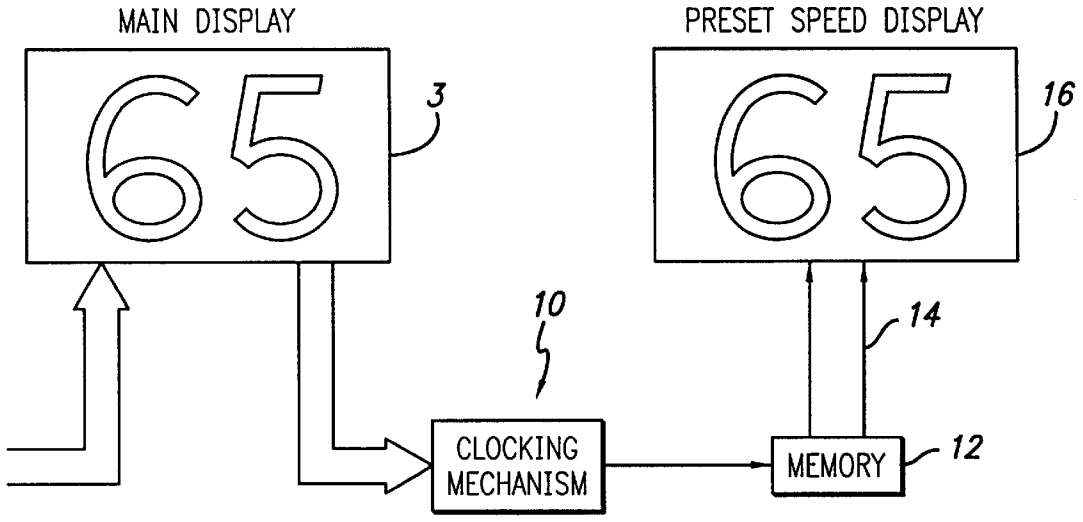


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

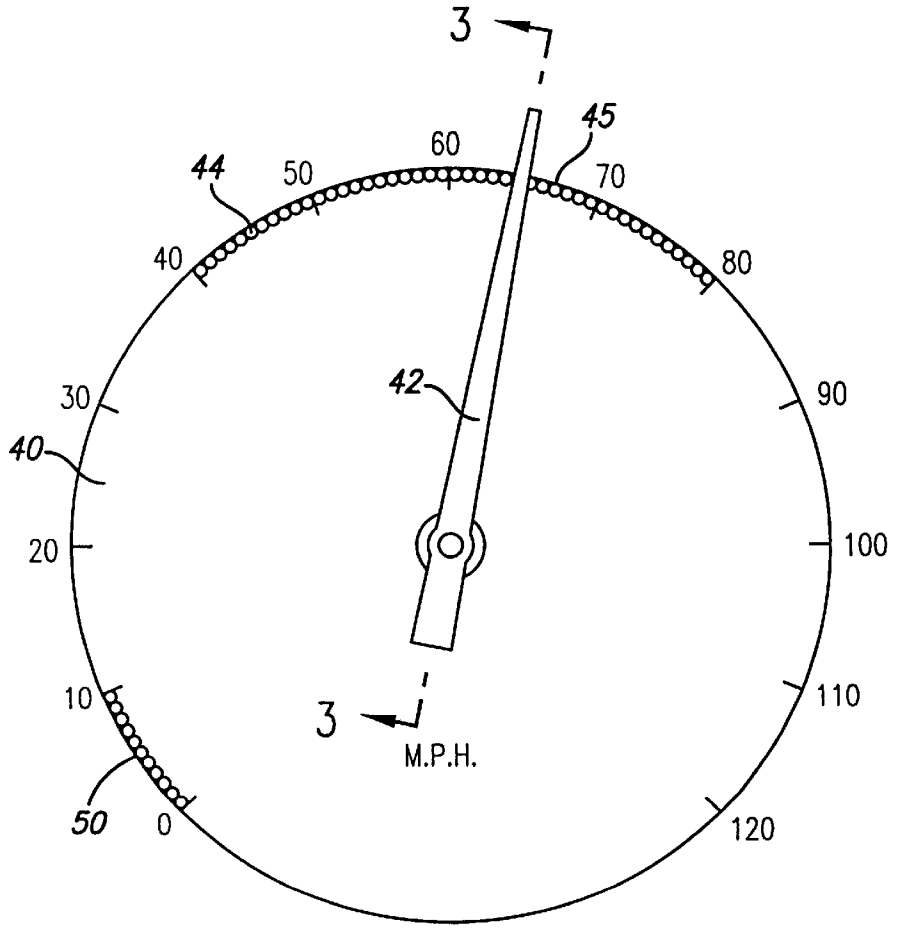

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

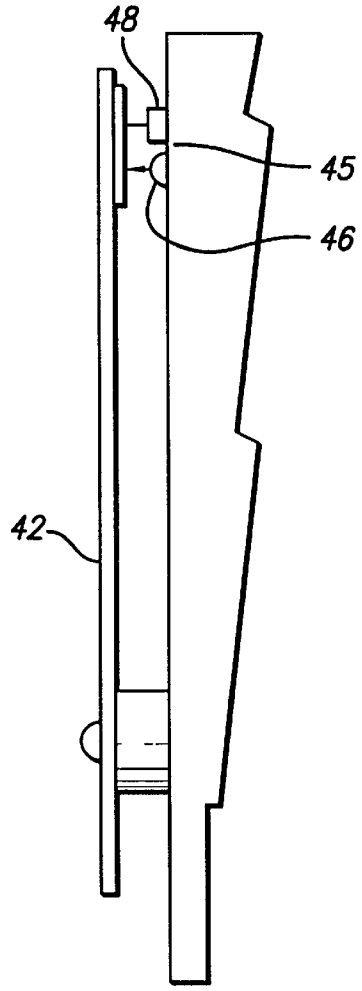


FIG. 5

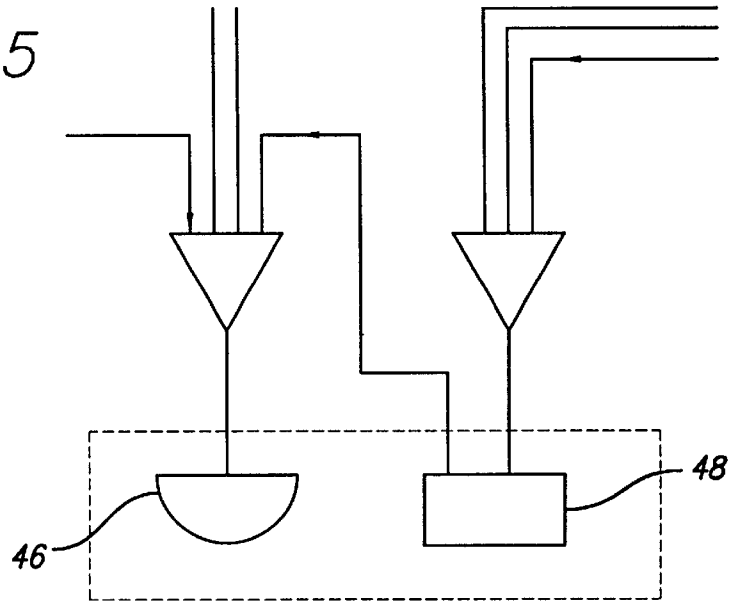
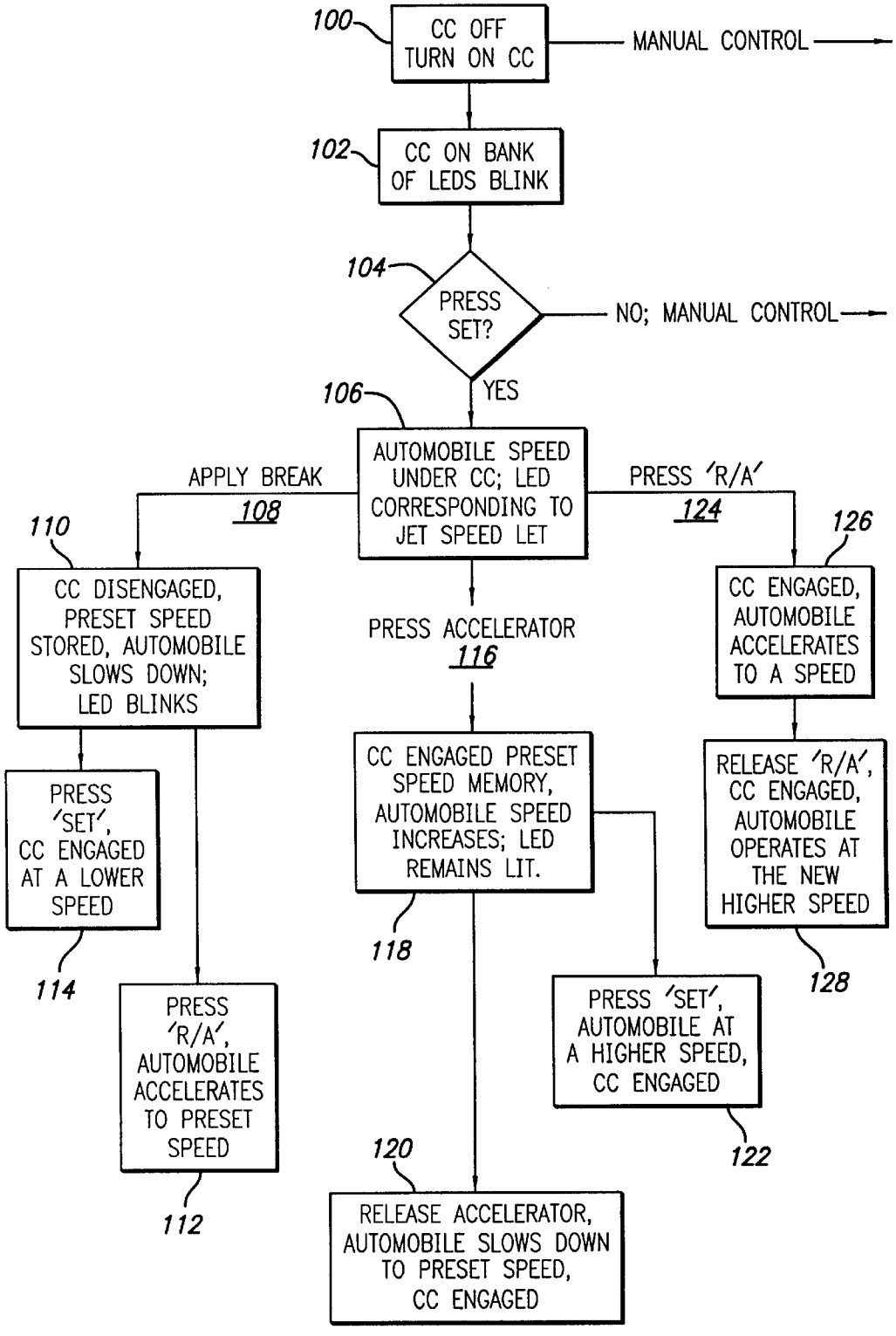


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
Bayard, P.A.
222 Delaware Avenue, Suite 900
Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

JAGUAR LAND ROVER NORTH AMERICA LLC

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. General Motors Company	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE

DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD

/S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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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Stephen B. Brauerman (#4952)
Vanessa R. Tiradentes (#5398)
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(302) 655-5000
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sbrauerman@bayardlaw.com
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Telephone: (310) 826-7474
Facsimile: (310) 826-6991
agiza@raklaw.com
mfenster@raklaw.com

EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

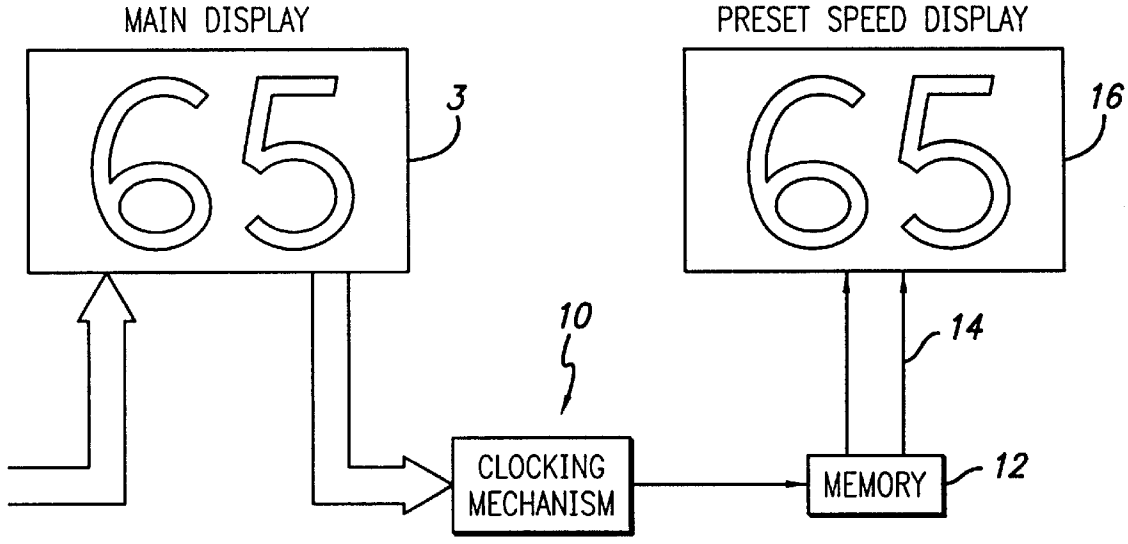
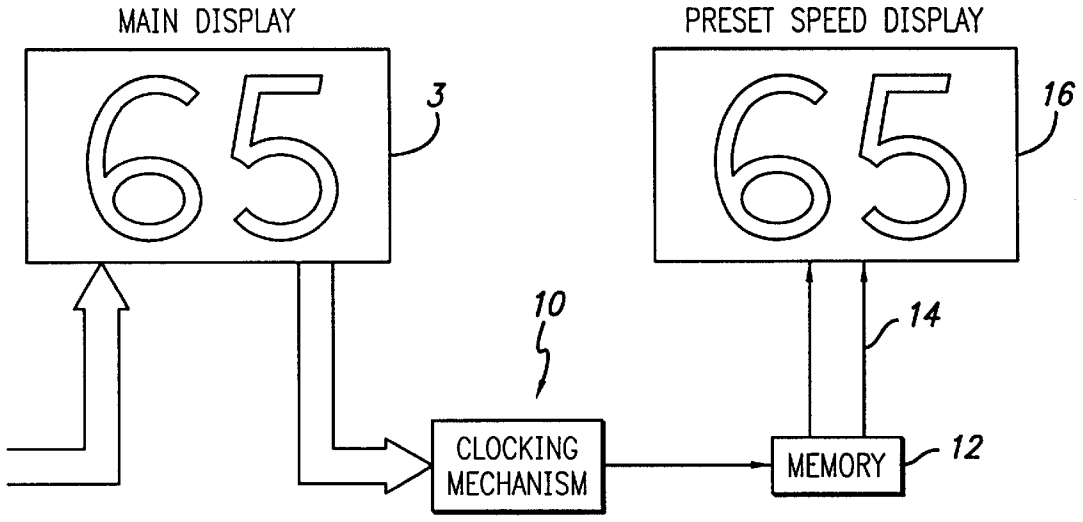


FIG. 1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PRESET SPEED DISPLAY
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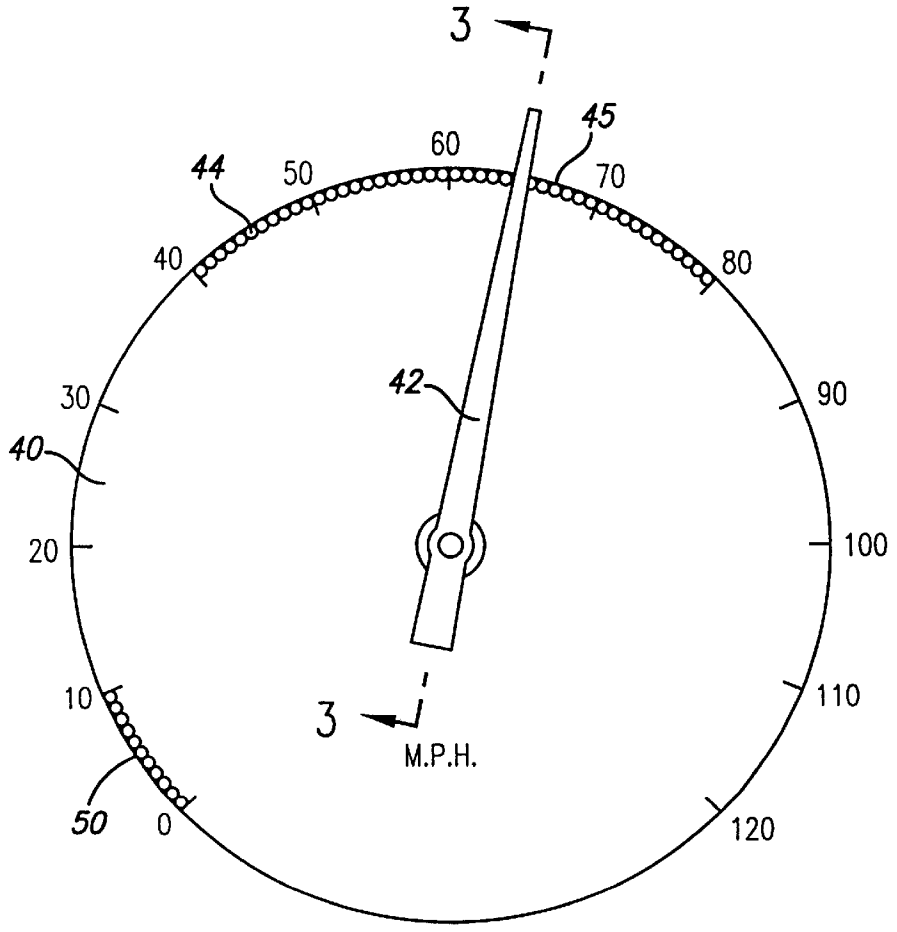
16
10
14
CLOCKING MECHANISM
MEMORY
12


