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Patel

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(54) **CRUISE CONTROL INDICATOR**

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1998.

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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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Wood

(57) **ABSTRACT**

A system for indicating the operational status and param-
eters 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 speed-
ometers. 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

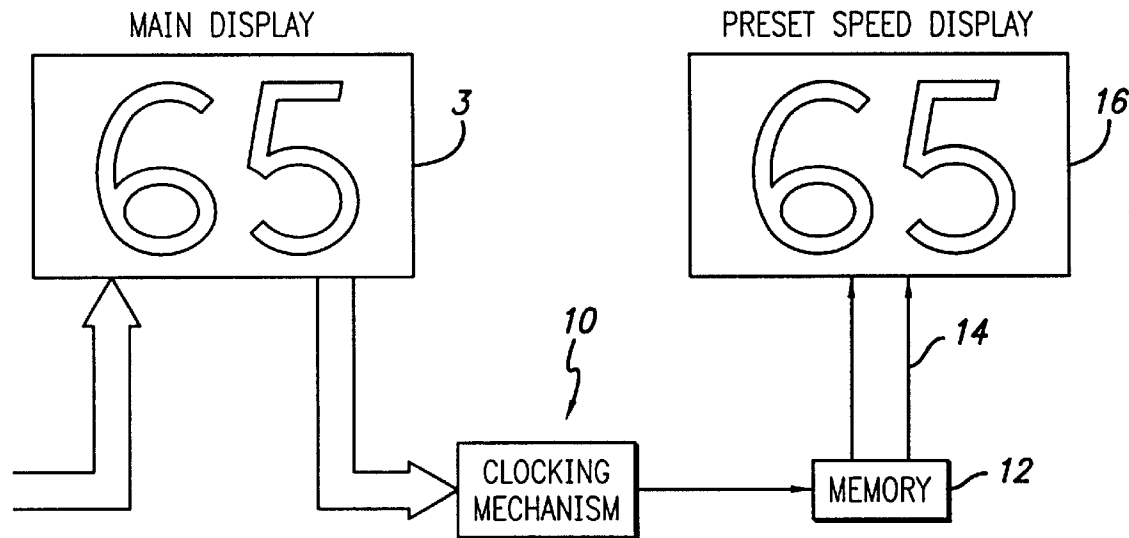


FIG. 1

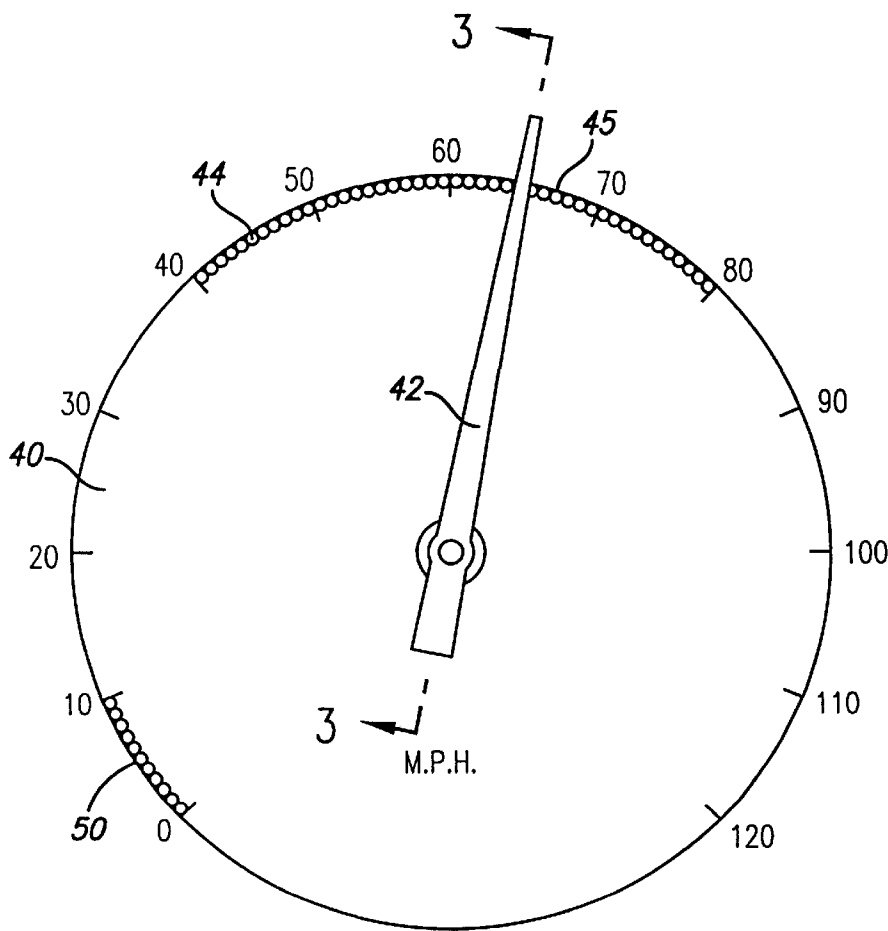
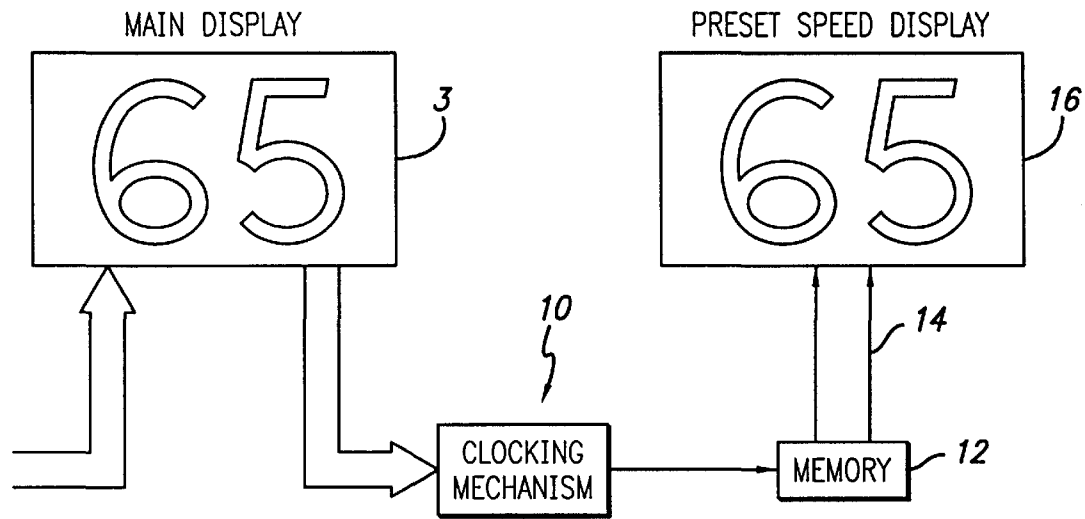


