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- (71) Applicant: **JOHNSON CONTROLS, INC.** [US/US];
5757 N. Green Bay Avenue, Milwaukee, 53201 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **SHAFER, Bryan L** [US/US]; 17849 Hunters Lane, Grand Haven, MI 49417 (US). **OTTO, Steve H** [GB/US]; 1729 Waukazoo Drive, Holland, 49417 (US). **SIMS, Michael J** [US/US]; 10662

Deer Ridge Court, Zeeland, MI 49464 (US). **SMITH, Howard** [US/US]; 4809 Pinnacle Court, Wyoming, MI 49519 (US). **UREEL, Emil J** [US/US]; 1730 Summit Street, Holland, MI 49423 (US).

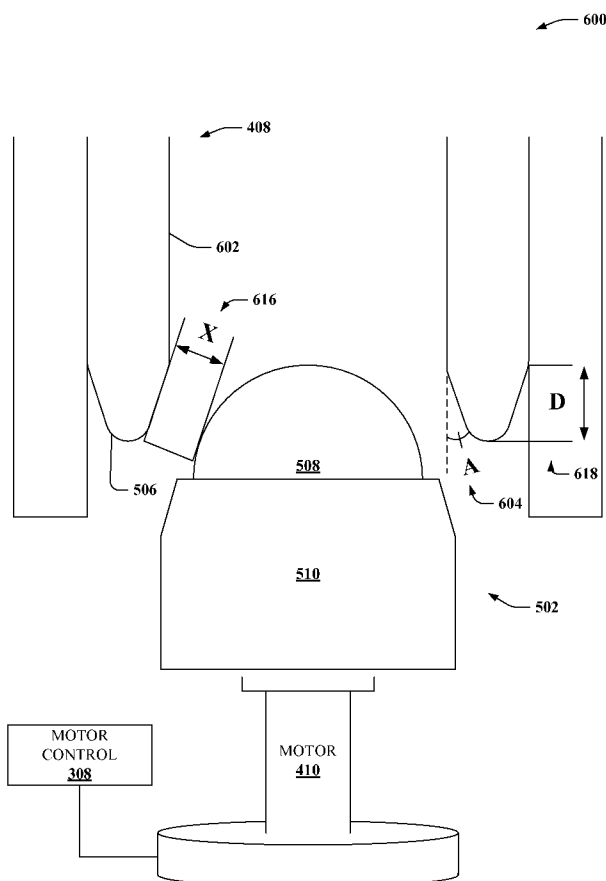
(74) Agents: **AMIN, Himanshu S.** et al.; Amin & Turocy, LLP, 1900 E. 9th Street, 24th Floor, National City Center, Cleveland, OH 44114 (US).

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(54) Title: INTERFACE TO A VEHICLE DISPLAY



(57) Abstract: The subject disclosure provides for rich illumination of vehicle displays utilizing an adjustable interface between a light source and a display. The display can include a light source and a light pipe. The light pipe can receive a portion of light from the light source and couple the light to an indicator and/or a display. The light pipe and light source can be connected by a baffle. In addition, a motor and motor controller can be coupled to the light source, the baffle and/or the light pipe to adjust a position or orientation of one such component, e.g., the light source, with another, such as the light pipe. Accordingly, by dynamically adjusting a position of the light source or light pipe, an illumination characteristic at the display and/or indicator can be dynamically altered to provide rich illumination for the display.

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Title: INTERFACE TO A VEHICLE DISPLAY

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application Serial No. 60/876,922, filed December 22, 2006, entitled MOTOR AND LIGHT PIPE GEOMETRY and U.S. Provisional Application Serial No. 60/878,535, filed January 4, 2007, entitled CONTACTLESS POWER TRANSFER TO MOVABLE VEHICLE SYSTEM, the entireties of which are incorporated herein by reference. The subject Application for Patent further references U.S. Provisional Application No. 60/860,032, International Application Publication No. WO/2005/022088 filed August 27, 2004, entitled UNIVERSAL ACTUATOR PARTICULARLY FOR DASHBOARDS, and International Application No. PCT/US07/87627 filed December 14, 2007, entitled VEHICLE DISPLAY, the entireties of which are incorporated herein by reference.

TECHNICAL FIELD

[0002] The subject disclosure relates generally to instrument clusters and displays for vehicles and other transportation devices, and more particularly to providing rich illumination of a vehicle display *via* an adjustable interface between a light source and the display.

BACKGROUND

[0003] Automotive vehicles include instrumentation to provide information about operations of the vehicle to an occupant of the vehicle (*e.g.*, a driver or passenger). Typically, several instrumentation displays are disposed in close proximity to provide an instrument cluster. The instrument cluster should provide useful vehicle information to the driver while minimizing distraction and driver workload. Specifically, an instrument cluster should provide the driver with needed or desired information when the driver needs or desires such information. Each display requires a certain amount of instrument cluster real estate (*e.g.*, surface area of the instrument cluster). Contemporary instrument clusters are designed to fit as many displays as suitable into a single cluster. Designers take caution however, not to overcrowd the cluster as that can make displays distracting to a driver or difficult to read.

[0004] Accordingly, instrument cluster designers typically spend time trying to improve presentation of information without overcrowding a display. For instance, a designer may try to group like information with other like information, or provide visual effects at a display to catch an occupant's attention. As an example, radio controls can be grouped together, and near to media playback controls, such as a DVD player or CD player, or the like. However, where grouping cannot provide a needed visual efficacy for an instrument cluster or other vehicle display, alternate mechanisms of providing dynamic illumination can be beneficial.

SUMMARY

[0005] The following presents a simplified summary in order to provide a basic understanding of some aspects of the disclosed innovation. This summary is not an extensive overview, and it is not intended to identify key/critical elements or to delineate the scope thereof. Its sole purpose is to present some concepts in a simplified form as a prelude to the more detailed description that is presented later.

[0006] The subject disclosure provides for rich illumination of vehicle displays utilizing an adjustable interface between a light source and the display. The display can include a light source that provides light and a light pipe. The light pipe can receive a portion of the light and couple the light to an indicator or a display. The light pipe and light source can be coupled by a baffle. In addition, the baffle can be connected to a motor that can adjust a position of the baffle with respect to the light source and/or the light pipe. Accordingly, a characteristic of light accepted by the baffle and light pipe can be altered to provide rich variations in illumination at the indicator or display.

[0007] According to some aspects, a motor can move a light source in a radial direction with respect to an input baffle in order to adjust illumination output. According to other aspects, the light source can be moved longitudinally with respect to the baffle, or longitudinally and in the radial direction. According to still other aspects, the motor can adjust a position of the baffle or a light pipe, or both, with respect to the light source. The light source, baffle and light pipe can be of varying lengths, widths, and diameters, such that at least a portion of light provided by the light source is coupled to the light pipe.

[0008] According to one or more other aspects, an input end of a baffle, proximate a light source, can be chamfered to allow for greater movement of the light

source with respect to the baffle. In such a manner, a position of the light source can be adjusted to greater degree without being restricted by the baffle as well. Furthermore, an intensity distribution of light coupled into the baffle can be adjusted by controlling a depth and/or angle of the chamfered input end.

[0009] To the accomplishment of the foregoing and related ends, certain illustrative aspects of the disclosed innovation are described herein in connection with the following description and the annexed drawings. These aspects are indicative, however, of but a few of the various ways in which the principles disclosed herein can be employed and is intended to include all such aspects and their equivalents. Other advantages and novel features will become apparent from the following detailed description when considered in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 provides a depiction of a vehicle having one or more displays with a motorized LED interface according to aspects of the subject innovation.

[0011] FIG. 2 depicts an example vehicle instrument cluster having a motorized LED interface to a display.

[0012] FIG. 3 depicts an example configuration of light pipes and display screens for a vehicle instrument cluster according to further aspects.

[0013] FIG. 4 depicts an example system having a motor controlled interface between a light source and a light pipe for a vehicle information display.