3
45
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60
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FIG. 2

FIG. 3

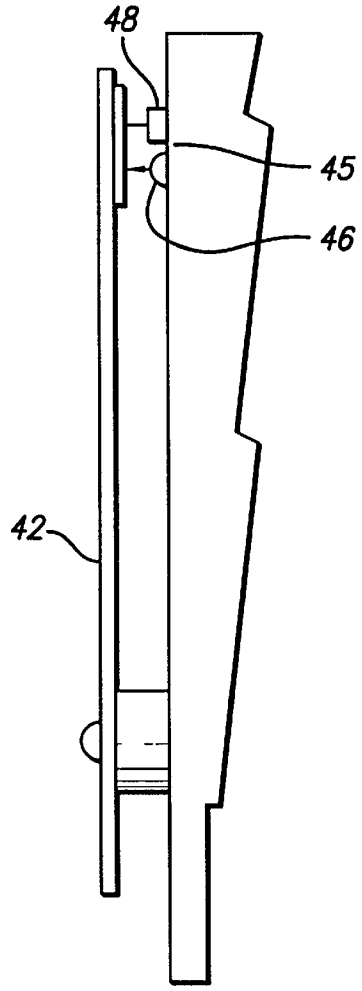


FIG. 5

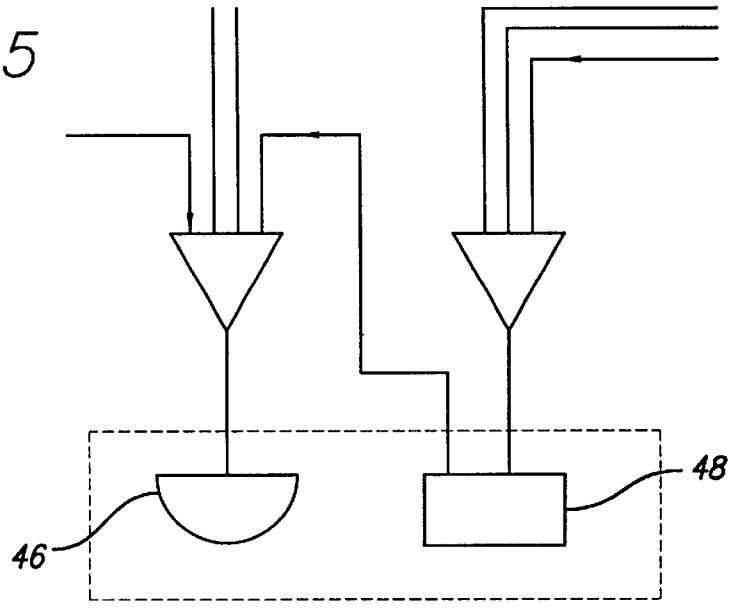
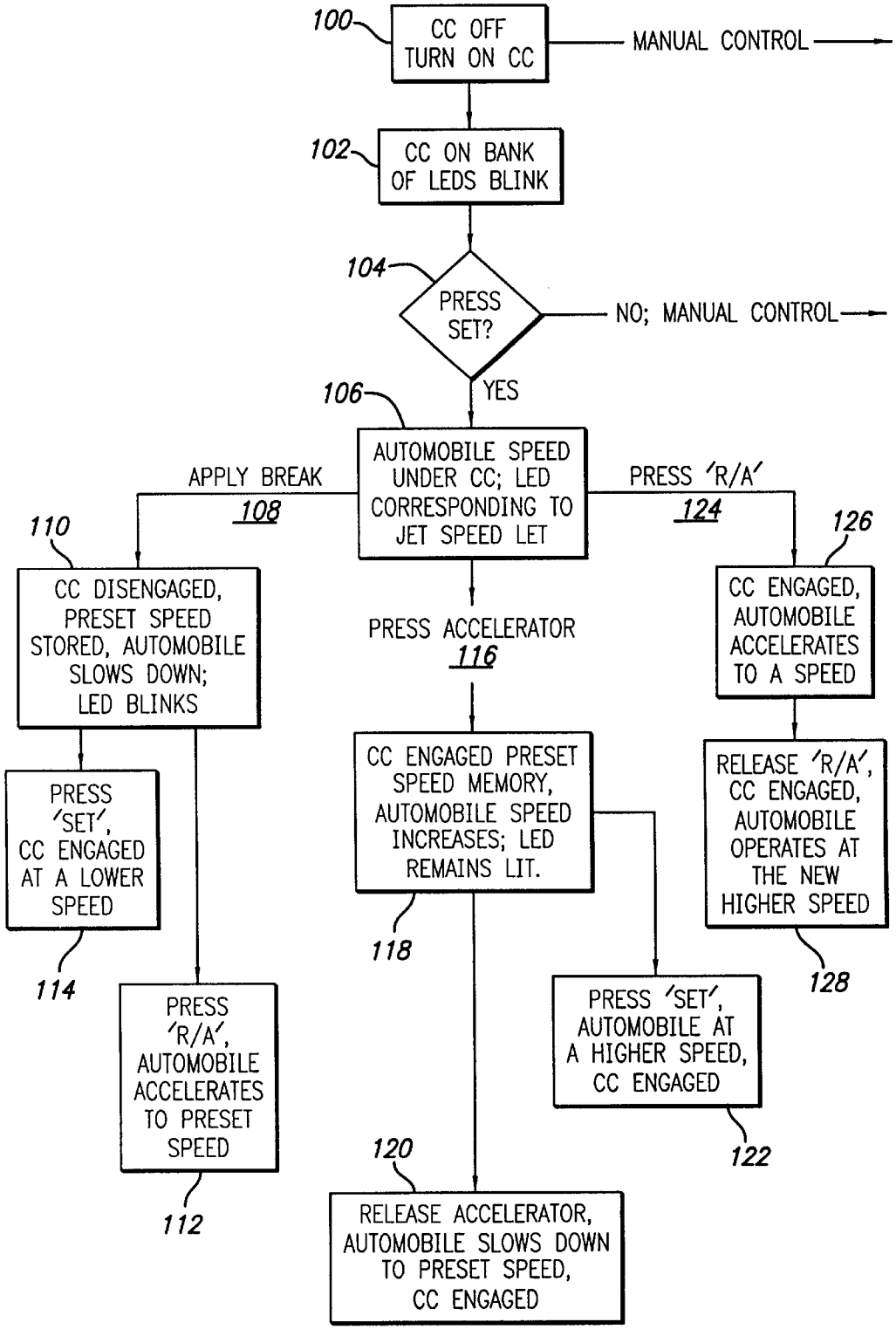


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

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County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
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	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
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- ☐ 160 Stockholders' Suits
- ☐ 190 Other Contract
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REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
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	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE: DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD: /S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. _____
	)	
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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Stephen B. Brauerman (#4952)
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mfenster@raklaw.com

EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

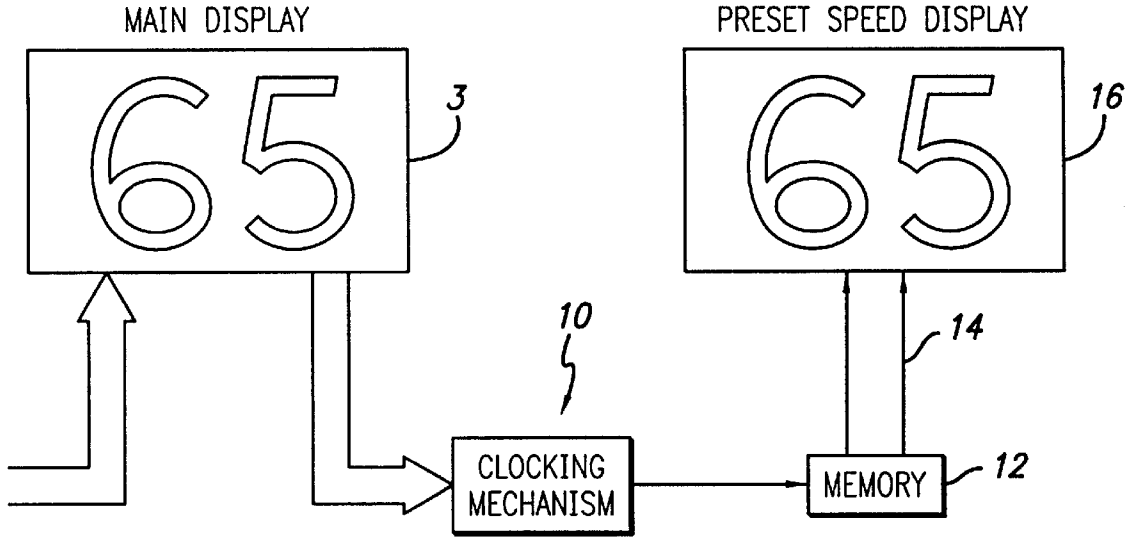
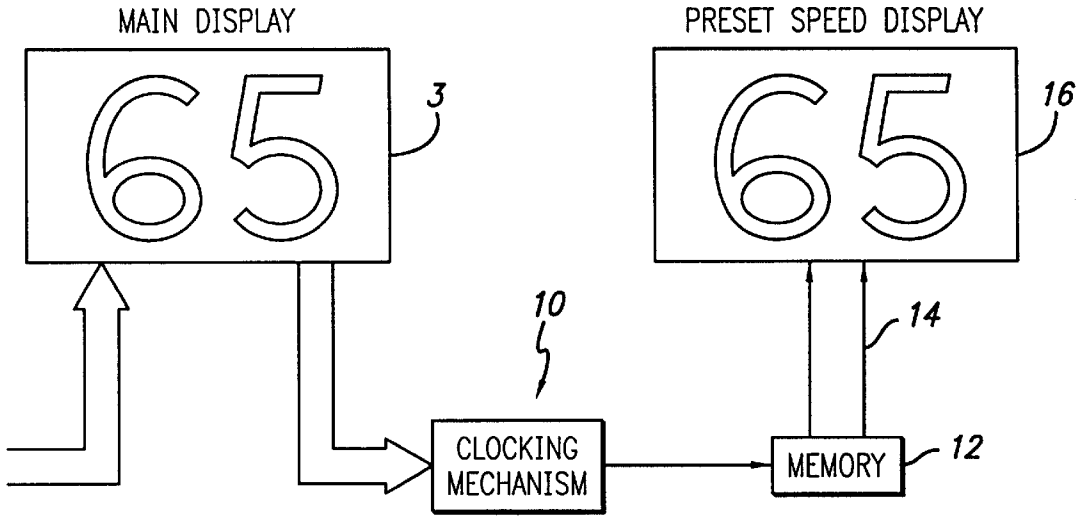