FIG. 2

FIG. 3

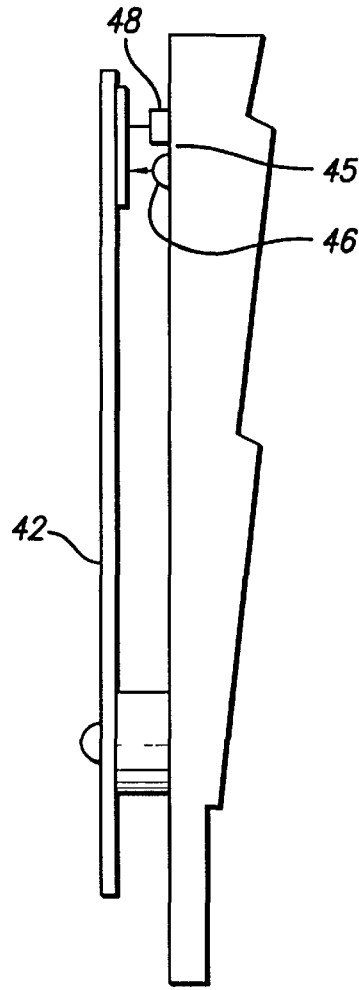


FIG. 5

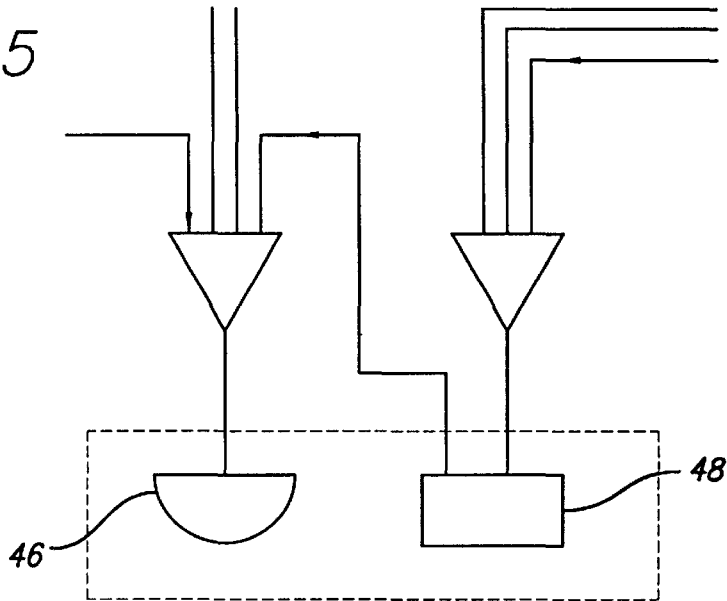
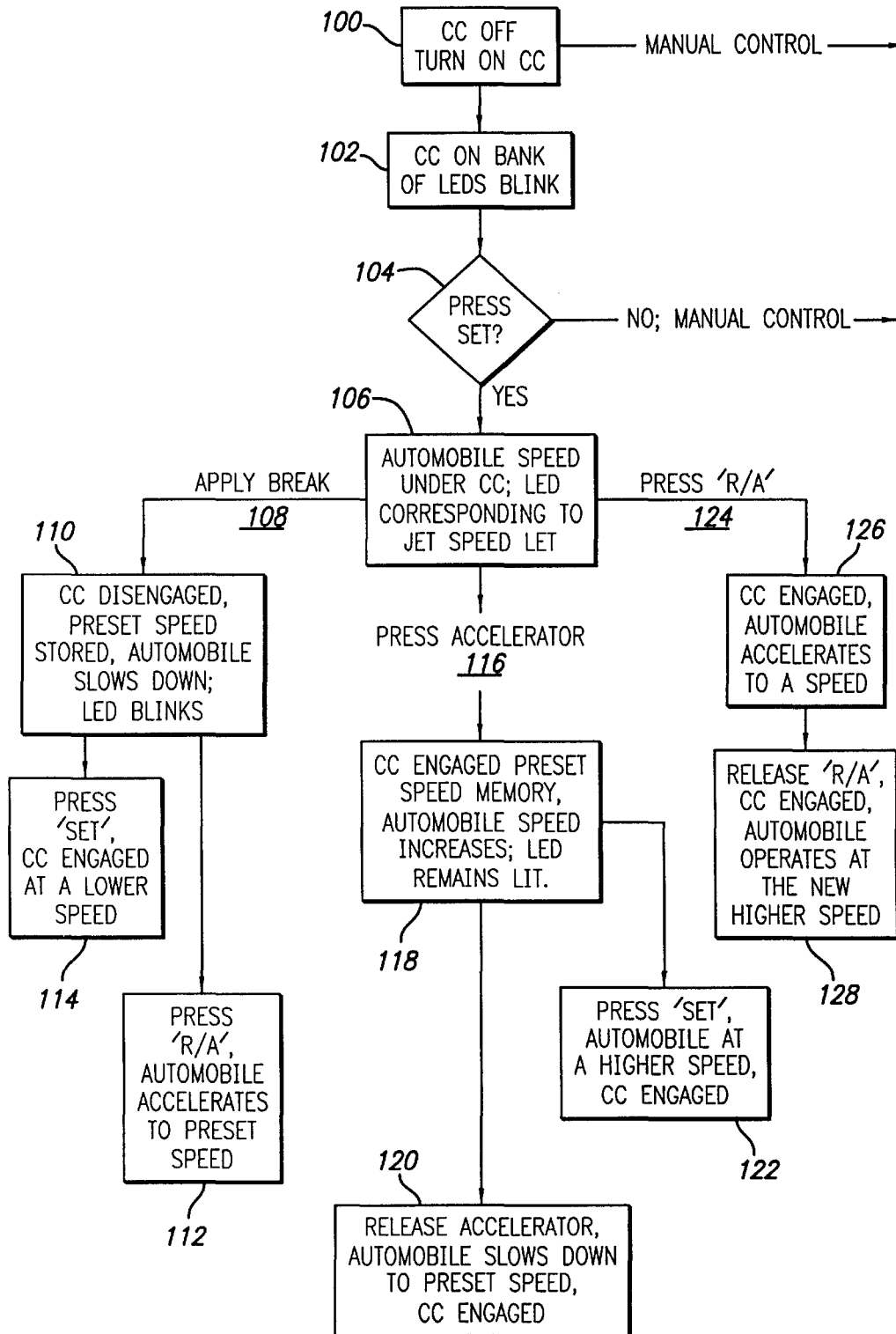


FIG. 4



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.

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