[0014] FIG. 5 illustrates a sample system of a motor controlled baffle that interfaces a light source with a light pipe indicator.

[0015] FIG. 6 depicts an example system that reposition a light source with respect to a light pipe interface to provide varied illumination for an indicator or display.

[0016] FIG. 7 illustrates an example of various light pipe interfaces utilized to receive light from a light source according to further aspects.

[0017] FIG. 8 depicts a sample display indicator coupled with a light source by a reflective baffle according to one or more aspects.

[0018] FIG. 9 illustrates various re-configurable positions of a light source with respect to a light pipe interface.

[0019] FIG. 10 depicts a sample operating environment suitable to control an electronic component, such as a stepper motor.

DETAILED DESCRIPTION

[0020] The subject disclosure is now described with reference to the drawings, wherein like reference numerals are used to refer to like elements throughout. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding thereof. It may be evident, however, that the innovation can be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form in order to facilitate a description thereof.

[0021] As used in this application, the terms “component,” “system,” “equipment,” “interface”, “network,” and/or the like are intended to refer to an electronic, mechanical, and/or optical apparatus, and/or a computer-related entity, such entity including either hardware, a combination of hardware and software, software, or software in execution. For example, a component can be, but is not limited to being, a mechanical structure, an electronic device, or an optical device, or a combination thereof, a process running on a processor, a processor, a hard disk drive, multiple storage drives (*e.g.*, of optical and/or magnetic storage medium), a data object, an executable, a thread of execution, a program, and/or a computer. By way of illustration, both an application running on a server, the server, a client, an input interface, a control module, or a device, circuit, or a suitable combination thereof, can be a component. One or more components can reside within a process and/or thread of execution, and a component can be localized on one computer or apparatus, and/or distributed between two or more computers or apparatuses.

[0022] FIG. 1 illustrates an example depiction of a vehicle 100, 102 in accordance with aspects of the subject disclosure. More specifically, disclosed is a repositionable light source interface to an information display of a vehicle 100, 102. The light source interface can provide for rich variation in display illumination by adjusting a position of a light source (*e.g.*, light emitting diode [LED]) with respect to a display interface. Vehicle 100, 102 can include various automobiles, such as a car, pick-up truck, heavy truck such as a semi-tractor, bus, van, mini-van, sport utility vehicle (SUV), and so on. In addition to the foregoing, it should be appreciated that the subject disclosure can be applicable to other transportation devices other than an automobile (100, 102), including a boat or ship, train, airplane, helicopter, *etc.* Accordingly, any suitable transportation device having at least one information

display can be associated with a repositionable light source interface to provide rich, varied illumination.

[0023] The vehicle 100, 102 depicted at FIG. 1 includes various sample information displays (104, 106, 108A, 108B, 108C, 108D). Display 104 can comprise an instrument cluster on a vehicle control panel, for instance. The instrument cluster (104) can provide various information pertinent to a state of the vehicle (*e.g.*, concurrent vehicle speed, engine speed, fluid levels, temperature(s), illumination status, heating – ventilation – air conditioning [HVAC] information, or a combination thereof or of like information) or of a vehicle system (*e.g.*, climate control, interior illumination, exterior illumination, entertainment, media playback, navigation, vehicle operation, and so on). Instrument cluster 104 can have one or more indicators configured to present qualitative or quantitative data pertinent to a displayed vehicle system (*e.g.*, vehicle speed). The indicators can be coupled with a light source(s) for illumination in low light levels (*e.g.*, nighttime display). The light source(s) can be coupled with the indicator, and by dynamically adjusting a position of the light source, various illumination characteristics (*e.g.*, intensity, color, *etc.*) can be provided to the indicators.

[0024] The vehicle 100, 102 can also include one or more console information displays 106. The console information display 106 can provide visual data related to a vehicle system, navigation, media playback and/or entertainment. The console information display 106 can be coupled with a processing device, such as a computer, or the like. For instance, the console display can be coupled with a global positioning system (GPS) device and project a GPS position of a vehicle at an electronic map displayed at the console information display 106. As another example, the console information display 106 can present a digital video disc (DVD) movie played by a media player coupled to the display (106), playback information pertinent to an audio title, or other media playback information. According to some embodiments, the display (106) can be illuminated by a light source with an adjustable position relative to an input interface of the display (106). Accordingly, various dynamic lighting characteristics can be presented based on dynamic adjustment of the position.

[0025] Vehicle 100, 102 can further include information/entertainment displays 108A, 108B, 108C, 108D at various segments of the interior of the vehicle 100, 102. The information/entertainment displays 108A, 108B, 108C, 108D can be secured to a rear of a seat of vehicle 100, 102. Alternatively, or in addition, one or

more such displays 108A, 108B, 108C, 108D can be located on an overhead drop down panel (not depicted), a console center stack (not depicted), or the like. The displays (108A, 108B, 108C, 108D) can further be portable devices connected *via* wire, short-range wireless (*e.g.*, radio frequency [RF]), or both, to a power and/or data source in the vehicle (100, 102). Alternatively, the displays (108A, 108B, 108C, 108D) can connect to a docking station (not depicted) within the vehicle, and power and/or data can be received *via* electronics coupled to the docking station. In similar fashion as the console information display 106, information/entertainment displays 108A, 108B, 108C, 108D can be illuminated by an adjustable light source. A position of the light source can be dynamically controlled to provide rich illumination for such displays 108A, 108B, 108C, 108D.

[0026] Each display device (104, 106, 108A, 108B, 108C, 108D) includes at least a light source and a viewable display surface. The viewable display can be a computer-controlled dynamically adjustable screen (*e.g.*, a TFT and/or fixed segment screen), a display surface having static indicia, a viewable surface of a light pipe, or any suitable surface that can emit light or through which light can propagate to an observer. The display surface can be substantially rigid (*e.g.*, made of a rigid plastic, glass, *etc.*) to define a static viewing surface or at least in part flexible (*e.g.*, soft plastic filled with a malleable silicone) to provide a dynamic viewing surface. The display surface can include various indicia to convey information to a viewer (*e.g.*, graphical icon, text, etched features, computer-generated indicia, laser-generated indicia, hologram, or the like). Indicia can be selectively generated and/or displayed, and/or selectively illuminated in order to selectively present information to a viewer by way of the viewable display screen.

[0027] A light source coupled with a display (104, 106, 108A, 108B, 108C, 108D) can comprise an LED, an incandescent lamp or other suitable filament source, an arc light source (*e.g.*, metal-halide lamp), a visible laser (*e.g.*, green laser, red laser, *etc.*), an invisible source coupled with an emissive phosphor, an electromagnetic emitter coupled with an emissive phosphor (*e.g.*, a cathode ray tube), or any suitable combination thereof or of the like. In addition, a display can include a motor that can alter a position and/or orientation of the light source with respect to at least the display, or an input interface of such display (*e.g.*, a surface of a light pipe or of an input baffle). Changing position or orientation of the light source can alter illumination characteristics at a viewable display screen. In some embodiments,

intensity and/or illumination of the display surface can be altered. According to further embodiments, color of illumination at the display surface can be altered. Accordingly, a rich variation in illumination can be provided at the display surface.

[0028] FIG. 2 illustrates a sample instrument cluster 104 according to one or more aspects of the claimed subject matter. The instrument cluster 104 can be suitable for use in an automobile or other vehicle (*e.g.*, a bus, train, aircraft, or the like). The instrument cluster 104 can include a housing 202 fabricated from plastic (or, *e.g.*, a polymeric material in general), metal, wood, and so on. The housing 202 can further include mounting brackets 204 for mounting the instrument cluster 104 to an interior surface of the vehicle (*e.g.*, a dashboard or instrument panel, or other suitable position, preferably in view of a driver of the vehicle).

[0029] One or more components of instrument cluster 104 can, alternatively, be mounted in other areas of the vehicle, such as on a vehicle instrument panel between a driver of the vehicle and a front seat passenger, or in front of the front seat passenger. Housing 202 can include a clear front surface (*e.g.*, made of clear plastic) and a perimeter 208 configured for visual and/or tactile user appeal.