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

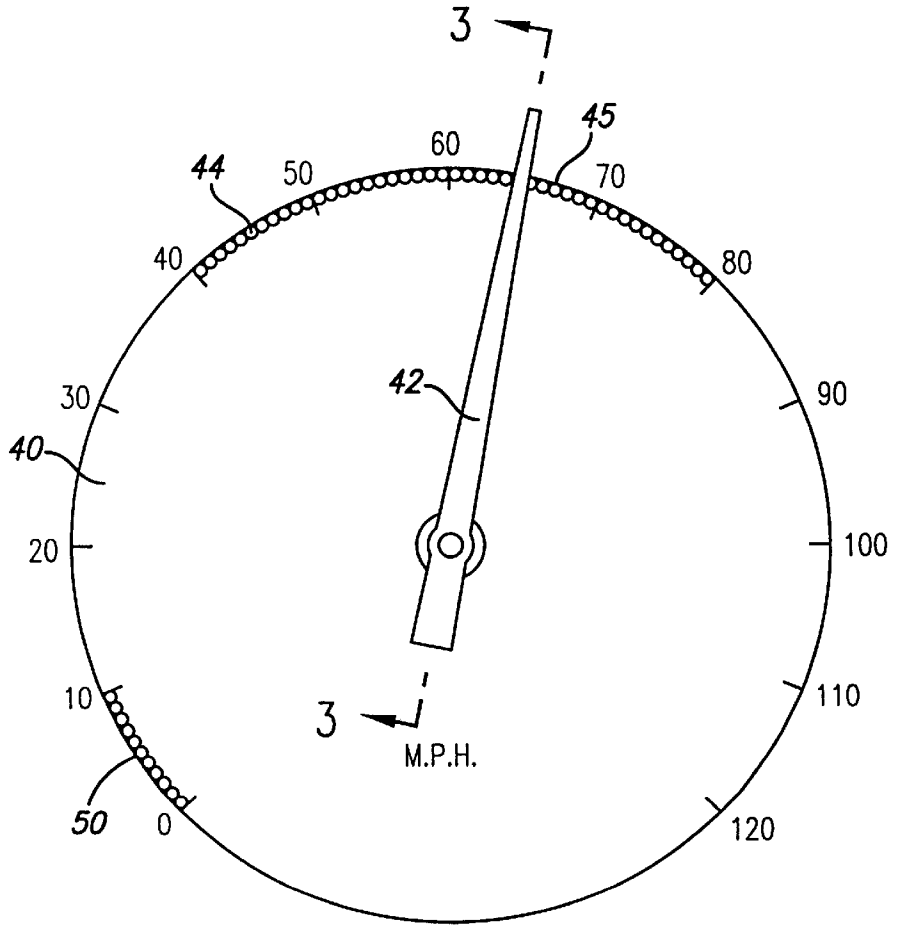

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

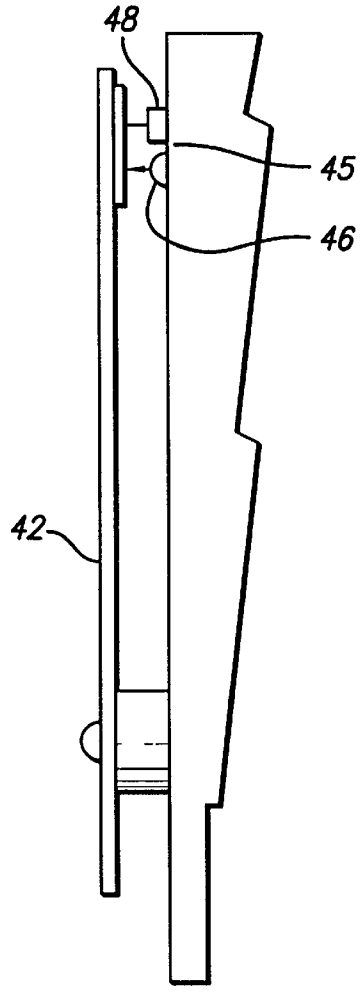


FIG. 5

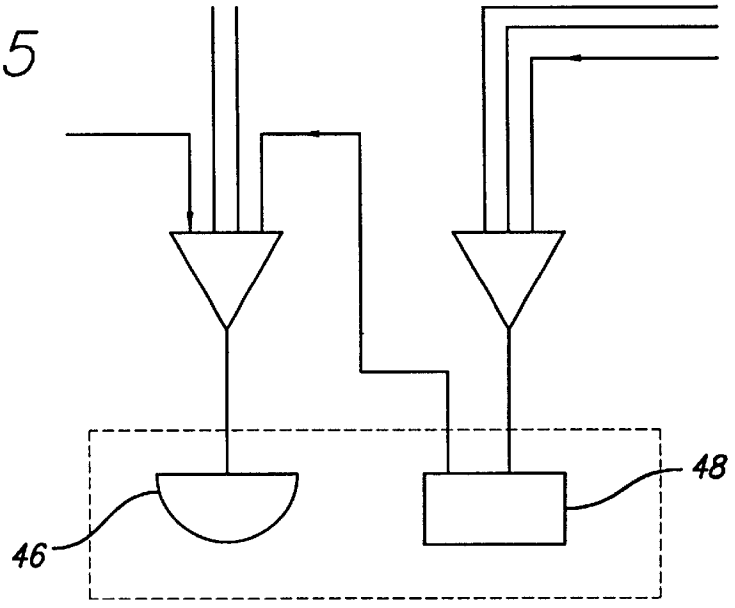
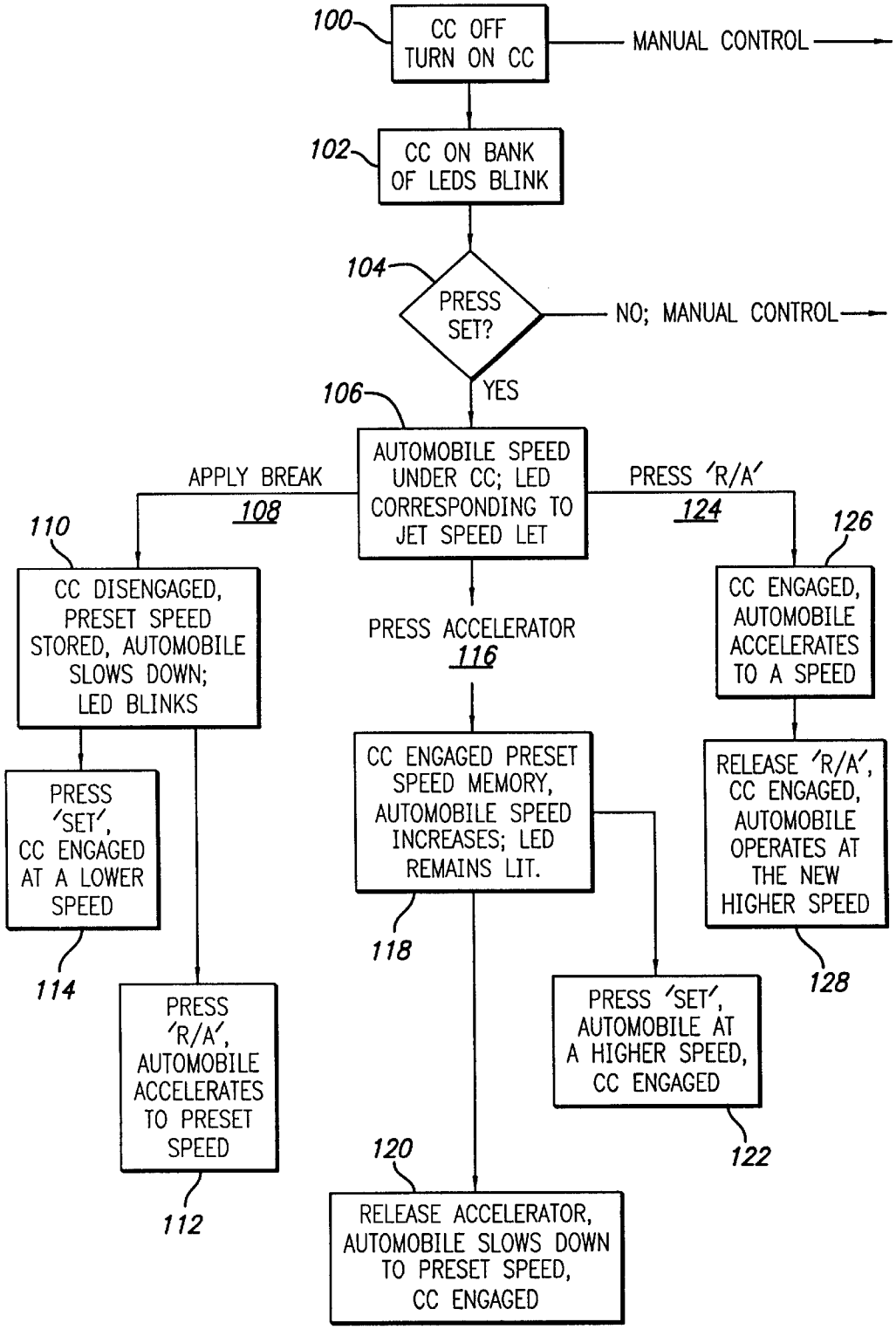


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
Bayard, P.A.
222 Delaware Avenue, Suite 900
Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

PORSCHE CARS NORTH AMERICA, INC.

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

(Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
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	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE: DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD: /S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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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EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

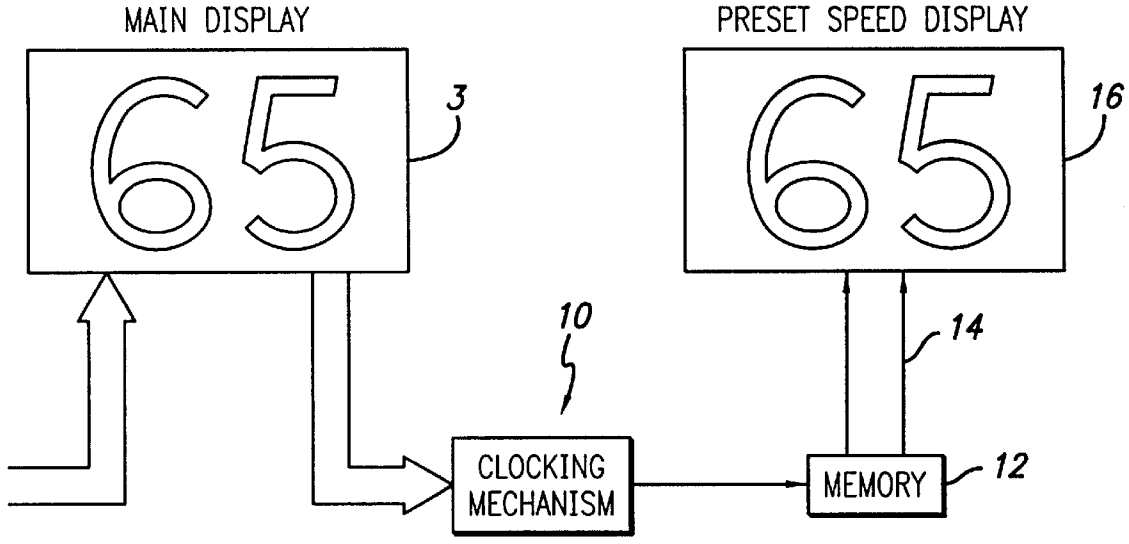
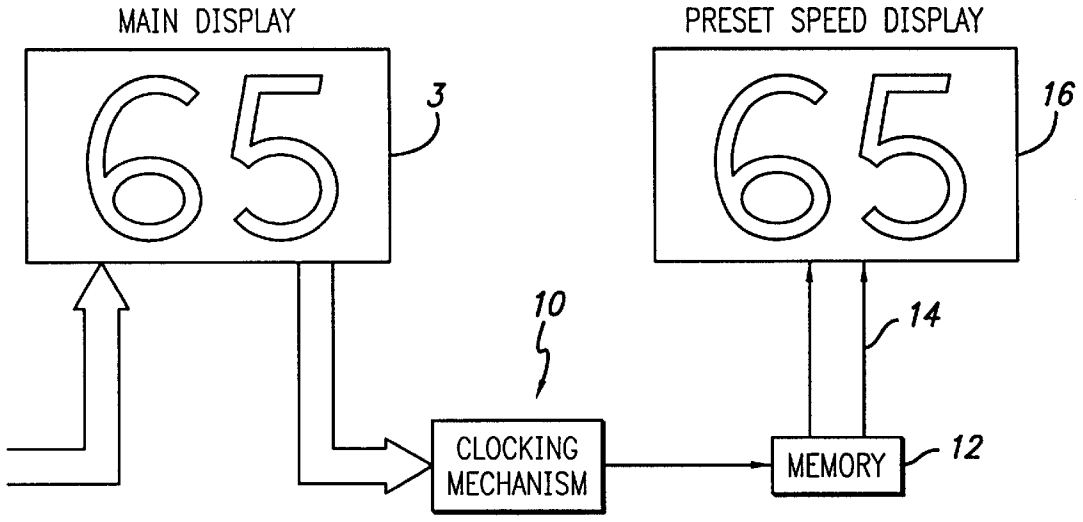


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

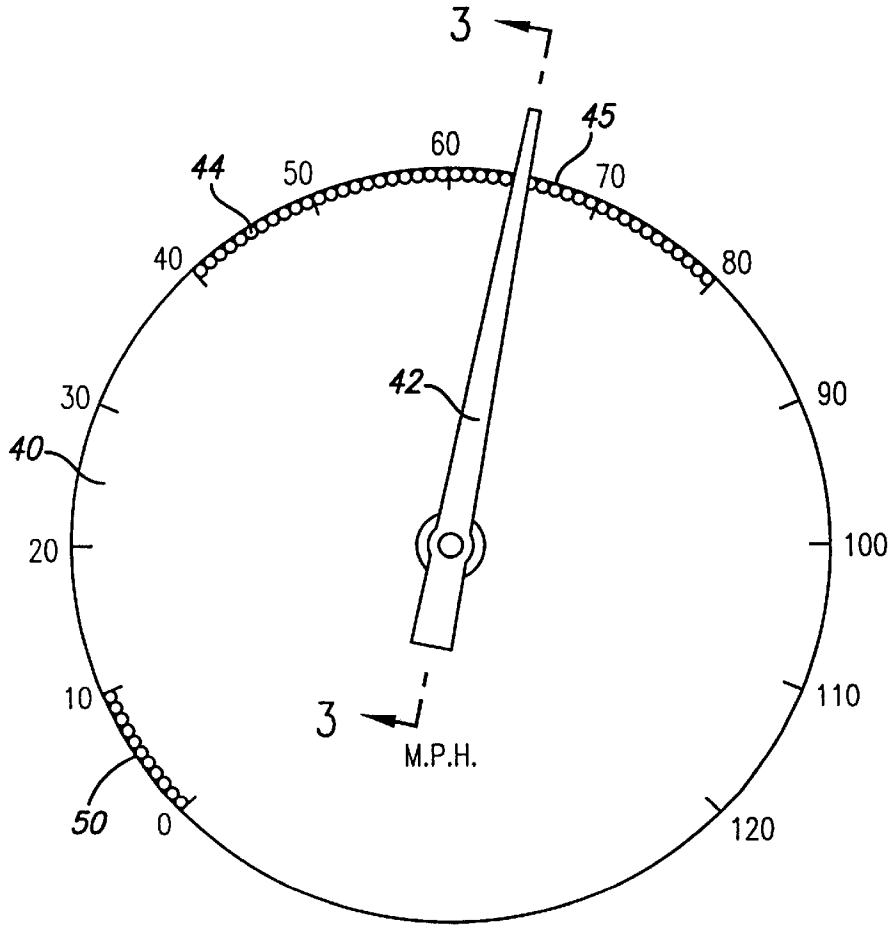

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

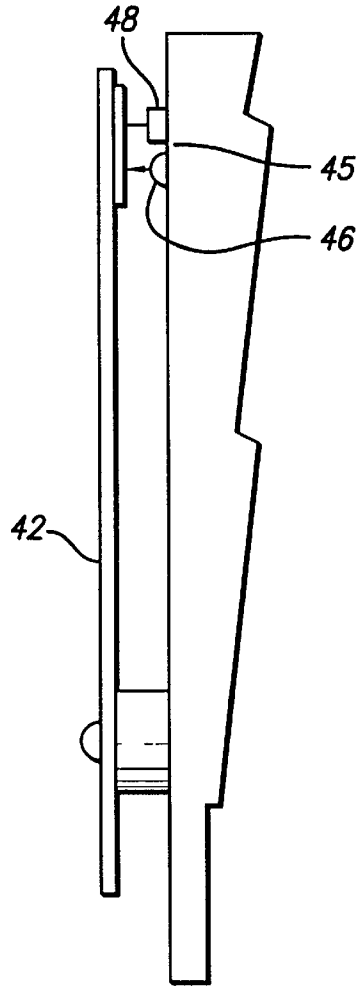


FIG. 5

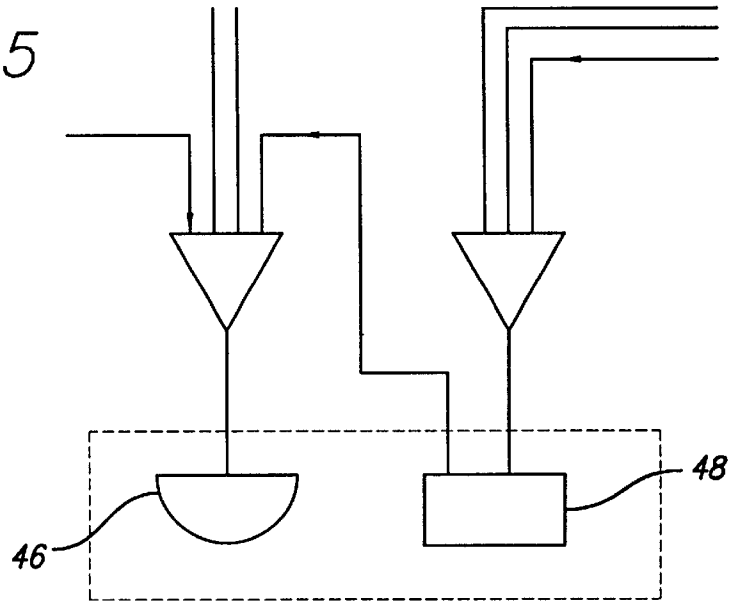
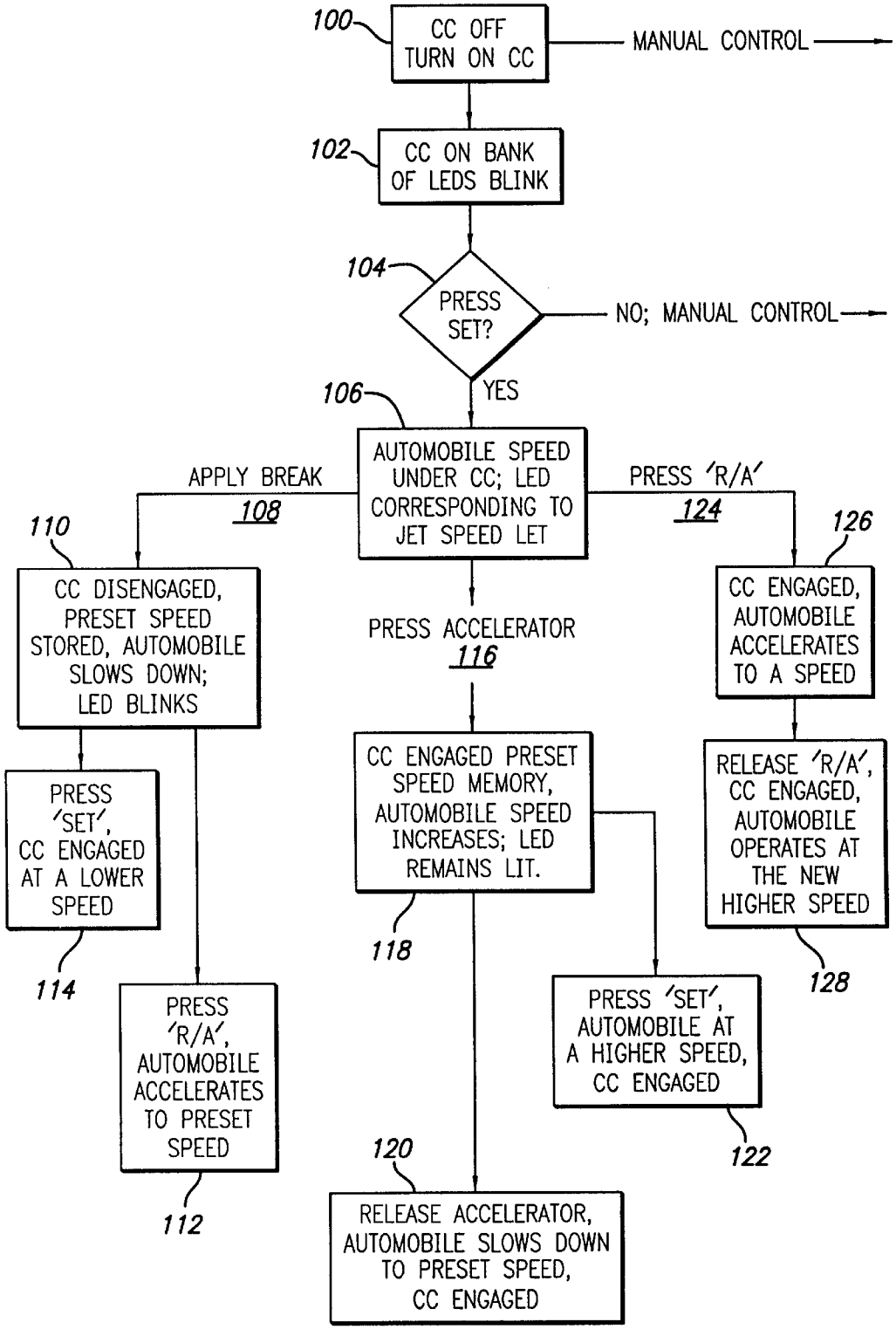


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

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County Of Residence Of First Listed Defendant New Castle County, Delaware

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II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
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- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

(Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
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	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Volvo Cars of North America, LLC	Unassigned	Filed on December 21, 2012

DATE: DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD: /S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. _____
	)	
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 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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Stephen B. Brauerman (#4952)
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Facsimile: (310) 826-6991
agiza@raklaw.com
mfenster@raklaw.com