[0030] As depicted in FIG. 2, instrument cluster 104 includes a display surface 206 having one or more displays 210A, 210B, 210C. The displays can include static displays (*e.g.*, flat surfaces that can transmit, refract, scatter, or reflect light), or dynamically configurable displays, that can utilize various display technologies (*e.g.*, TFT, fixed segment) to dynamically generate features and indicia on a display surface of the display. The displays can present vehicle information (*e.g.*, state information of one or more vehicle systems) to an operator of a vehicle. In addition, the displays 210A, 210B, 210C can be altered and/or illuminated to provide information about different vehicle systems, including for instance, qualitative information as well as relative quantitative information. According to some embodiments, a characteristic of such illumination (*e.g.*, color, intensity, illuminance) can be changed by adjusting a position and/or orientation of a light source that provides light to the displays 210A, 210B, 210C.

[0031] In an example embodiment, a display 210A, 210B, 210C can provide vehicle state information (*e.g.*, current speed) pertaining to a first vehicle system (*e.g.*, vehicle speed), and be re-configured to provide vehicle state information (*e.g.*, tire pressure) pertaining to a second vehicle system (*e.g.*, vehicle tires). The state information pertaining to the first vehicle system and to the second vehicle system can

be presented in a substantially same surface area of the display surface in the case of a dynamically configurable display. For instance, by dynamically re-configuring the displays 210A, 210B, 210C, a single display or a single portion of the display (*e.g.*, 210A) can provide multiple types of vehicle information. Alternatively, the state information pertaining to the first vehicle system and the second vehicle system can be presented in separate surface areas of the display surface 206 in the case of a static display. In such instance, a first light source (not depicted) and a first light pipe (not depicted), or a first interface thereof, can illuminate a first portion of the static display (*e.g.*, 210B) to illuminate features included in the first portion (*e.g.*, a speedometer scale). Likewise, an additional light source(s), light pipe(s), and/or light pipe interface(s) can illuminate a second portion of the static display (*e.g.*, 210C) to illuminate features included in the second portion (*e.g.*, fuel scale and indicator).

[0032] According to one or more further embodiments, a characteristic of illumination presented at the display surface 206 or at least one of the displays 210A, 210B, 210C can be dynamically altered. For instance, a light source (not depicted) coupled to such display surface 206 or displays 210A, 210B, 210C can be dynamically configured to change a manner in which light interacts with such surface (206) or displays (210A, 210B, 210C). According to some embodiments, the light source can be moved closer to or further from a viewable surface (206, 210A, 210B, 210C), or a light pipe(s) coupled to such surface(s), to modify an amount of light and/or intensity of light incident upon such surface. Alternatively, or in addition, a multi-color light (*e.g.*, tri-color LED) or multi-source light (*e.g.*, a dual-filament bulb) can be adjusted to provide different color or varied intensity to the viewable surface. According to some embodiments, a stepper motor, servomotor, or the like (not depicted), can be coupled to the light source to dynamically adjust a position or orientation of such light source based on user input, for instance.

[0033] FIG. 3 depicts an example configuration of light pipes (302A, 302B, 302C) and displays (210A, 210B, 210C) for a vehicle instrument cluster 104 according to further aspects. A display screen 206 can have one or more displays 210A, 210B, 210C. The displays 210A, 210B, 210C can comprise static displays (*e.g.*, light pipe surface with etched indicia) or dynamically configurable displays (*e.g.*, TFT screen), or a combination of both. Such displays can present information pertinent to a vehicle state, a source of media (*e.g.*, played by a vehicle media player), navigation system, or entertainment system, or a suitable combination thereof or of

the like. The information can comprise features or graphical indicia at the display screen 206 and/or displays 210A, 210B, 210C. The indicia can include dynamic computer-generated features, such as pictures or text, or dynamic laser-generated features (*e.g.*, provided by laser holography or the like), or static indicia such as etched, painted, glued, or fastened, *etc.*, graphical icons, graphical text, and so on.

[0034] Instrument cluster 104 can present information to an observer by way of indicia depicted at displays 210A, 210B, 210C and/or by illuminating features of such displays 210A, 210B, 210C related to pertinent vehicle, media and/or entertainment information. Illumination of such displays 210A, 210B, 210C can be facilitated at least in part by one or more light pipes 302A, 302B, 302C. The light pipes 302A, 302B, 302C can receive light from one or more light sources and propagate received light (*e.g.*, by way of total internal reflection [TIR]), or a portion thereof, to the display screen 206. Such light can illuminate the displays 210A, 210B, 210C and indicia/features presented thereon. The light can be of various intensities, colors, and so on.

[0035] According to some aspects, light coupled to the light pipes 302A, 302B, 302C and display screen 206 can be adjusted by controlling position of one or more light sources (not depicted) with respect to the light pipes 302A, 302B, 302C. For instance, one or more stepper motors, servomotors, or the like can be configured to adjust a position and/or orientation of such light sources. A motor(s) can be controlled *via* motor control 308 and interface circuit 310, for instance. Motor control 308 can be a suitable electro-mechanical device configured to generate and send electric signals configured to engage a motor (not depicted). Interface circuit 310 can translate the electric signals into other signals that can define a distance, direction, and or rotation of movement. The motor, in turn, can translate and/or rotate a position of one or more objects attached thereto in response to receiving electric signals from interface circuit 310 and motor control 308. In such a manner, a position/orientation of a light source with respect to a light pipe 302A, 302B, 302C can be dynamically adjusted, thereby altering characteristics of light provided by the light source and received by the light pipe.

[0036] According to one or more further embodiments, motor control 308 can receive input from a user input/output device 306. User input/output device 306 can be any suitable electronic or electro-mechanical user interface. For example, such device (306) can include a tactile touch screen interface that can recognize tactile

pressure (*e.g.*, from a touch of a finger) and translate the tactile pressure into electronic signals. The input/output device 306 can also comprise one or more knobs, buttons, sliders, or other electro-mechanical user interface items. Received input can be correlated with predetermined light source characteristics associated with a position or orientation of a light source and/or light pipe. For instance, an input (306) can be correlated with increased intensity at a display screen. Motor control 308 can send interface circuit 310 electric signals to adjust a position of a light source (or, *e.g.*, a light pipe 302A, 302B, 302C or input interface of such light pipe 302A, 302B, 302C) to provide more intensity to the display screen 206. According to some embodiments, increased intensity can be accomplished by moving the light source closer to an interface of a light pipe 302A, 302B, 302C, for instance.

[0037] In some embodiments, displays 210A, 210B, 210C can include one or more indicators 312A, 312B, 312C. A position and/or orientation of the indicators 312A, 312B, 312C can be dynamically adjusted to present current state information associated with a vehicle. For instance, an orientation of an indicator 312A, 312B, 312C can be adjusted relative to a qualitative or quantitative scale on a display surface 304A, 304B, 304C of the light pipes 302A, 302B, 302C. By orienting an end of an indicator 312A, 312B, 312C with a particular value of the relative scale, a concurrent value associated with a displayed system can be highlighted.

[0038] As a specific example, a graduated scale on a display surface (304A) of a light pipe (302A) is correlated with vehicle speed in increments of 5 miles per hour (mph). An indicator 312A correlated with the display surface 304A provides a concurrent vehicle speed by pointing at one of the speed increments. A motor (not depicted) attached to the indicator 312A can change an orientation of the indicator 312A with respect to the display 210A and light pipe display surface 304A, to allow the indicator 312A to point to different scale values. As vehicle speed changes, motor control 308 can adjust an orientation of the indicator 312A to point to other speed values along the graduated scale, as discussed above. Accordingly, speed can be dynamically updated by correlating a position and/or orientation of the indicator 312A with an appropriate increment (or, *e.g.*, a position in between increments) of the graduated scale.