EXHIBIT A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

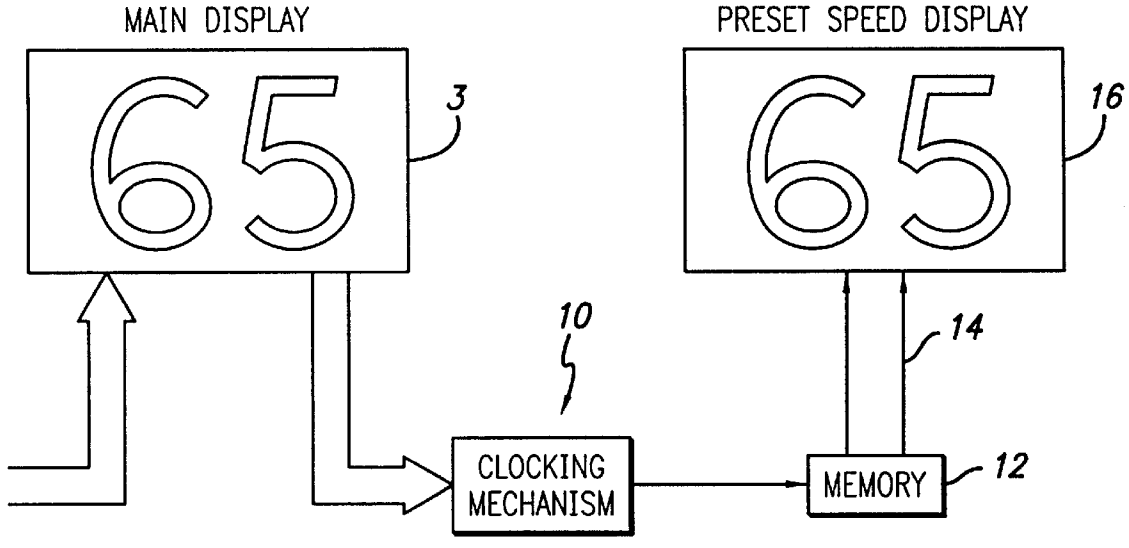
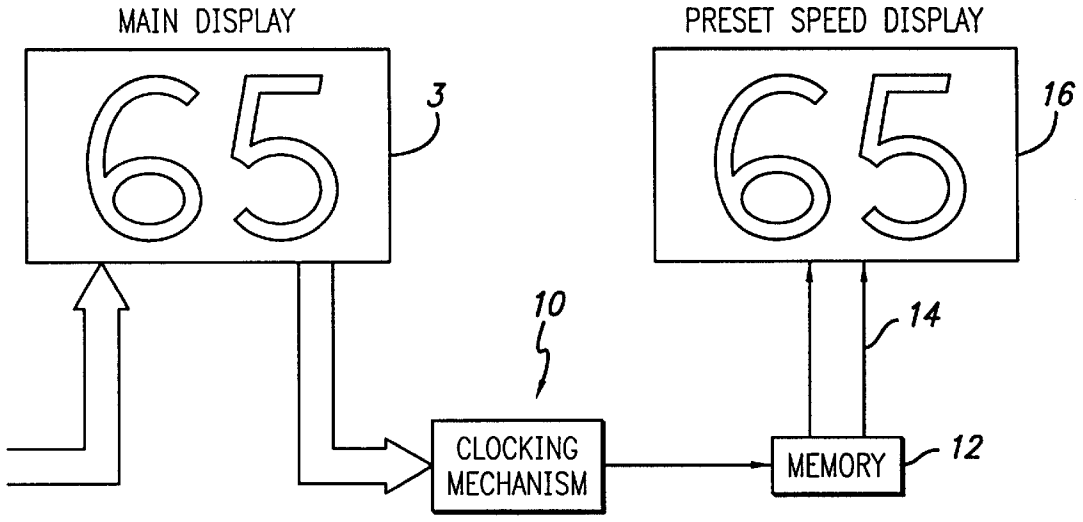


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

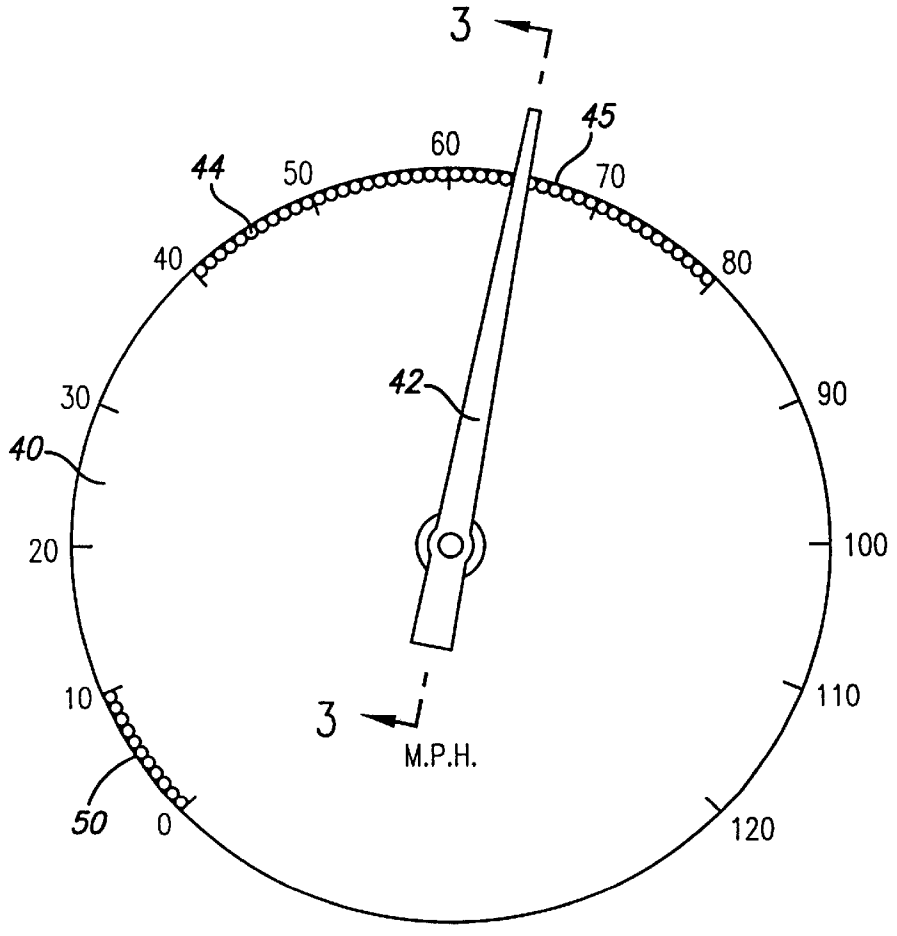

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

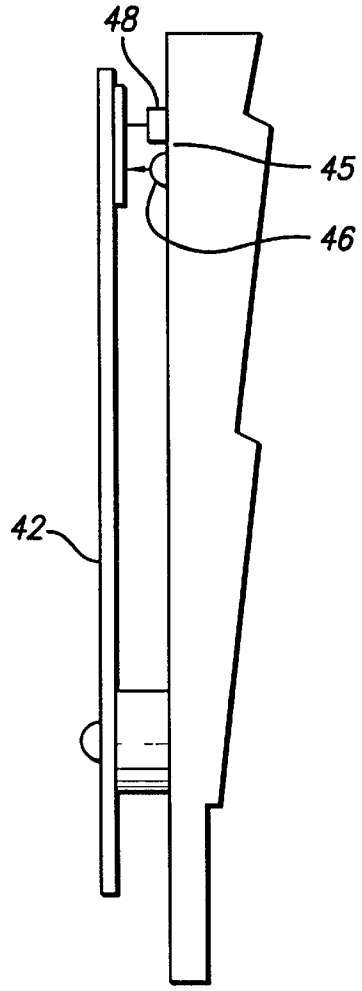


FIG. 5

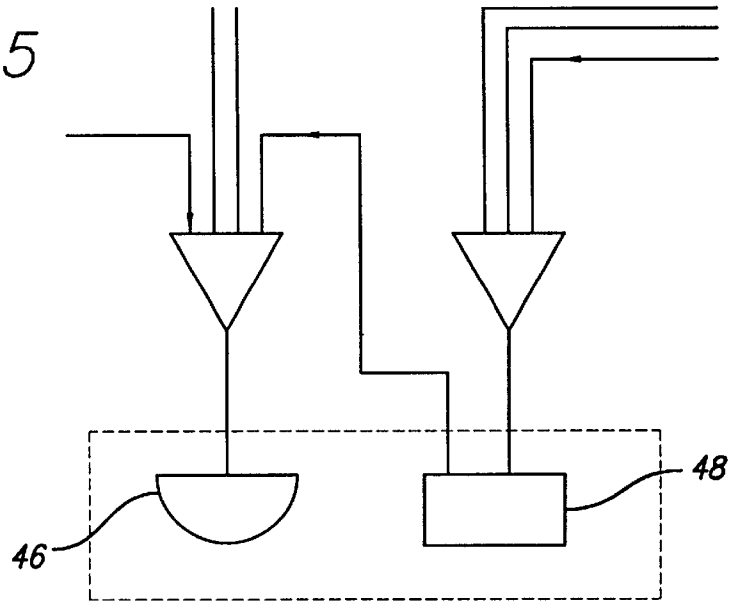
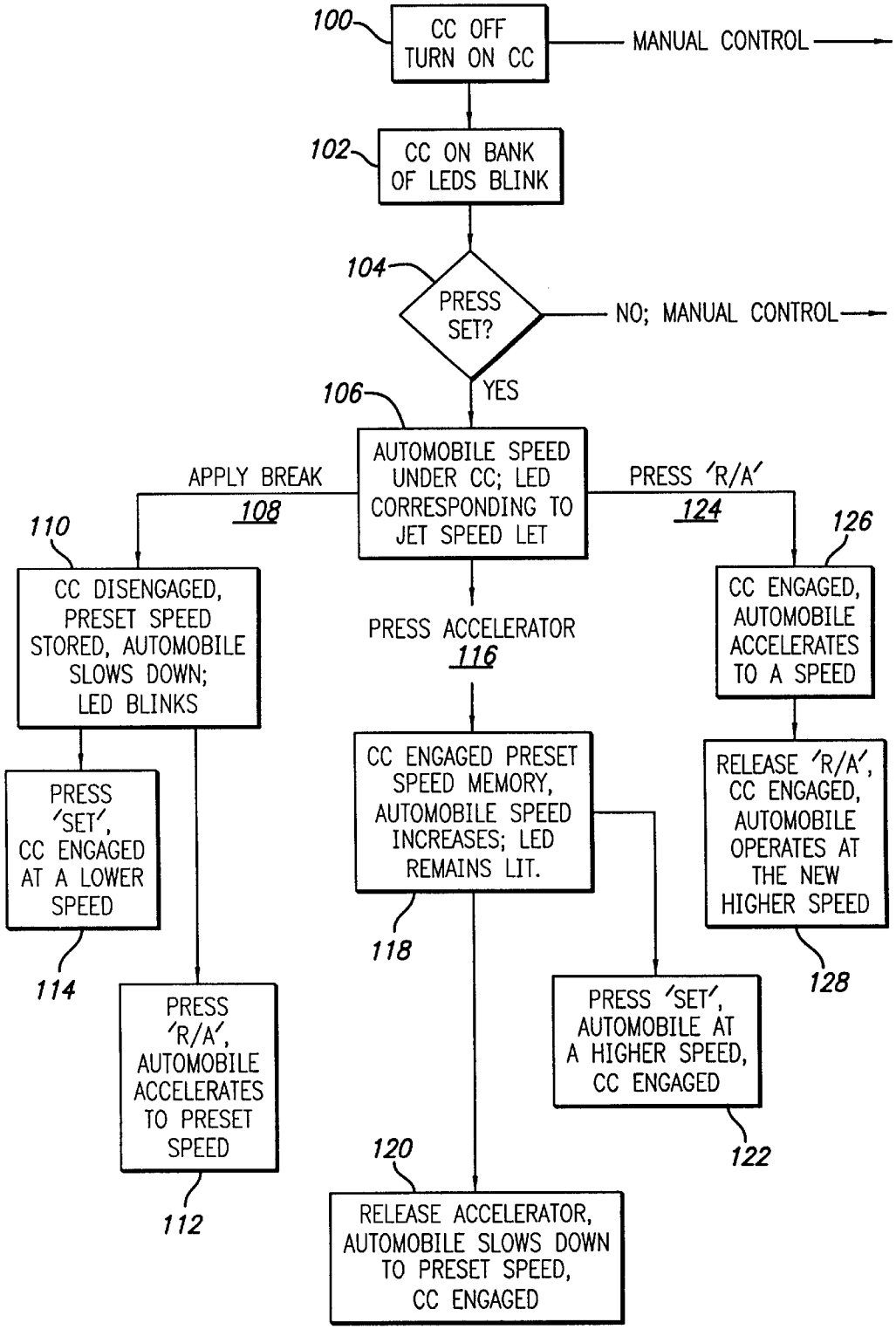


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

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(302) 655-5000

DEFENDANTS

VOLVO CARS OF NORTH AMERICA, LLC

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America, LLC	Unassigned	
Cruise Control Technologies LLC v. BMW of North America, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Chrysler Group LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Ford Motor Company	Unassigned	Filed on December 21, 2012
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	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Mercedes-Benz USA, LLC	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Porsche Cars North America, Inc.	Unassigned	Filed on December 21, 2012
Cruise Control Technologies LLC v. Subaru of America, Inc.	Unassigned	Filed on December 21, 2012

DATE: DECEMBER 21, 2012

SIGNATURE OF ATTORNEY OF RECORD: /S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ___ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)
	)
Plaintiff,	)
	)
v.	)
	)
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

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Exhibit A

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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 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**

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(51) **Int. Cl.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

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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

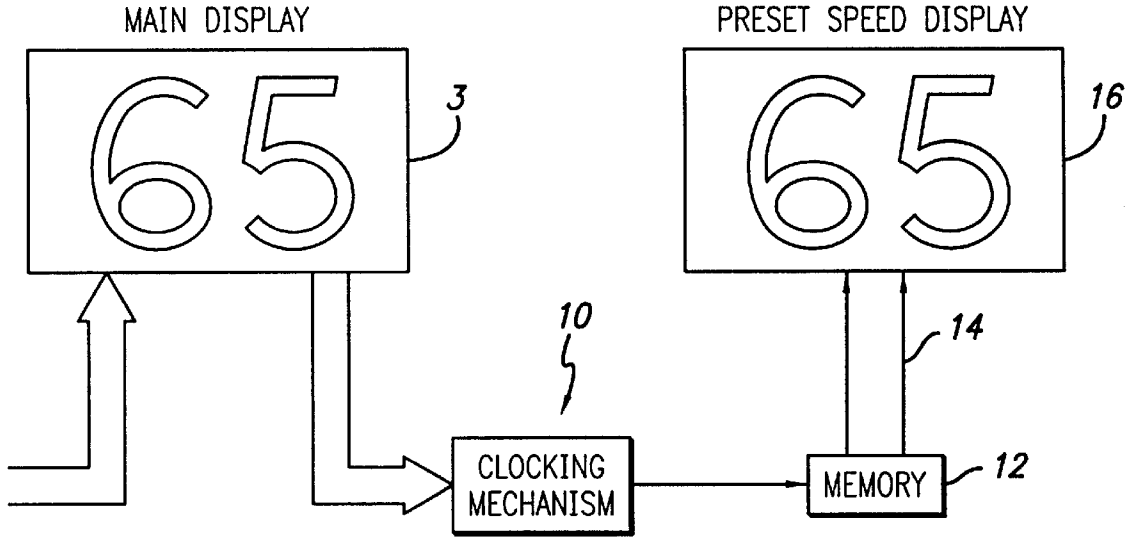
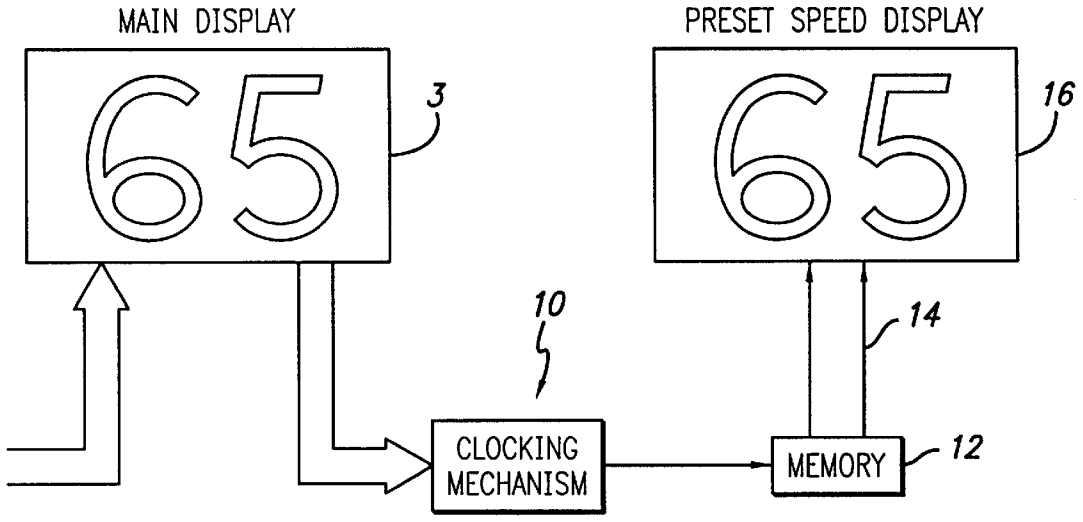