[0039] According to one or more other embodiments, indicators 312A, 312B, 312C can comprise a light pipe attached to one end of a baffle of a stepper motor (not depicted). Further, a light source can be coupled to an additional end of the baffle. A

second motor can control a position of the light source with respect to the baffle. By controlling position of the light source (*e.g.*, proximity to the baffle), an amount of light and/or intensity of light delivered to the light pipe/indicators 312A, 312B, 312C can be altered. Thus, the indicators can dynamically appear brighter, dimmer, or some combination thereof (*e.g.*, alternately brighter and dimmer to simulate blinking) by dynamically adjusting a position/orientation of the light source.

[0040] In addition, a distribution of light coupled to the light pipe/indicators 312A, 312B, 312C can be adjusted by controlling position of the light source with respect to the baffle as well. As a further example, in a case of a multi-colored light source (*e.g.*, a multi-die LED chip) or multiple light sources coupled to the indicators 312A, 312B, 312C, different light sources can be coupled to the light pipe/indicators 312A, 312B, 312C to provide different colors of illumination, and so on.

Accordingly, rich variations in indicator 312A, 312B, 312C and/or display 210A, 210B, 210C illumination can be provided. According to some embodiments, the variations can be at least in part associated with a user input (306).

[0041] FIG. 4 depicts an example system 400 having a motor controlled (308, 412) interface between a light source 410 and a light pipe 406 for a vehicle information display 106. The vehicle information display 106 can be associated with a computer-related processing system. Such a system can provide vehicle status information (*e.g.*, climate control, navigation, *etc.*), media information (*e.g.*, title, track, lyrics, *etc.* of played media or stored media), and/or entertainment information (*e.g.*, video game, movie, or like display). The motor controlled (308, 412) interface for the light source 410 and/or light pipe 406 can facilitate adjustable illumination for the information display 106 by dynamically controlling a position and/or orientation of the light source 410 or light pipe 406. Such control can be responsive to user input, responsive to vehicle status information (*e.g.*, engine temperature, fluid levels, and so on), or a combination thereof or of the like. Accordingly, system 400 can provide rich and dynamic illumination of a vehicle display.

[0042] Information display 106 can be positioned at a center stack console, vehicle dashboard, control panel, drop down panel (*e.g.*, from a roof of a vehicle), or any other suitable position in a vehicle interior. The information display 106 can include a bezel 402 that surrounds a display surface 404. The bezel 402 can be plastic (or, *e.g.*, another polymeric material), metal, wood, vinyl, or a combination of these or of like materials. The bezel 402 can provide support for the display surface 404 in

some aspects, and can provide accent lighting according to other aspects. For instance, bezel 402 can comprise a light pipe that receives light (*e.g.*, from light source 410) and illuminates, highlights, or accents the display surface 404.

[0043] Display surface 404 can be a static display or a dynamic display, or a combination of both. As a particular example, the display surface 404 can comprise a light pipe coupled to an emissive light source (410) and having etched or painted features or icons on a viewable surface (404). Light can selectively illuminate one or more painted features to “activate” a feature, and provide information to a viewer associated with the feature. More particularly, a feature depicting a seat belt warning can be illuminated to convey a problem with vehicle seat belts. As another example, a fuel gauge can be illuminated to provide information concerning fuel levels, and so on. According to still other examples, display surface 404 can comprise a computer-controlled TFT screen that generates dynamic indicia, such as computer generated graphics or text, to convey information.

[0044] Information display 106 can include a user input interface 414 according to some aspects. Although the user input interface 414 is depicted as a dial and/or button, such interface (414) can also be, for instance, a rocker switch or other push button coupled to a vehicle element that allows a user to cycle through various options to be provided on the display surface 404. In one example embodiment, during normal driving operation display surface 206 provides no display of information. However, while the vehicle is in park or neutral the information display 106 can display information pertinent to a number of vehicle systems, media systems, and/or entertainment systems.

[0045] Information display 106 can, in general, be illuminated by way of one or more light sources 410. As depicted, light source 410 can be coupled with a light pipe 406 by way of a baffle 408. Baffle 408 can be any suitable mechanism to provide an optical and/or mechanical coupling of the light source 410 and the light pipe 406. For instance, the baffle can serve as a physical mount for the light source 410 or light pipe 406, securing one or both in place. In another example, baffle 408 can serve to collect some light (*e.g.*, light emitted near a longitudinal axis of the light source 410) and absorb other light (*e.g.*, off-axis light). In other embodiments, baffle 408 can serve to block light emitting from one portion of the light source 410 and couple light emitting from a second portion of the light source 410 to the light pipe 406. As a particular example, if the light source 410 comprises an LED with multi-

color emissive die, one color can be blocked from coupling into the light pipe 406 by moving an emissive portion of an LED die associated with the color near to an absorbing surface of the baffle 408. Another color can be transmitted to the light pipe 406, by orienting the light source 410 such that light from an emissive die corresponding to the other color is transmitted through the baffle 408.

[0046] In some embodiments, baffle 408 is a hollow cylindrical object (or, *e.g.*, a multi-sided elongated tube), where at least one light source (410) can interface with a first end of the cylindrical object (408) and at least one light pipe 406 can interface with a second end of the cylindrical object (408). In such a manner, light transmitted within an interior portion of the baffle 408 can be coupled from the light source 410 to the light pipe 406. According to further embodiments, the baffle 408 can have a reflective coating or surface, such that at least a portion of light incident upon the baffle 408 is not absorbed. Such light could reflect off one or more surfaces of the baffle 408 and potentially couple into the light pipe 406. According to specific aspects, baffle 408 can be an output gear of a stepper motor, servomotor, or the like (412).

[0047] The light source 410, baffle 408 and/or light pipe 406 can be coupled with at least one motor 412 that can adjust a position of such components (406, 408, 410). By controlling a position of the light source 410 with respect to the light pipe 406, for instance, an amount, color, and/or intensity distribution of light coupled from the light source 410 to the light pipe 406 can be altered. Accordingly, light coupled from the light pipe 406 to the bezel 402 or display surface 404 can be altered also. In some aspects, the light pipe 406 or light source 410 can be moved substantially within a plane perpendicular to a longitudinal axis of the baffle 408 (*e.g.*, in a case where the baffle is a cylinder, tube-like object, and so on). In other embodiments, such objects (406, 410) can be moved in and out of the baffle 408 substantially in the longitudinal axis. According to still other aspects, the light pipe 406 and light source 410 can be coupled together by the baffle 408 to form a pointer or indicator. A motor 412 coupled to the pointer or indicator can adjust an orientation of the pointer/indicator with respect to a display surface. In addition, a second motor (412) coupled to the light pipe and/or light source can adjust a relative position of the source/pipe, so as to alter illumination occurring at the light pipe. Accordingly, dynamic control of light at the light pipe and/or information display can be accomplished by the motor control system (308, 412) depicted at FIG. 4.

[0048] FIG. 5 illustrates a sample system 500 of a motor controlled baffle 408 that interfaces an LED 502 with a light pipe indicator 504. The light pipe indicator 504 can be any suitable translucent or semi-translucent material (*e.g.*, glass, plastic, *etc.*) suitable to provide TIR for at least a portion of light coupled within the light pipe 504. In addition, light pipe 504 can enable at least a portion of such light to transmit or scatter out of a display portion of the light pipe 504. Accordingly, light pipe 504 can serve as a pointer for a graduated display scale (*e.g.*, vehicle speed) indicating a concurrent state of a vehicle system (*e.g.*, current vehicle speed, such as 55 mph).

[0049] In addition to the foregoing, light pipe 504 can receive light from the LED 502 and transmit and/or scatter a portion of the received light to a viewing surface of the light pipe 504. Thus, a viewable surface of the light pipe 504 can be illuminated, for instance, in relatively low ambient light levels (*e.g.*, at night). By illuminating the light pipe 504, information provided at an associated display can be read at night, for instance.

[0050] Light pipe 504 can be coupled with a baffle 408. The baffle 408 can mount to and/or secure the light pipe 504 or the light pipe can move with respect to the baffle 408. Baffle 408 can also be coupled with an LED 502. Specifically, LED 502 can be optically coupled to baffle 408, such that light provided by the LED 502 can propagate within the walls of the baffle 408. Baffle 408 can be reflect, scatter and/or absorb light provided by LED 502, and at least a portion of light not absorbed can be coupled into light pipe 504. In some embodiments, baffle 408 can be an output gear of a motor (*e.g.*, motor 410).

[0051] According to some embodiments, baffle 408 can provide a common longitudinal axis for LED 502 and light pipe 504 and couple the LED 502 and light source 504 to each other. Specifically, baffle 408 can help to maintain a position and/or orientation of the light pipe 504 and LED 502 such that light emitted by the latter is incident upon an input interface of the former. The baffle 408, LED 502, and light pipe 504 can also form a display object, such as an indicator or pointer for an instrument panel (not depicted). In such embodiments, light provided by the LED 502 is transmitted into the light pipe 504 and scattered or transmitted once again toward an observer, to illuminate the indicator/pointer (502, 504, 408).

[0052] According to some embodiments, LED 502 can include an emissive/transmissive portion 508 (hereinafter referred to as an emissive portion) and a base portion 510. The emissive portion 508 can comprise one or more light-

emitting chips (not depicted) and optionally a lens (508), such as a domed lens (508) that can transmit and/or scatter light. The light emitting chips can emit radiation of a common wavelength or range of wavelengths (*e.g.*, blue, ultraviolet), or multiple ranges of wavelengths (*e.g.*, blue, red and green) to provide multiple output colors. The base portion 514 can comprise a mount and can optionally secure to or within baffle 408 for stability.

[0053] According to further embodiments, a motor 410 is coupled with baffle 408, LED 502, and/or light pipe 504. The motor 410 is configured to adjust a position or orientation of one such component (502, 504, 408) with another (502, 504, 408). So, for instance, motor 410 can move LED 502 with respect to baffle 408 and/or light pipe 504. Alternatively, or in addition, motor 410 can move light pipe 504 with respect to LED 502 and baffle 408. It should also be appreciated that motor 410 can move baffle 408 with respect to light pipe 504 or light 502, as suitable.

[0054] Motor 410 is controlled by motor control 308. Motor control 308 can generate electric signals configured to cause motor 410 to rotate, translate, spin, or a combination thereof or of the like. Accordingly, light source 502, baffle 408 and/or light pipe 504 can be rotated, translated, and/or spun, or the like.

[0055] By repositioning the LED 502 with respect to baffle 408 and/or light pipe 504, for instance, a characteristic of illumination coupled into the light pipe 504 (or, *e.g.*, into a display screen illuminated by the light pipe 504) can be altered. For instance, less light can be coupled into the light pipe 504 by moving the LED 502 further away from the light pipe 504 (*e.g.*, in a longitudinal axis) or more light can be coupled into the light pipe 504 by moving the LED 502 closer to light pipe 504. According to still other aspects, LED 502 can be repositioned in a plane perpendicular to a longitudinal axis of the baffle 408. Accordingly, a portion of the emissive surface 508 can be blocked by baffle 408, changing an intensity distribution of light incident upon light pipe 504. In such a manner, characteristics of light can be dynamically adjusted based on the position of the light source 502, light pipe 504, and/or baffle 408.

[0056] According to still other embodiments, baffle 408 can include at least one end having a chamfer 506 (*e.g.*, proximate the LED 502). The chamfer 506 can allow for a wider range of movement of the LED 502. For instance, LED 502 can move a greater degree in a plane that is perpendicular to a longitudinal axis of the baffle 408, due to extra clearance within the baffle 408 provided by chamfer 506.

[0057] In additional embodiments, baffle 408 can have a diameter substantially equivalent to at least one of between 2mm and 5mm, between 2.5 mm and 3.5mm, or substantially equivalent to 3mm. Further, LED 502 can have a diameter substantially equivalent to one of between 1mm and 4mm, between 2mm and 3mm, or substantially equivalent to 3mm. It should be appreciated that in some embodiments, LED 502 and baffle 408 do not overlap in a plane perpendicular to a longitudinal axis of the baffle 408. Accordingly, LED 502 can have a diameter larger than an interior diameter or width of baffle 408. Said differently, an end of the baffle 408 proximate the LED 502 can be trimmed to a dimension that is smaller than the diameter of the LED 502.

[0058] FIG. 6 illustrates an example system 600 that can reposition a light source (502) with respect to a light pipe interface to provide varied illumination for an indicator or display. System 600 can include a light source 502, such as an LED. The LED (502) can have an emissive surface 508, which can comprise at least a chip that emits electromagnetic energy (*e.g.*, visible light, ultraviolet radiation, infrared radiation, and so on). The emissive surface 508 can also include a lens that covers the chip. Such a lens (510) can be dome shaped, or other suitable shape for redirecting energy emitted by the chip into a predetermined intensity distribution. In some embodiments, the chip emits UV radiation at least in part and an emissive phosphor within the lens (510) or on a surface of the lens (510) absorbs a portion of the UV radiation and emits visible light.

[0059] System 600 can also include a baffle 408. In some embodiments, the baffle 408 can secure a position of the light source 502 (*e.g.*, where distance X 616 is substantially equal to zero). Baffle 408 can have an interior surface 602. The interior surface 602 can be configured to interact in a predetermined manner with light emitted by light source 502. For instance, the interior surface 602 can be configured to reflect the light, absorb the light, and/or scatter the light. In some embodiments, for instance where baffle 408 is comprised of a material that is at least in part translucent (*e.g.*, plastic or glass), the interior surface 602 can also refract or transmit the light.

[0060] As depicted at FIG. 6, baffle 408 can have a chamfer 506 at an end proximate the light source 502. The chamfer 506 can have a nominal distance from an emissive surface (or, *e.g.*, a mounting surface, where light source 502 has no lens) of light source 502. The nominal distance is depicted at X 616. The nominal distance X 616 can be any suitable value. Accordingly, to some embodiments, the nominal

distance X 616 can be substantially between 0.5 and 0.7 mm (*e.g.*, 0.612mm). Chamfer 506 can also include an angle to a longitudinal axes of the baffle 408, depicted at angle A 604. In some embodiments, angle A 604 can be substantially between 15 and 40 degrees. In other embodiments, angle A 604 can be substantially between 25 and 35 degrees. In still other embodiments, angle A 604 can be substantially 30 degrees.

[0061] In accordance with one or more other aspects, chamfer 506 can have a length D 618 that extends along a longitudinal dimension of baffle 408. In some aspects, the length D 618 can be symmetric about an outer perimeter of the end of the baffle 408 proximate light source 502. In other aspects, the length D 618 can be asymmetric, larger at one portion of the perimeter than another portion (*e.g.*, larger on the left side and smaller on the right side). According to some embodiments, a length D 618 of the chamfer 506 projected along a longitudinal axis of the baffle 408 is substantially between 2mm and 4mm. According to other embodiments, length D 618 is substantially between 2.5mm and 3.5mm. According to still other embodiments, length D 618 is substantially 3mm. In addition, according to one or more additional embodiments, length D 618 can extend along an entire longitudinal axis of baffle 408.

[0062] System 600 can also include a motor 410 coupled to a motor control 308. The motor can dynamically adjust a position or orientation of light source 502 with baffle 408 to change luminous intensity and/or luminous flux emitted from light source 502 and incident upon baffle 408 or propagating down an interior length of baffle 408. By dynamically adjusting the position/orientation, an illumination characteristic of a light source or display coupled to baffle 408 can be dynamically altered. For instance, the illumination can appear brighter or dimmer, or alternately brighter and dimmer by dynamically adjusting the position.