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

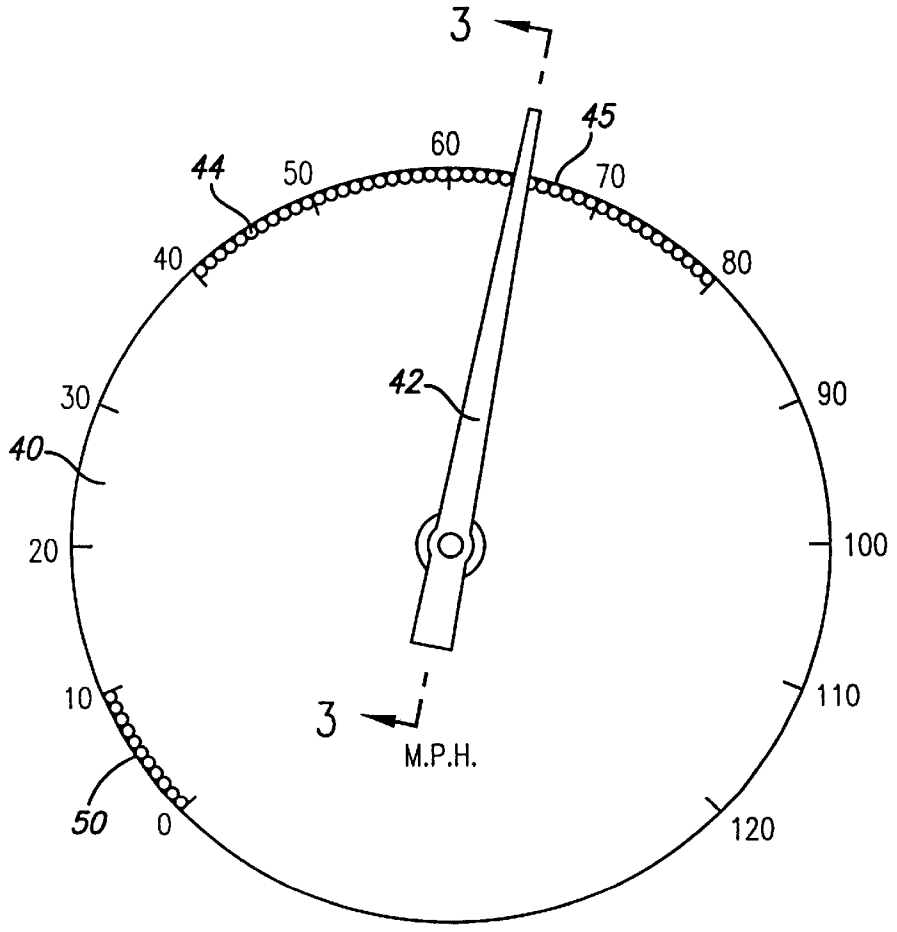

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

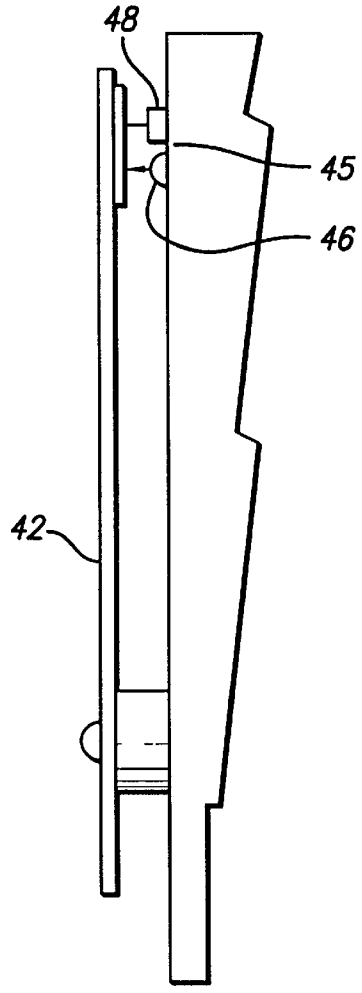


FIG. 5

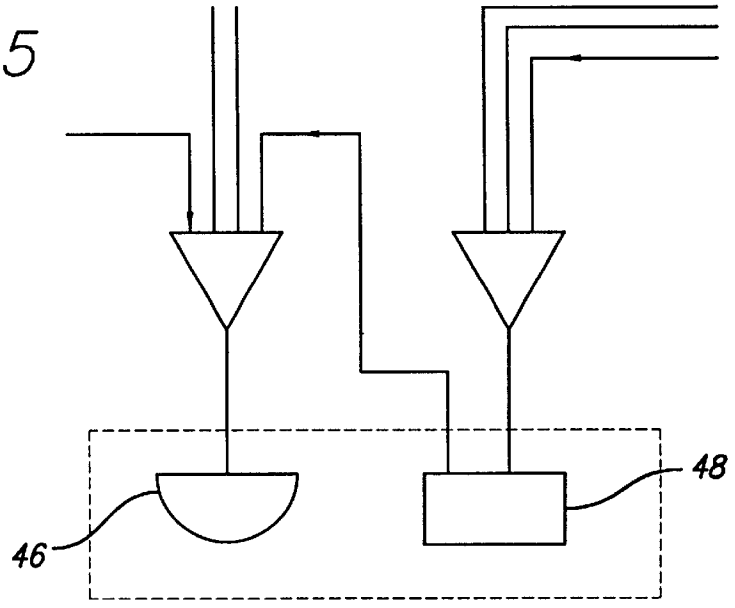
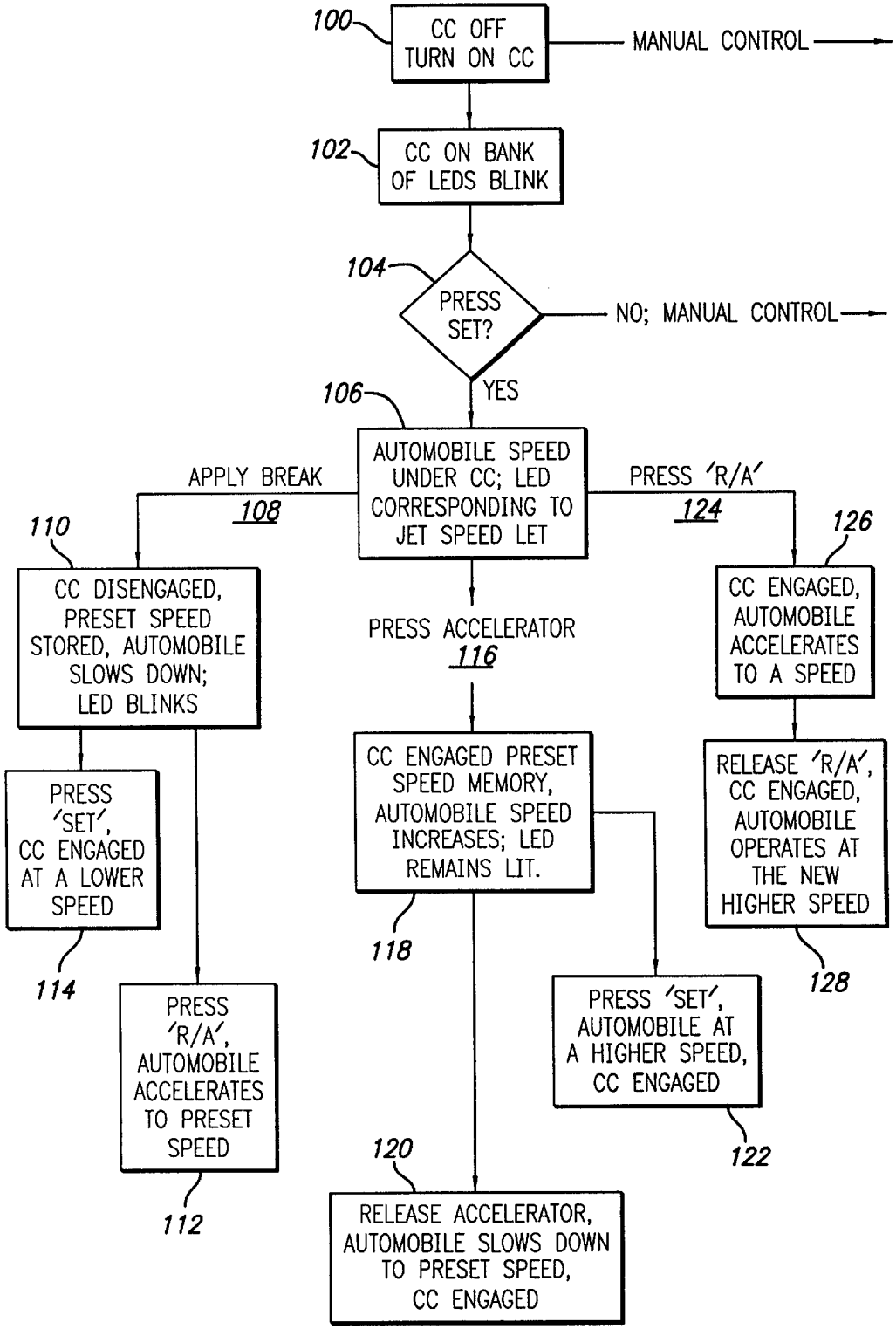


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
Bayard, P.A.
222 Delaware Avenue, Suite 900
Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

AMERICAN HONDA MOTOR CO., INC.

County Of Residence Of First Listed Defendant Los Angeles County, California

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

See Addendum attached hereto.

JUDGE

DOCKET NUMBERS

DATE

JANUARY 15, 2013

SIGNATURE OF ATTORNEY OF RECORD

/S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ____ JUDGE _____ MAG. JUDGE _____

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Toyota Motor North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Volkswagen Group of America, Inc.	Unassigned	Filed January 15, 2013

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)
	)
Plaintiff,	)
	)
v.	)
	)
HYUNDAI MOTOR AMERICA,	)
	)
Defendant.	)

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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

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sbrauerman@bayardlaw.com
vtiradentes@bayardlaw.com

Attorneys for Plaintiff Cruise Control Technologies LLC

Exhibit A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

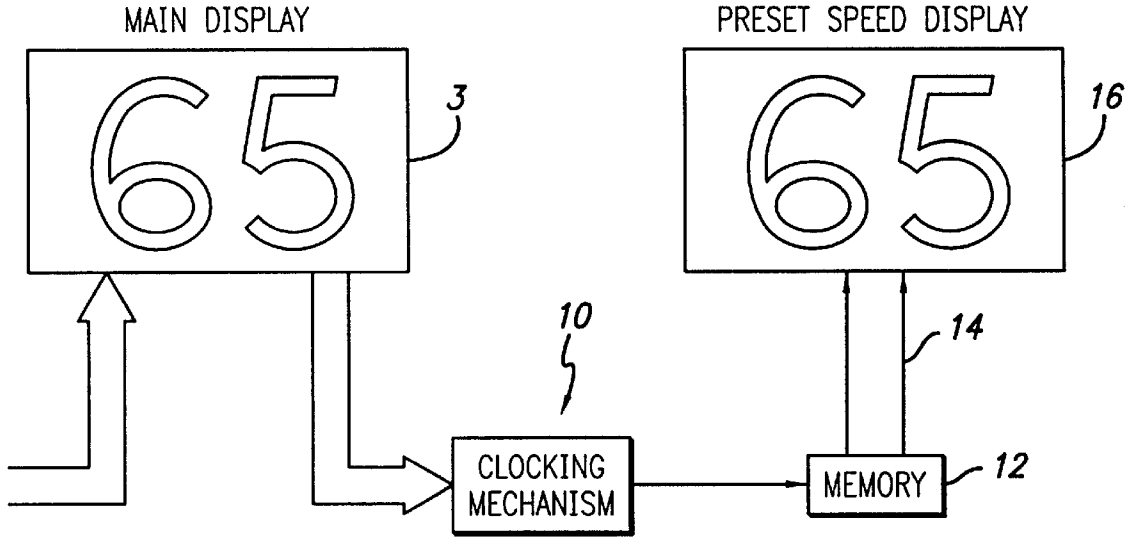
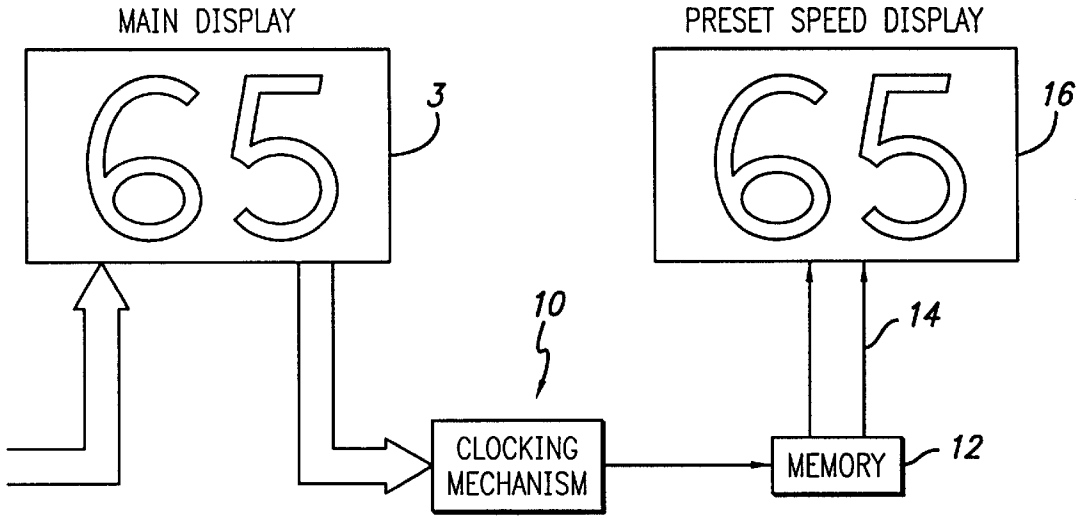


FIG. 1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3
PRESET SPEED DISPLAY
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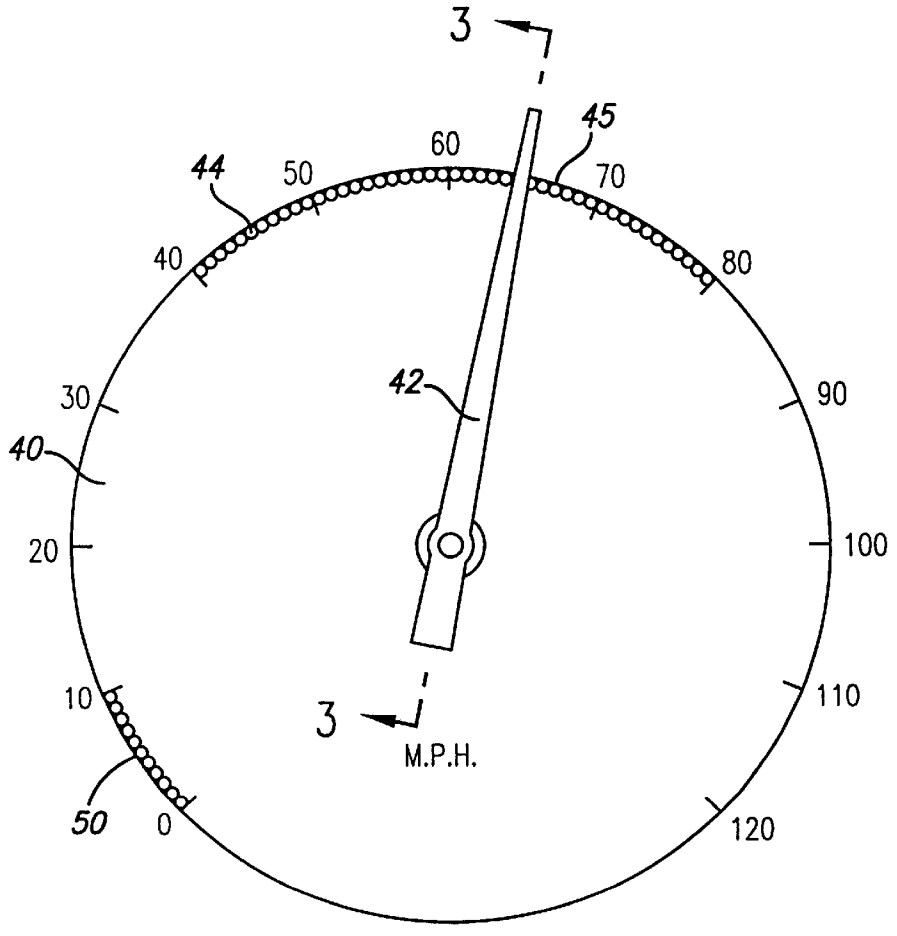
16
10
14
CLOCKING MECHANISM
MEMORY
12


3
45
44
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60
70
40
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120

FIG. 2

FIG. 3

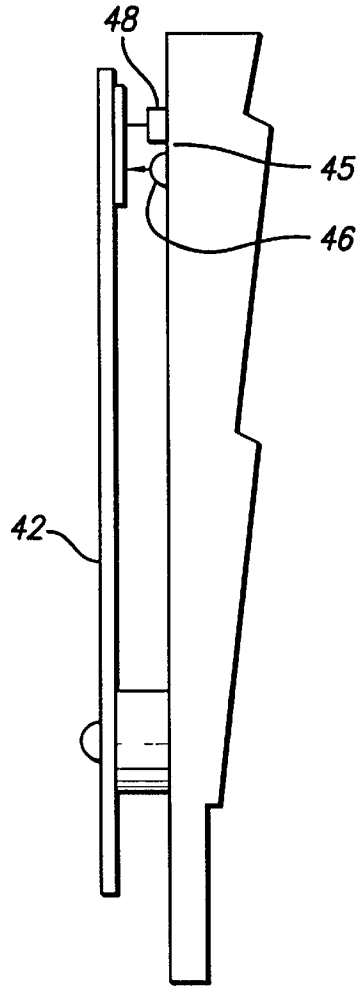


FIG. 5

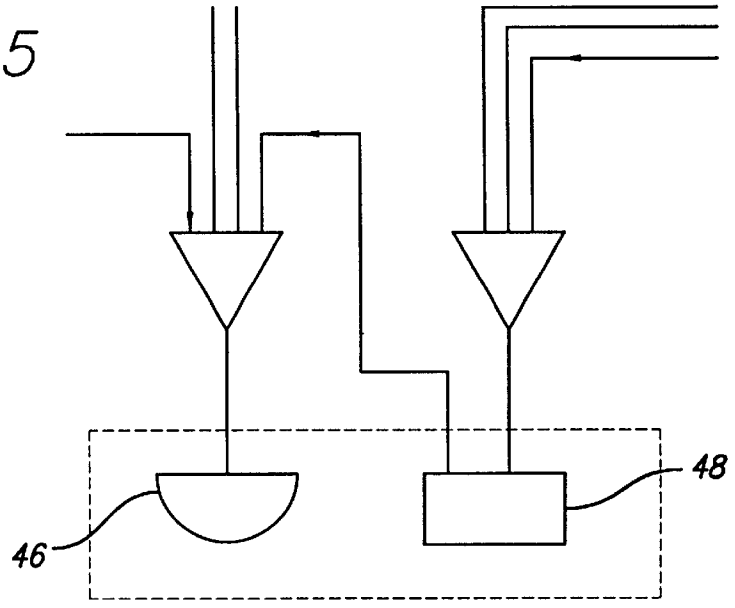
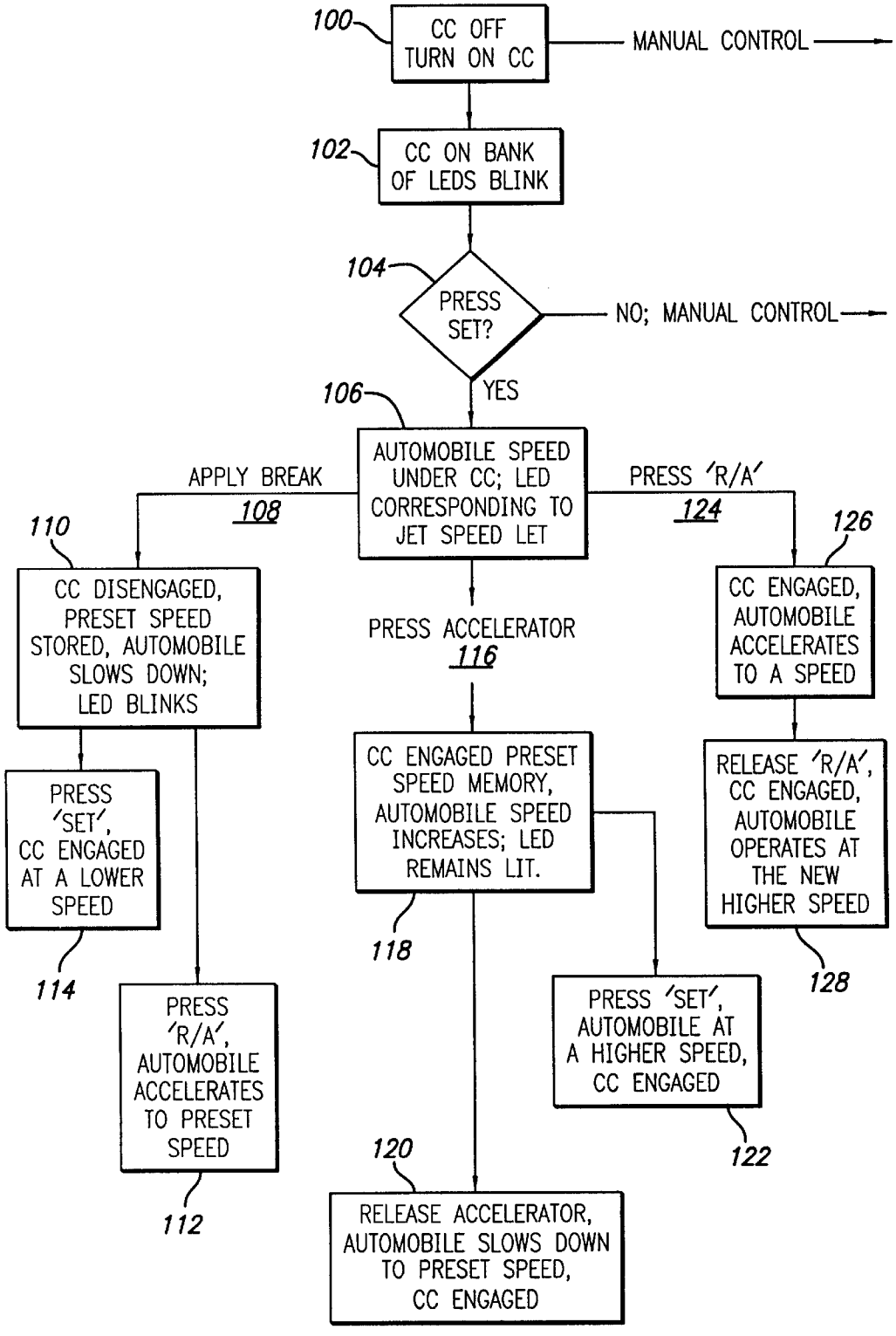


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

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DEFENDANTS

HYUNDAI MOTOR AMERICA

County Of Residence Of First Listed Defendant Orange County, California

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 110 Insurance
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- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

See Addendum attached hereto.

JUDGE

DOCKET NUMBERS

DATE

JANUARY 15, 2013

SIGNATURE OF ATTORNEY OF RECORD

/S/ STEPHEN B. BRAUERMAN (SB4952)

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RECEIPT # _____ AMOUNT _____ APPLYING IFP ____ JUDGE _____ 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

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Attorneys for Plaintiff Cruise Control Technologies LLC

Exhibit A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 701/301; 340/438, 441, 815.4; 180/170; 345/30; 362/23, 482, 489, 459

(56) **References Cited**

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OTHER PUBLICATIONS

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

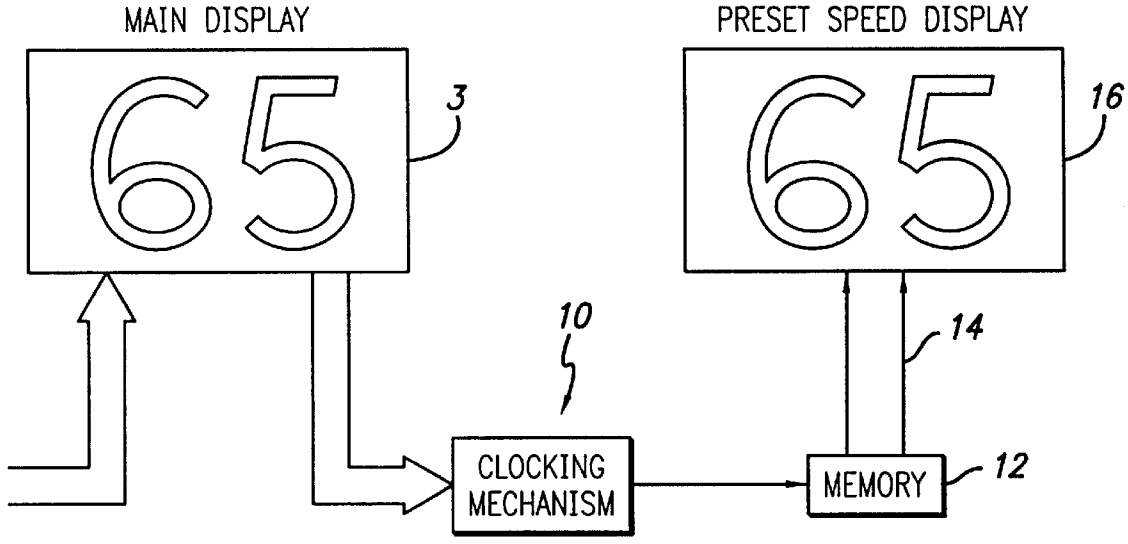
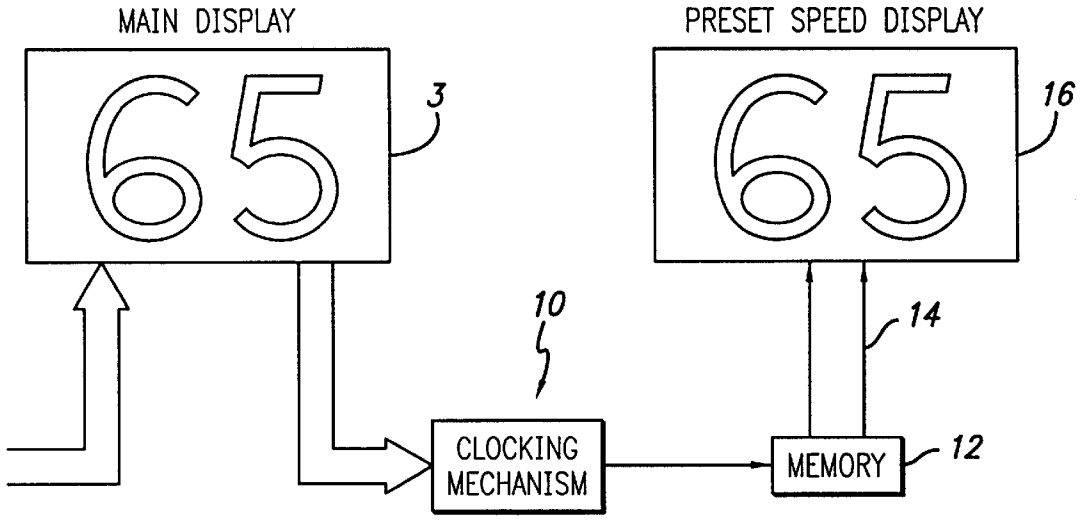


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

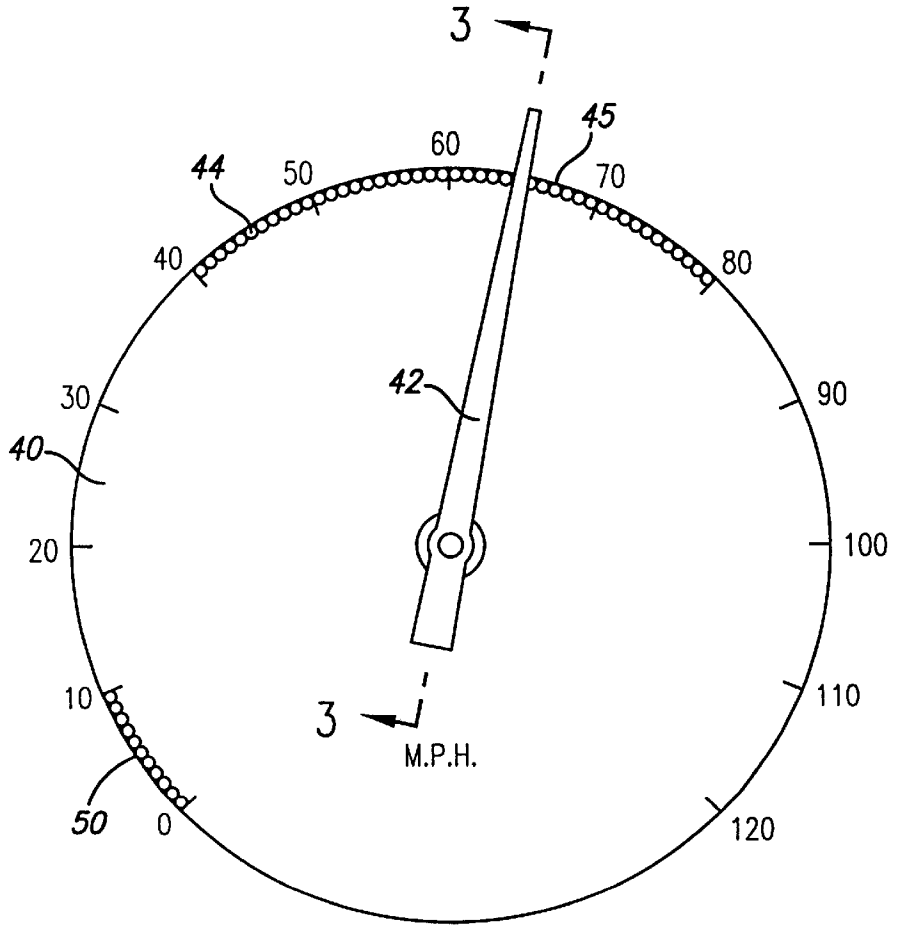

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

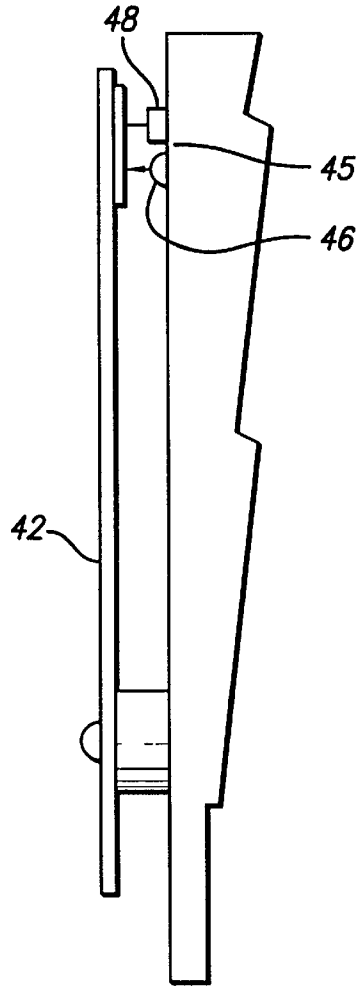


FIG. 5

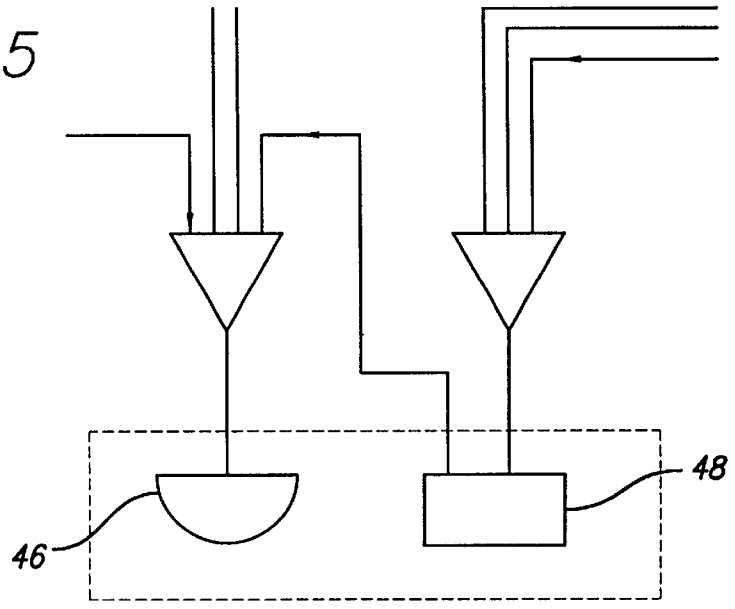
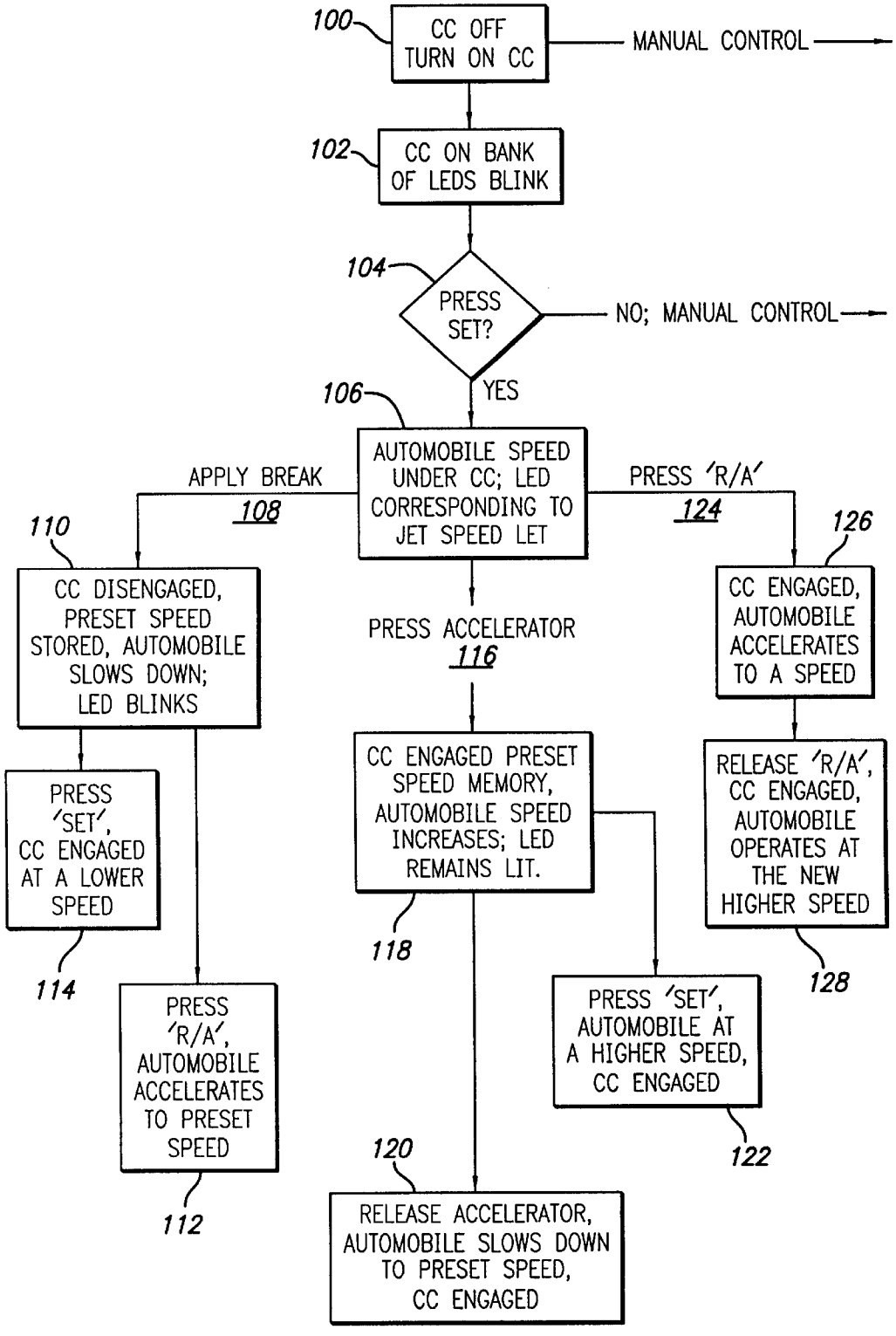


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

(c) Attorneys (Firm Name, Address And Telephone Number)

Richard D. Kirk (No. 0922)
Stephen Brauerman (No. 4952)
Bayard, P.A.
222 Delaware Avenue, Suite 900
Wilmington, DE 19899-5130
(302) 655-5000

DEFENDANTS

NISSAN NORTH AMERICA, INC.