[0063] According to other embodiments, various portions of a viewable display surface can be provided more or less illumination by changing a distribution of light propagating through the baffle 408 (*e.g.*, by adjusting a position of the light source 502 in a plane perpendicular to the longitudinal axis of the baffle 408, or an angle of the light source 502 with such axis). Further, according to still other embodiments, an intensity distribution can be adjusted in a predetermined manner by setting angle A 604 and/or length D 618 to a predetermined value. Adjusting position of light source 502 and/or baffle 408 can be in accordance with a user input, or a vehicle system (*e.g.*, if emergency lights are on, a display associated with such lights

can appear to blink by alternately increasing and decreasing an intensity of light incident upon such display). Thus, system 600 can provide for rich and varied illumination at a display by dynamically controlling a position of light source 502 and/or baffle 408.

[0064] FIG. 7 illustrates an example of various light pipe interfaces 702A, 702B, 702C utilized to receive light from a light source according to further aspects. Interfaces 702A, 702B, 702C can include a light source 502A, 502B, 502C having an emissive surface 508A, 508B, 508C and a base 510A, 510B, 510C. Each interface 702A, 702B, 702C can also include a light pipe 704A, 704B, 704C with an input surface 706A, 706B, 706C. Positions of the light sources 502A, 502B, 502C with respect to light pipes 704A, 704B, 704C, and shape of input surfaces 706A, 706B, 706C, can be designed to couple a particular luminous flux from the light sources 502A, 502B, 502C into the light pipes 706A, 706B, 706C.

[0065] As depicted at 702A, an input interface 706A of a light pipe 704A can have a substantially flat surface. The flat surface (706A) can provide a substantially nominal intensity distribution for light received from the light source 502A. Such light can be coupled to a display surface of the light pipe 704A, or to a larger display (*e.g.*, of an instrument cluster, an information center display screen, and so on).

[0066] As depicted at 702B, an input interface 706B of a light pipe 704B can have a substantially convex surface 706B. Such a convex surface 706B can serve to increase an intensity distribution of light received from the light source 502B (*e.g.*, by focusing light rays incident upon such surface 706B). Accordingly, light pipe 704B can provide different illumination characteristics for a display as compared with a nominal illumination provided by light pipe 704A.

[0067] As depicted at 702C, an input interface 706C of a light pipe 704C can have a substantially concave surface 706C. Such a concave surface 706C can serve to decrease an intensity distribution of light received from the light source 502C. Specifically, light rays incident upon such surface 706C can be defocused. By decreasing an intensity distribution of received light, apparent brightness of a display can also be decreased, for instance.

[0068] According to some embodiments, light pipes 704A, 704B, 704C can be made of a flexible material (*e.g.*, silicone within flexible polymeric shell). A shape of the flexible material can be changed to provide different illumination. For instance, an input surface (706A, 706B, 706C) of a flexible light pipe (704A, 704B, 704C) can

be adjusted from substantially flat, to substantially concave, to substantially convex, in order to provide for dynamic alteration of an intensity distribution of light received by the light pipe. Accordingly, light source (502A, 502B, 502C) and light pipe (704A, 704B, 704C) interfaces (702A, 702B, 702C) can be dynamically adjusted in conjunction with a flexible light pipe material.

[0069] FIG. 8 depicts a sample display indicator 800 coupled with a light source 502 by a reflective baffle 408 according to one or more aspects. Light source 502 can have an emissive surface 510 and a base portion 512. The light source 502 can be an LED, incandescent lamp, arc lamp, or the like.

[0070] Light source 502 can be coupled with a baffle 408 that can mount to and secure the light source 502, in some aspects, or can simply be optically coupled to light source 502, allowing a portion of light transmitted by the light source 502 to propagate to light pipe/indicator 802, in other aspects. In the latter case, baffle 408 can include a chamfer at an end proximate the light source 502 to allow for additional movement of the light source (*e.g.*, in a plane perpendicular to a longitudinal axis of the baffle 408) with respect to the baffle.

[0071] A portion of light emitted by the light source 502 can be coupled into light pipe indicator 802. Light pipe/indicator can be comprised of a suitable material that is at least partially translucent. Accordingly, such partially translucent material can enable light from the light source 502 to exhibit TIR within an interior portion of the light pipe/indicator 802. The light pipe/indicator 802 can be utilized to point to various levels of a display screen to indicate concurrent state information pertaining to a vehicle (*e.g.*, vehicle speed). For instance, a motor (not depicted) coupled with system 800 can change an orientation of the light pipe/indicator 802, baffle 408, and/or light source 502 with respect to a graduated scale to point an end of the light pipe/indicator 802 at one or more of the increments. In such a manner an increment, correlated to a vehicle state (*e.g.*, 35mph) can be distinguished from other increments to display vehicle speed.

[0072] According to additional embodiments, light propagating with light pipe/indicator 802 can be extracted at various positions along a length of light pipe/indicator 802 for illumination. For instance, it can be beneficial to illuminate the light pipe/indicator 802 in low ambient light levels (*e.g.*, nighttime). By coupling light from the light source 502 into the light pipe/indicator 802, the latter can be illuminated. For instance, the light pipe/indicator 802 can be painted with a scattering

paint, scattering features (*e.g.*, ridges, stipples, prisms, or the like) that can extract and/or scatters light out of the light pipe/indicator 802. According to other aspects, a thickness of the light pipe/indicator can be decreased by an angle B 804 along a length of the light pipe/indicator. In such a manner, light can be extracted out of the light pipe/indicator 804 gradually along the length of the light pipe/indicator 802.

[0073] According to still other aspects, a stepper motor or servomotor (not depicted) can be coupled to the light source 502, baffle 408, or light pipe/indicator 802. Accordingly, a position or orientation of the light source 502 can be adjusted with respect to the light pipe/indicator 802. An amount of light received by the baffle 408 and propagated to the light pipe/indicator 802 can depend on an orientation of the light source 502 with an input end of the baffle 408. Accordingly, brightness or distribution of light coupled to the light pipe/indicator 802 can be dynamically adjusted by dynamically changing such position/orientation. In addition, if one portion of the emissive surface 510 of the light source 502 emits a first color and a second portion emits a second color, color control can be provided by adjusting a position and/or orientation of the light source 502. For instance, a first portion of the emissive surface 508 can be coated with a film of a first color (*e.g.*, red), and a second portion of the emissive surface 508 can be coated with a film of a second color (*e.g.*, green). Alternatively, the light source 502 can include multiple emissive portions (*e.g.*, multi-die LED) that emit light of different colors. The multiple emissive portions can be located at a different position on an outer surface of the base portion 510 of the light source, for instance. Accordingly, but adjusting a position of the light source 502 with respect to the baffle, light of a particular color can be blocked, limiting a color of light that couples to the light pipe/indicator 802 and is displayed to a viewer.

[0074] FIG. 9 illustrates various re-configurable positions of a light source with respect to a light pipe interface. Particularly, the positions of the light source are adjusted in a plane that is perpendicular to a longitudinal axis (*e.g.*, depicted by the dotted line at 902B and 908B) of the baffle. At 902 and 902A, a nominal position is depicted. The nominal position includes a light source (*e.g.*, an LED) that is aligned substantially with an axis of a baffle. For instance, a cross section A-A of 902 is depicted at 902B. The cross section A-A 902B illustrates such nominal position from a perpendicular perspective. As depicted (902B), an axis of the light source is substantially co-axial with an axis of the baffle.

[0075] At 904 and 904A, a laterally shifted light source is depicted. The laterally shifted source is near to a lateral edge of a baffle. Likewise, at 906 and 906A a vertically shifted source is depicted. Such source is near to a vertical edge of the baffle.

[0076] At 908 and 908A, a vertical/lateral shifted source is depicted. The vertical/lateral shifted source is diagonally shifted with respect to the nominal position illustrated at 902 and 902A. Specifically, the vertically/laterally shifted source can be seen at another perspective at 902B. As depicted at 902B, the shifted source is no longer substantially co-axial with a longitudinal axis of the baffle. Accordingly, a distribution of light emitted from the light source can be different for a shifted source, as opposed to the nominal source, changing an illumination distribution of an output display as well.