County Of Residence Of First Listed Defendant Sacramento County, California

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
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- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
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- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

See Addendum attached hereto.

JUDGE

DOCKET NUMBERS

DATE

JANUARY 15, 2013

SIGNATURE OF ATTORNEY OF RECORD

/S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ____ JUDGE _____ MAG. JUDGE _____

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. 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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Attorneys for Plaintiff Cruise Control Technologies LLC

Exhibit A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

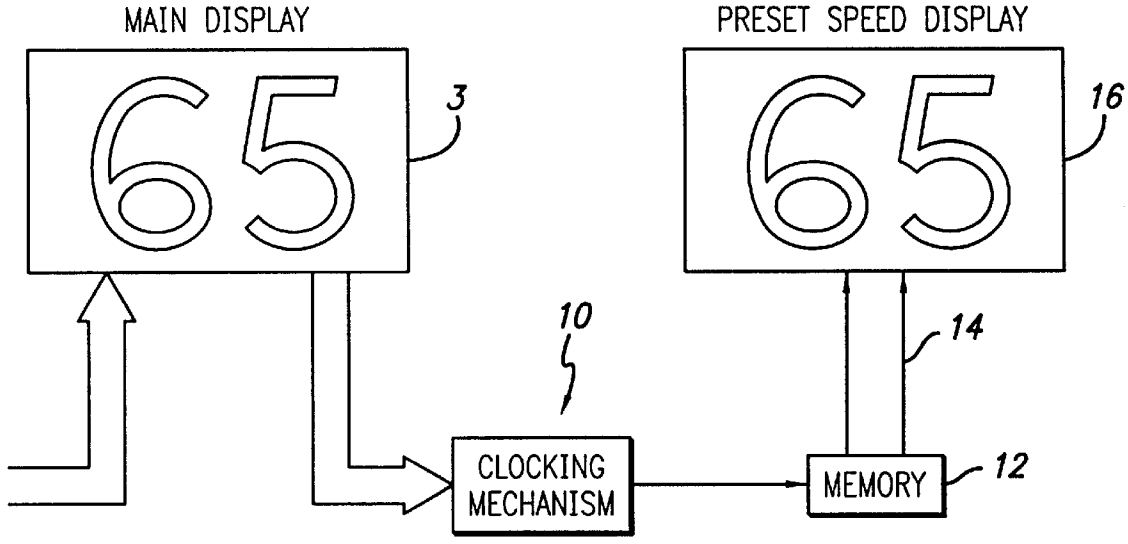
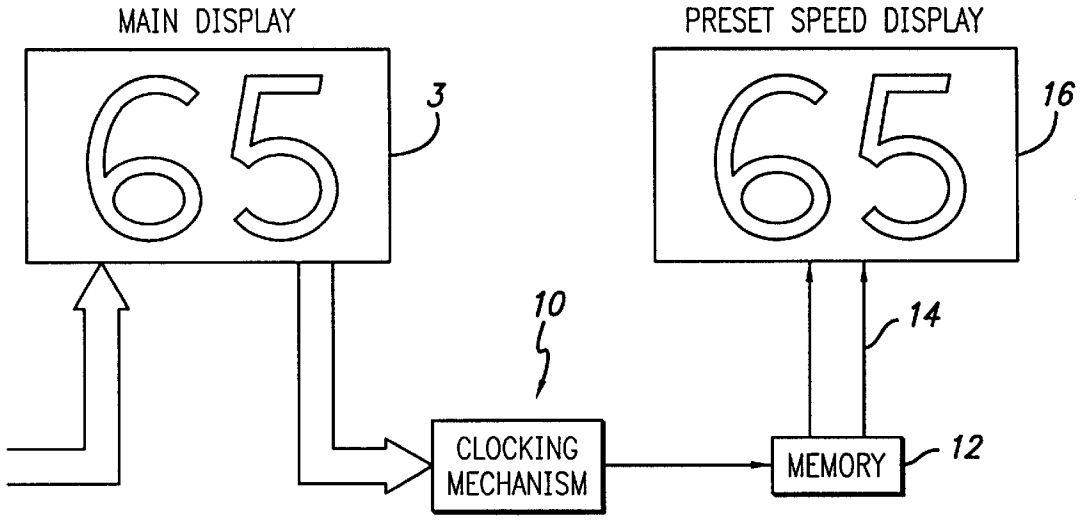


FIG. 1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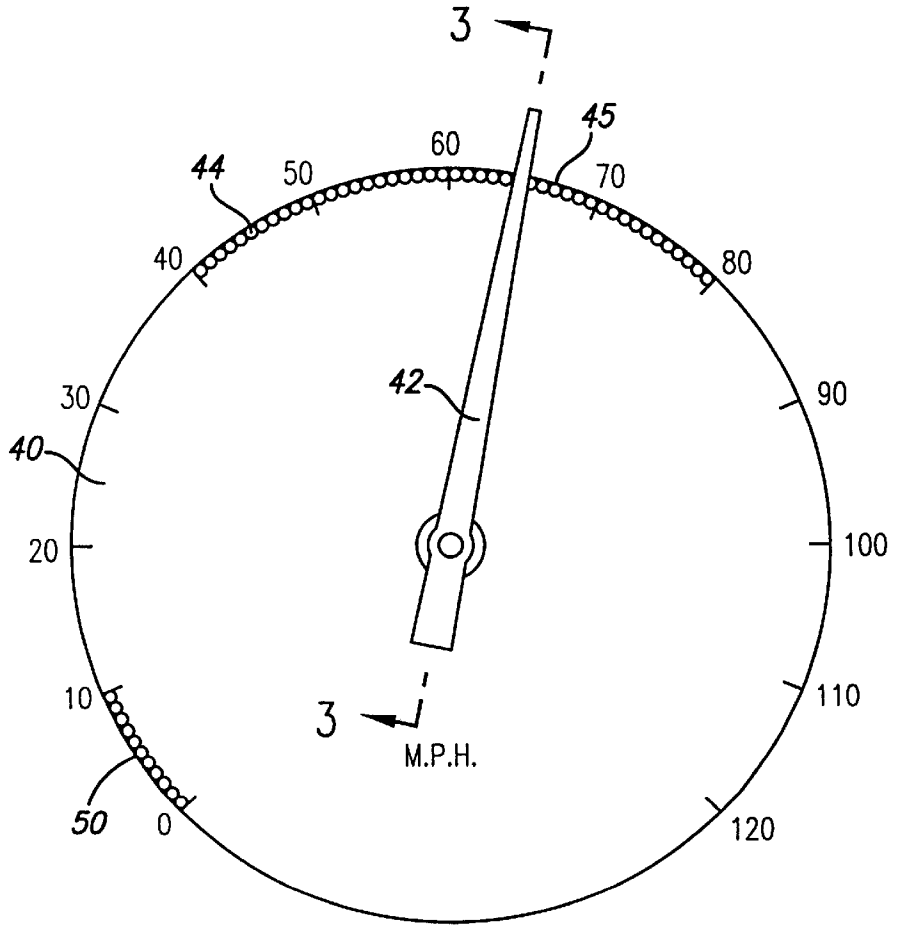
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FIG. 2

FIG. 3

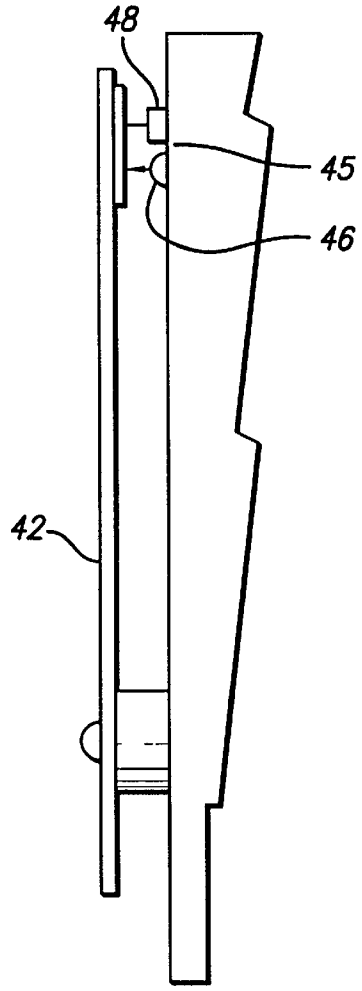


FIG. 5

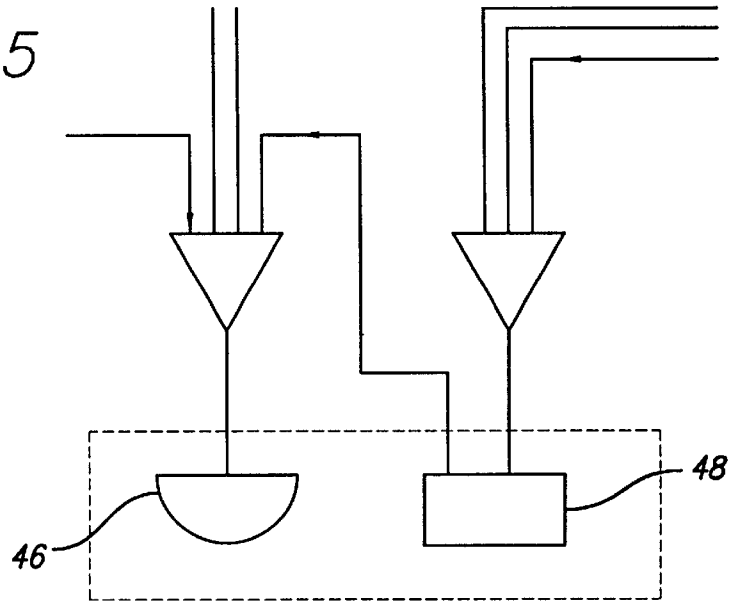
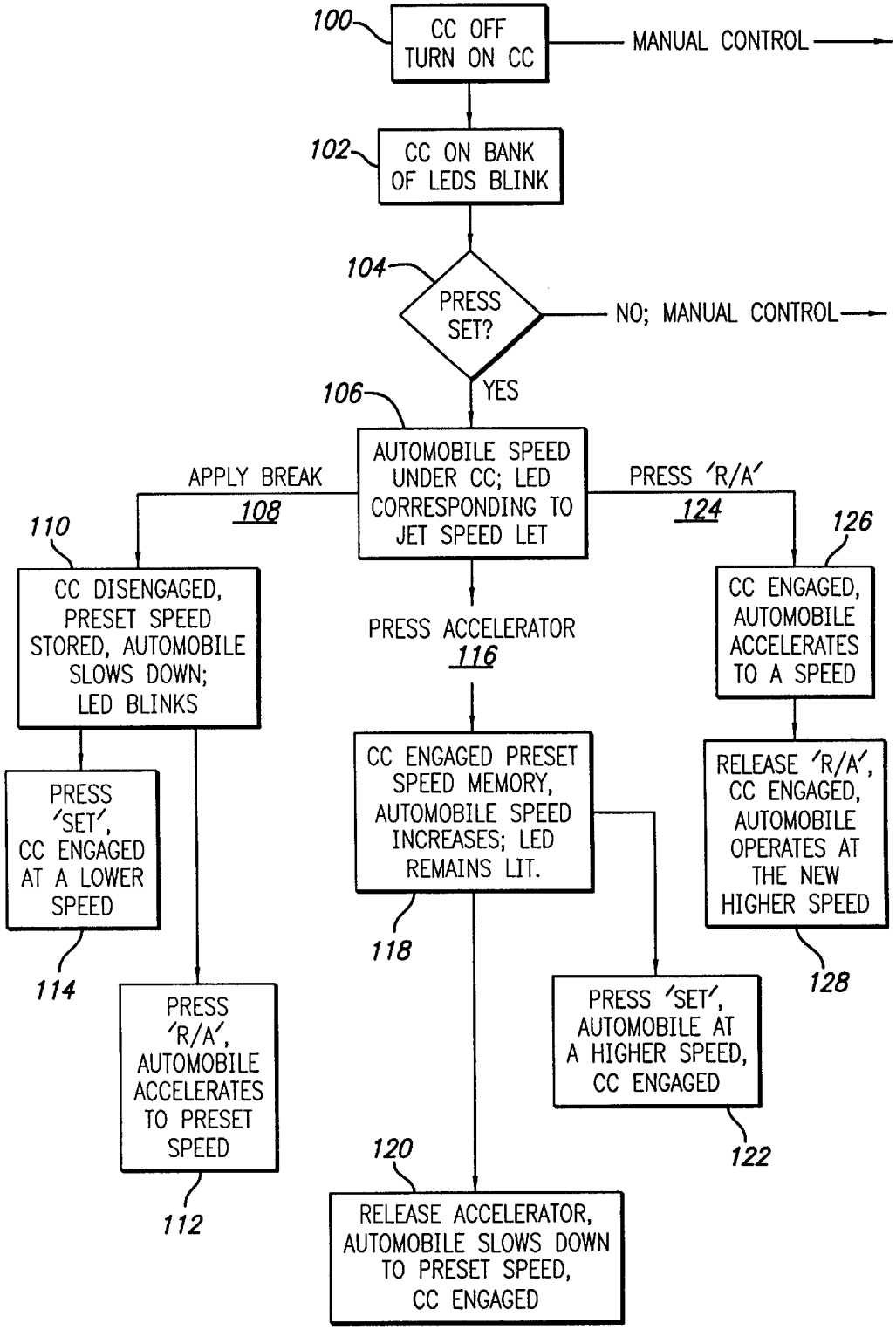


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

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DEFENDANTS

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County Of Residence Of First Listed Defendant Los Angeles County, California

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
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	PTF	DEF		PTF	DEF
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Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
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- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

See Addendum attached hereto.

JUDGE

DOCKET NUMBERS

DATE

JANUARY 15, 2013

SIGNATURE OF ATTORNEY OF RECORD

/S/ STEPHEN B. BRAUERMAN (SB4952)

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP ____ JUDGE _____ MAG. JUDGE _____

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Volkswagen Group of America, Inc.	Unassigned	Filed January 15, 2013

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CRUISE CONTROL TECHNOLOGIES LLC,	)
	)
Plaintiff,	)
	)
v.	)
	)
VOLKSWAGEN GROUP OF AMERICA, INC.,	)
	)
Defendant.	)

COMPLAINT FOR PATENT INFRINGEMENT

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

BACKGROUND

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

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

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vtiradentes@bayardlaw.com

Attorneys for Plaintiff Cruise Control Technologies LLC

Exhibit A

US006324463B1

(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.**[7] **G06F 7/00**; B60K 31/00

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

(58) **Field of Search** 701/93, 96, 70, 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.	340/815.45