[0077] It should also be noted that an end of the baffle proximate the light source can have a chamfered edge. The chamfered edge provides additional movement for the light source in a plane perpendicular to the longitudinal axis of the baffle. For instance, by providing additional clearance, the light source can be shifted with respect to the baffle to a greater amount, before physically abutting the baffle (*e.g.*, as depicted at 908B). Additionally, the chamfered edge can be utilized to couple more light emitted from the light source within the baffle, or to alter an intensity distribution of such light. Accordingly, the chamfered edge can be designed to provide a desired illumination effect at an output display.

[0078] FIG. 10 represents an example of an operating environment 1000 suitable to perform various electronic processing, logic, or interface functions pertinent to a computer-related vehicle interface, including a control circuit 308 that operates a stepper motor, servomotor, or the like. In order to provide additional context for various aspects of the claimed subject matter, FIG. 10 and the following discussion are intended to provide a brief, general description of the operating environment 1000 in which various processing logic and/or interface aspects can be implemented. While the description is in the general context of computer-executable instructions that can run on one or more computers, those skilled in the art will recognize that the claimed subject matter also can be implemented in combination with other program modules and/or as a combination of hardware and software.

[0079] Generally, program modules include routines, programs, components, data structures, *etc.*, that perform particular tasks or implement particular abstract data

types. Moreover, those skilled in the art will appreciate that the inventive methods can be practiced with other computer system configurations, including single-processor or multiprocessor computer systems, minicomputers, as well as personal computers, hand-held computing devices, microprocessor-based or programmable consumer electronics, and the like, each of which can be operatively coupled to one or more associated devices (*e.g.*, a TFT display of a display screen, a control circuit of a motorized device, and so on).

[0080] The illustrated aspects of the claimed subject matter can also be practiced in distributed computing environments where certain tasks are performed by remote processing devices that are linked through a communications network. (*E.g.*, a communications network can include a short range radio network, such as a BLUETOOTH network or WiFi network, a short range wire link suitable for an interior of a vehicle, or a wireless interface to the Internet or other suitable data network such as *via* a cellular or mobile network interface, WiFi network, WiMAX network, satellite link, or the like.) In a distributed computing environment, program modules can be located in both local and remote memory storage (1002) devices. For instance, a control circuit 308 can be located within a vehicle control panel, whereas a display in a rear portion of the vehicle associated with the control circuit 308 can be wirelessly coupled to the control circuit 308 *via* the short-range radio network.

[0081] An operating environment 1000 can typically include or be coupled to a variety of computer-readable media 1012. Computer-readable media 1012 can be any available media that can be accessed by a control circuit 308 and includes both volatile and non-volatile media and/or removable and non-removable media. By way of example, and not limitation, computer-readable media (1012) can comprise computer storage media and communication media. Computer storage media includes both volatile and non-volatile, removable and non-removable media implemented in any method or technology for storage of information such as computer-readable instructions, data structures, program modules or other data. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital video disk (DVD) or other optical disk storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by the control circuit 308.

[0082] Communication media typically embodies computer-readable instructions, data structures, program modules or other data (*e.g.*, navigation module, motor control module, entertainment module, media playback module and so on) in a modulated data signal such as a carrier wave or other transport mechanism, and includes any information delivery media. The term “modulated data signal” means a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media includes wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, RF, infrared and other wireless media. Suitable combinations of the any of the above should also be included within the scope of communication media derived from computer-readable media and capable of subsequently propagating through electrically conductive media, (*e.g.*, such as a system bus, microprocessor, data port, and the like) and/or non-electrically conductive media (*e.g.*, in the form of radio frequency, microwave frequency, optical frequency and similar electromagnetic frequency modulated data signals).

[0083] The operating environment 1000 for implementing various vehicle processing, logic and/or interface functions includes a control circuit 308, the control circuit 308 including a processing unit 1004, a system memory 1002 and a system bus 1108. The system bus 1006 couples system components including, but not limited to, the system memory 1002 to the processing unit 1004. The processing unit 1004 can be any of various commercially available processors, such as a single core processor, a multi-core processor, or any other suitable arrangement of processors. The system bus 1006 can be any of several types of bus structure that can further interconnect to a memory bus (with or without a memory controller), a peripheral bus, and a local bus using any of a variety of commercially available bus architectures. The system memory 1002 can include read-only memory (ROM), random access memory (RAM), high-speed RAM (such as static RAM), EPROM, EEPROM, and/or the like. Additionally or alternatively, the control circuit 308 can include a hard disk drive (1012), upon which program instructions, data, and the like can be retained. Moreover, removable data storage (1012) can be associated with the control circuit 308. Hard disk drives, removable media, *etc.* (1012) can be communicatively coupled to the processing unit 1004 by way of the system bus 1006.

[0084] The system memory 1002 can retain a number of program modules, such as an operating system, one or more application programs, other program

modules, and program data. Specifically, application programs and program modules can include GPS navigation software, media playback controls, entertainment software such as gaming software, vehicle status modules providing feedback pertinent to various vehicle systems, and the like. All or portions of an operating system, applications, modules, and/or data can be, for instance, cached in RAM, retained upon a hard disk drive, or any other suitable location. A user can enter commands and information into the control circuit 308 through an input interface 1008. The input interface 1008 can include one or more wired/wireless input devices, such as a keyboard, pointing and clicking mechanism, pressure sensitive screen, microphone, joystick, stylus pen, *etc.* An output interface 1010, including at least a graphical display (not depicted) or other type of interface can also be connected to the system bus 1006.

[0085] The control circuit 308 can operate in a networked environment using logical connections *via* wired and/or wireless input interface 1008 and output interface 1010 to one or more remote computers, phones, or other computing devices, such as workstations, server computers, routers, personal computers, portable computers, microprocessor-based entertainment appliances, peer devices or other common network nodes, *etc.* The input/output interfaces 1008, 1010 can provide a communication link between the control circuit 308 and various devices/networks by way of antenna, port, network interface adaptor, wireless access point, modem, and/or the like.

[0086] The control circuit 308 is operable to communicate with any wireless devices or entities operatively disposed in wireless communication by the input/output interfaces 1008, 1010 including, *e.g.*, a printer, portable computer, portable data assistant, communications satellite, a mobile telephone, and/or the like. This can include at least WiFi and Bluetooth™ wireless technologies. Thus, the communication can be a predefined structure as with a conventional network or simply an ad hoc communication between at least two devices.

[0087] WiFi, or Wireless Fidelity, allows the control circuit 308 to connect to the Internet within a vehicle by way of a wireless interface. WiFi is a wireless technology similar to that used in a cell phone that enables such devices (*e.g.*, control circuit) to send and receive data (1008, 1010) anywhere within a range of a WiFi network base station. WiFi networks use radio technologies called IEEE 802.11 (a, b, g, *etc.*) to provide secure, reliable, fast wireless connectivity. A WiFi network can be

used to connect computers to each other, to the Internet, and to wired networks. WiFi networks operate in the unlicensed 2.4 and 5 GHz radio bands, at an 11 Mbps (802.11a) or 54 Mbps (802.11b) data rate, for example, or with products that contain both bands (dual band), so the networks can provide real-world performance similar to the basic 10BaseT wired Ethernet networks.

[0088] The aforementioned systems have been described with respect to interaction between several components, modules and/or electronic interface functions. It should be appreciated that such systems and components/modules/functions can include those components or sub-components specified therein, some of the specified components or sub-components, and/or additional components. For example, a system could include vehicle information display 106, computer-readable medium 1012, interface circuit 310 and motor control 308, or a different combination of these and other components. Sub-components could also be implemented as components communicatively coupled to other components rather than included within parent components. Additionally, it should be noted that one or more components could be combined into a single component providing aggregate functionality. For instance, input interface 1008 can include output interface 1010, or *vice versa*, to facilitate interfacing input and output devices with a control circuit by way of a single component. The components may also interact with one or more other components not specifically described herein but known by those of skill in the art.