OTHER PUBLICATIONS

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

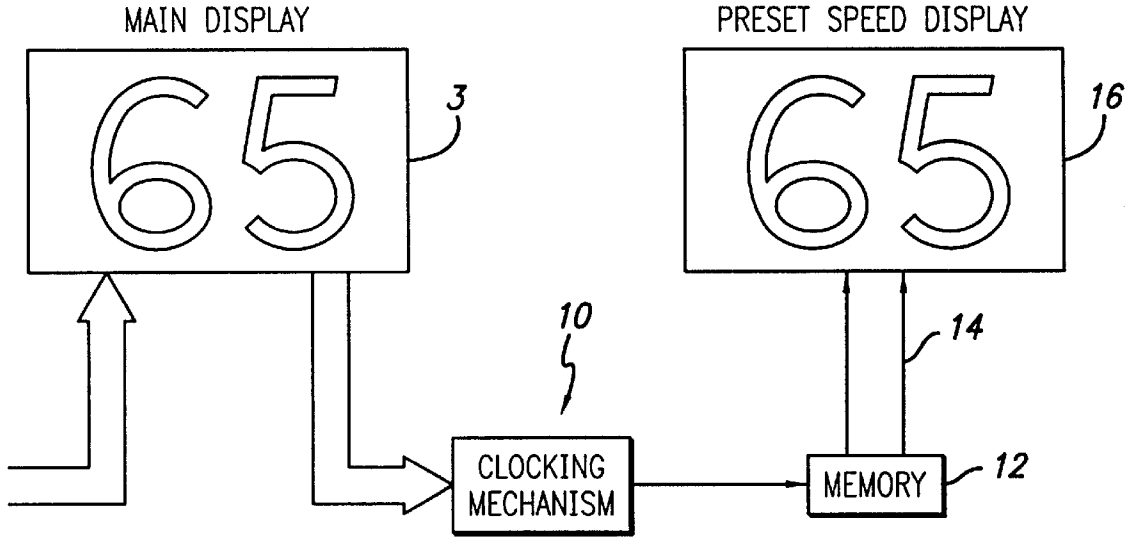
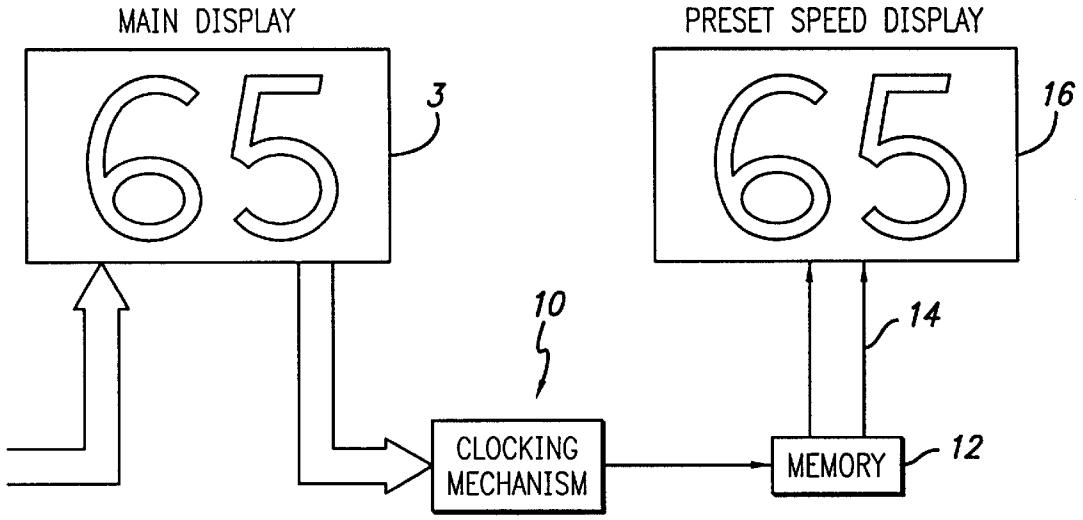


FIG. 1


MAIN DISPLAY
65
3
PRESET SPEED DISPLAY
65
16
10
14
CLOCKING MECHANISM
MEMORY
12

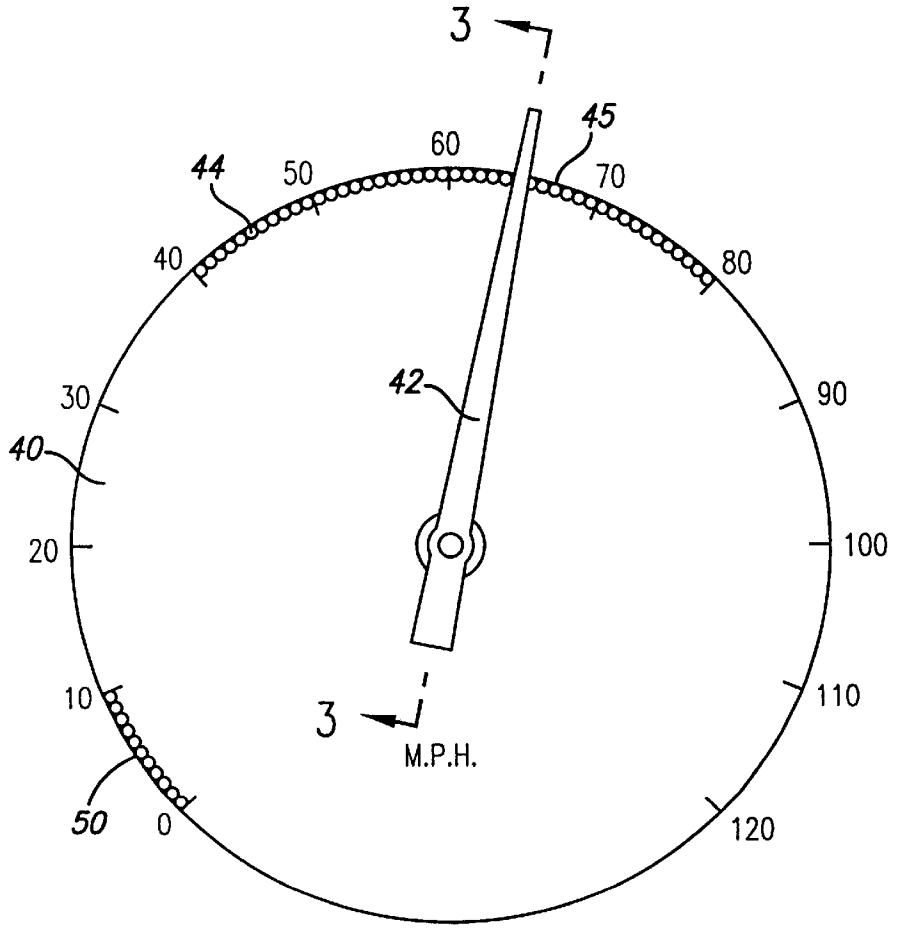

3
45
44
50
60
70
40
80
42
30
90
40
20
100
10
110
3
M.P.H.
50
0
120

FIG. 2

FIG. 3

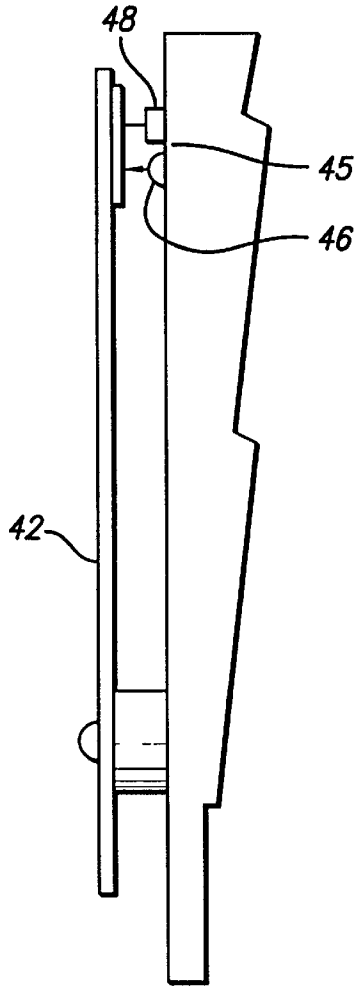


FIG. 5

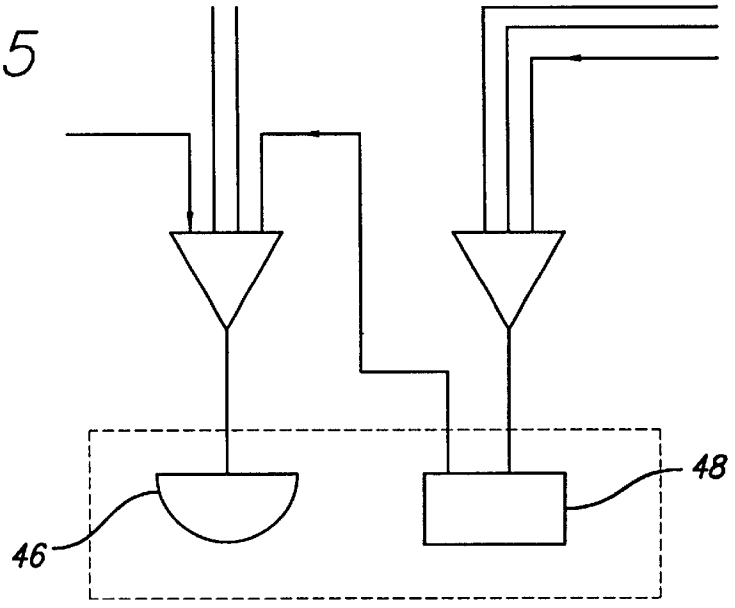
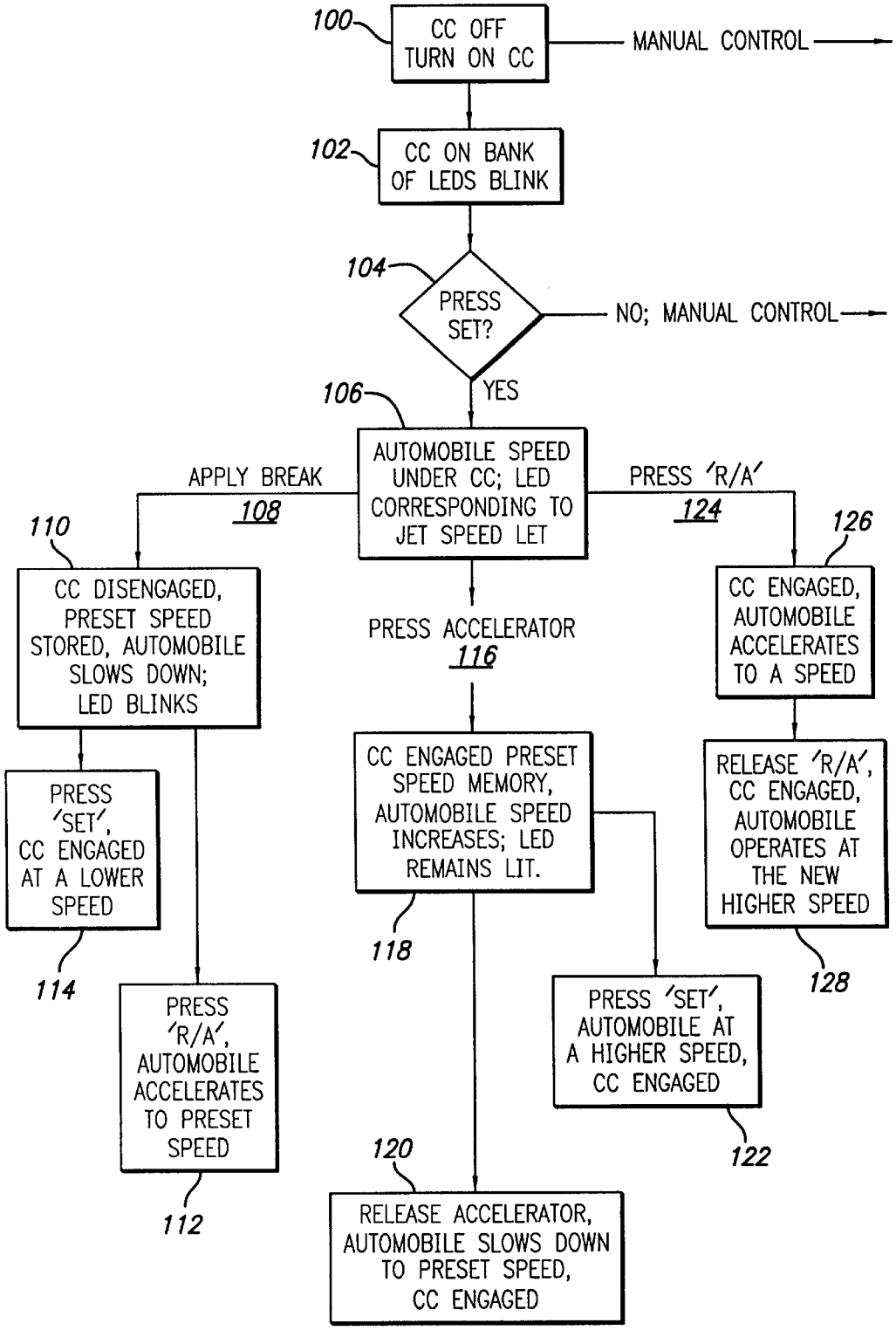


FIG. 4


100
CC OFF
TURN ON CC
MANUAL CONTROL
102
CC ON BANK
OF LEDS BLINK
104
PRESS
SET?
NO; MANUAL CONTROL
YES
106
AUTOMOBILE SPEED
UNDER CC; LED
CORRESPONDING TO
JET SPEED LET
APPLY BREAK
108
PRESS 'R/A'
124
110
CC DISENGAGED,
PRESET SPEED
STORED, AUTOMOBILE
SLOWS DOWN;
LED BLINKS
PRESS ACCELERATOR
116
126
CC ENGAGED,
AUTOMOBILE
ACCELERATES
TO A SPEED
PRESS
'SET',
CC ENGAGED
AT A LOWER
SPEED
CC ENGAGED PRESET
SPEED MEMORY,
AUTOMOBILE SPEED
INCREASES; LED
REMAINS LIT.
RELEASE 'R/A',
CC ENGAGED,
AUTOMOBILE
OPERATES AT
THE NEW
HIGHER SPEED
114
118
128
PRESS
'R/A',
AUTOMOBILE
ACCELERATES
TO PRESET
SPEED
PRESS 'SET',
AUTOMOBILE AT
A HIGHER SPEED,
CC ENGAGED
120
122
112
RELEASE ACCELERATOR,
AUTOMOBILE SLOWS DOWN
TO PRESET SPEED,
CC ENGAGED

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 "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 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 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 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 automatically 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 control button or on the dashboard, this information is of some but minimal value to the operator. They do not, 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 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 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 control conditions.

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 until a new set speed is input or the system is disabled.

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

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 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 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 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 transportation means that could utilize a cruise control system.

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

For vehicles having digital speed displays, the speed information is already in digitized form, such as binary 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 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 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 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 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 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-

tion of the vehicular speed on the highway, the cruise control disengages, step **110**, and the LED indicating the previously set speed point goes into a blinking mode. This will assure that the operator has the full knowledge of the status of the cruise control, in particular, that it is on but disengaged, with the potential to return the vehicle's speed to the preset speed corresponding to the blinking LED on the dial **40**. The operator may continue to drive the vehicle under complete manual control while the preset speed is stored in the cruise control and as indicated by the blinking LED. When the 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 speedometer 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, water vehicles, etc. Such alterations, modifications, and improvements, though not expressly described or mentioned 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 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 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 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 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 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 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".

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; and

maintaining the display of the symbol indicative of the preset speed while the vehicle is at the speed above the preset speed.

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 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 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 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

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.

* * * * *

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

CRUISE CONTROL TECHNOLOGIES LLC

(b) County Of Residence Of First Listed Plaintiff New Castle County, Delaware

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DEFENDANTS

VOLKSWAGEN GROUP OF AMERICA, INC.

County Of Residence Of First Listed Defendant New Castle County, Delaware

Attorneys (If Known)

II. BASIS OF JURISDICTION (PLACE AN "X" IN ONE BOX ONLY)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place An 'X' In One Box For Plaintiff And One Box For Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT *PLACE AN "X" IN ONE BOX ONLY)*

CONTRACT
- ☐ 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

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury Med. Malpractice
- ☐ 365 Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

HABEUS CORPUS:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 RR & Truck
- ☐ 650 Airline Regs
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt Relations
- ☐ 730 Labor/Mgmt Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl Ref Inc Security Act

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS Third Party 26 USC 7609

OTHER STATUTES
- ☐ 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 I Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes
- ☐ 890 Other Statutory Actions

V. ORIGIN

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from State Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION (Cite The U.S. Civil Statute Under Which You Are Filing And Write Brief Statement Of Cause. Do Not Cite Jurisdictional Statutes Unless Diversity)

Action for patent infringement under 35 U.S.C. § 101, et seq.

Injunctive and declaratory relief and for damages for patent infringement

VII. REQUESTED IN COMPLAINT

CHECK IF THIS IS A **CLASS ACTION** ☐ UNDER F.R.C..P. 23

DEMAND $

CHECK YES only if demanded in complaint
JURY DEMAND: ☒ YES ☐ NO

VIII. RELATED CASE(S) (See instructions)

See Addendum attached hereto.

JUDGE

DOCKET NUMBERS

DATE

JANUARY 15, 2013

SIGNATURE OF ATTORNEY OF RECORD

/S/ RICHARD D. KIRK (RK0922)

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RECEIPT # _____ AMOUNT _____ APPLYING IFP ____ JUDGE _____ MAG. JUDGE _____

Addendum to Civil Cover Sheet

RELATED CASES	JUDGE	DOCKET NUMBERS
Cruise Control Technologies LLC v. Audi of America LLC	Judge Gregory M. Sleet	12-1753-GMS
Cruise Control Technologies LLC v. BMW of North America LLC	Judge Gregory M. Sleet	12-1754-GMS
Cruise Control Technologies LLC v. Chrysler Group LLC	Judge Gregory M. Sleet	12-1755-GMS
Cruise Control Technologies LLC v. Ford Motor Company	Judge Gregory M. Sleet	12-1756-GMS
Cruise Control Technologies LLC v. General Motors Company	Judge Gregory M. Sleet	12-1757-GMS
Cruise Control Technologies LLC v. Jaguar Land Rover North America LLC	Judge Gregory M. Sleet	12-1758-GMS
Cruise Control Technologies LLC v. Mercedes-Benz USA LLC	Judge Gregory M. Sleet	12-1759-GMS
Cruise Control Technologies LLC v. Porsche Cars North America Inc.	Judge Gregory M. Sleet	12-1760-GMS
Cruise Control Technologies LLC v. Subaru of America Inc.	Judge Gregory M. Sleet	12-1761-GMS
Cruise Control Technologies LLC v. American Honda Motor Co., Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Hyundai Motor America	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Nissan North America, Inc.	Unassigned	Filed January 15, 2013
Cruise Control Technologies LLC v. Toyota Motor North America, Inc.	Unassigned	Filed January 15, 2013