[0089] Furthermore, various portions of the disclosed systems can include or consist of artificial intelligence or knowledge or rule based components, sub-components, processes, means, methodologies, or mechanisms (*e.g.*, support vector machines, neural networks, expert systems, Bayesian belief networks, fuzzy logic, data fusion engines, classifiers...). Such components, *inter alia*, and in addition to that already described herein, can automate certain mechanisms or processes performed thereby to make portions of the systems more adaptive as well as efficient and intelligent.

[0090] What has been described above includes examples of the claimed subject matter. It is, of course, not possible to describe every conceivable combination of components or methodologies for purposes of describing the claimed subject matter, but one of ordinary skill in the art can recognize that many further combinations and permutations of such matter are possible. Accordingly, the claimed

subject matter is intended to embrace all such alterations, modifications and variations that fall within the spirit and scope of the appended claims. Furthermore, to the extent that the term “includes” is used in either the detailed description or the claims, such term is intended to be inclusive in a manner similar to the term “comprising” as “comprising” is interpreted when employed as a transitional word in a claim.

CLAIMS

What is claimed is:

1. A system that provides configurable illumination for a vehicle display, comprising:
 - a light source that provides light;
 - a light pipe that receives at least a portion of the light and couples a portion of the light to an indicator or display surface of a vehicle display;
 - a baffle that couples the light source with an input interface of the light pipe, the baffle has a chamfer at an end proximate the light source; and
 - a motor coupled to the light pipe, the baffle, the light source, or a combination thereof, that alters a position of the light source or the light pipe with respect to the baffle.
2. The system of claim 1, the light source is a light emitting diode (LED).
3. The system of claim 2, the LED has a diameter substantially equivalent to one of:
 - between 1 millimeter (mm) and 4mm;
 - between 2mm and 3mm; or
 - 3mm.
4. The system of claim 2, the LED comprises a lens over a light emitting chip.
5. The system of claim 4, the end of the baffle that is proximate the light source is trimmed to an interior width that is smaller than a diameter of the lens.
6. The system of claim 1, the baffle comprises an output gear of the motor.
7. The system of claim 1, the baffle is substantially cylindrical in shape.

8. The system of claim 1, the baffle has a diameter substantially equivalent to at least one of:

between 2mm to 5mm;
between 2mm to 4mm; or
3mm.

9. The system of claim 1, the chamfer has an angle to a longitudinal axis of the baffle substantially equivalent to at least one of:

between 15 degrees to 40 degrees;
between 25 degrees to 35 degrees; or
30 degrees.

10. The system of claim 1, the chamfer extends along substantially an entire longitudinal dimension of the baffle.

11. The system of claim 1, a length of the chamfer projected along a longitudinal axis of the baffle is substantially equivalent to at least one of:

between 2mm and 4 mm;
between 2.5mm and 3.5 mm; or
3mm.

12. The system of claim 1, the motor is a stepper motor or a servo motor.

13. The system of claim 1, the motor adjusts a position of the light source with respect to the baffle.

14. The system of claim 1, the motor adjusts a position of the baffle with respect to the light source or the light pipe.

15. The system of claim 1, the motor adjusts a position of the light pipe with respect to the light source or the baffle.

16. The system of claim 1, the motor adjusts a position of the light source, the baffle, or the light pipe, or a combination thereof, with respect to the vehicle display.

17. The system of claim 1, the vehicle display is a portion of an instrument cluster, a portion of a center console, or a portion of an entertainment, media, or navigational display of a vehicle.

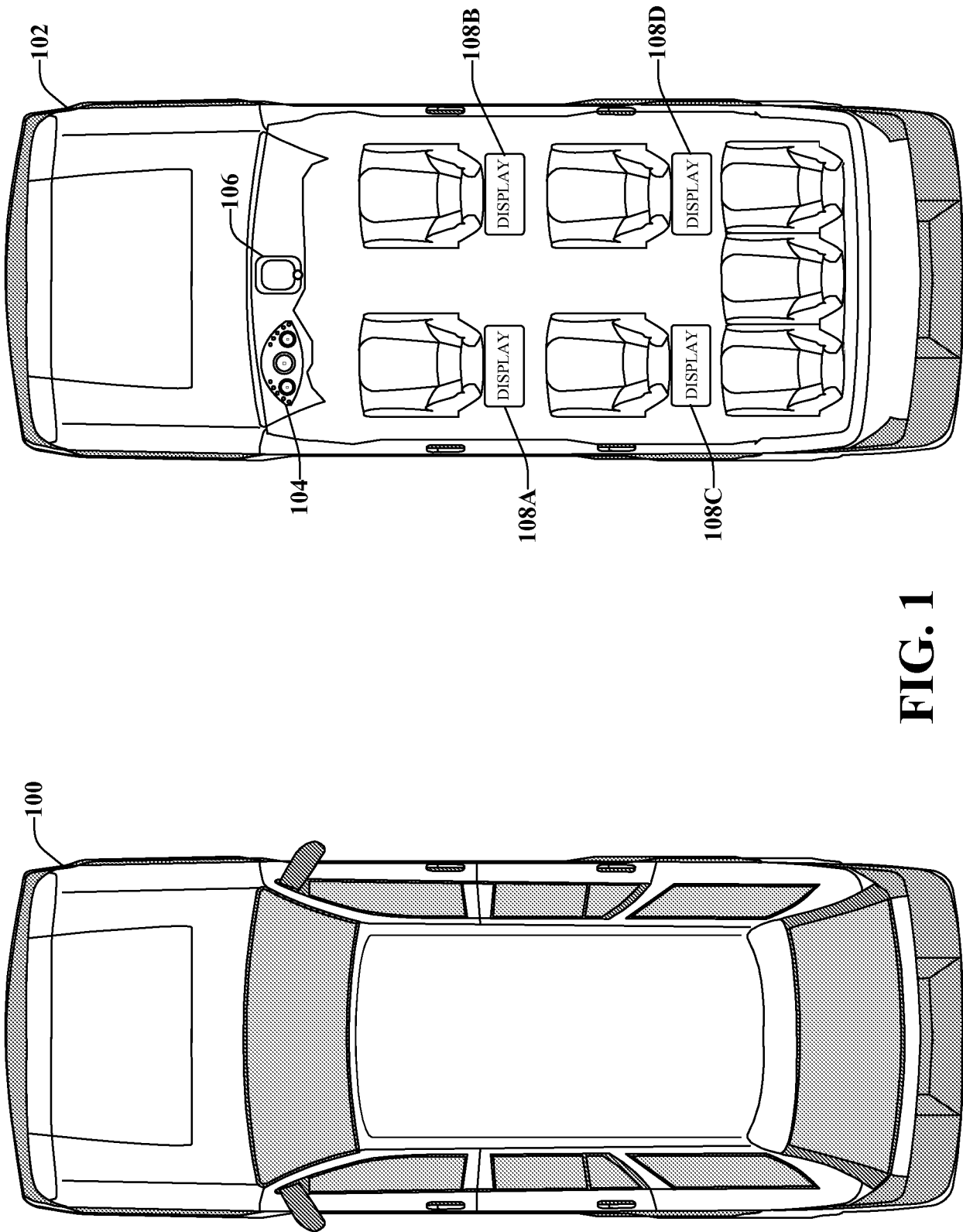
18. The system of claim 1, the motor adjusts a position of the light source, the baffle, or the light pipe, or a combination thereof, in a direction that is substantially co-axial with a longitude of the baffle.

19. The system of claim 1, further comprising:

a plurality of light sources configured to selectively illuminate the vehicle display, wherein the vehicle display generates a resolution greater than the number of light sources; and

a control circuit configured to control position or movement of the plurality of light sources in a manner that increases resolution of the vehicle display.

20. The system of claim 1, the chamfer widens the end of the baffle proximate the light source to facilitate an increased range of movement for the light source with respect to the end of the baffle.



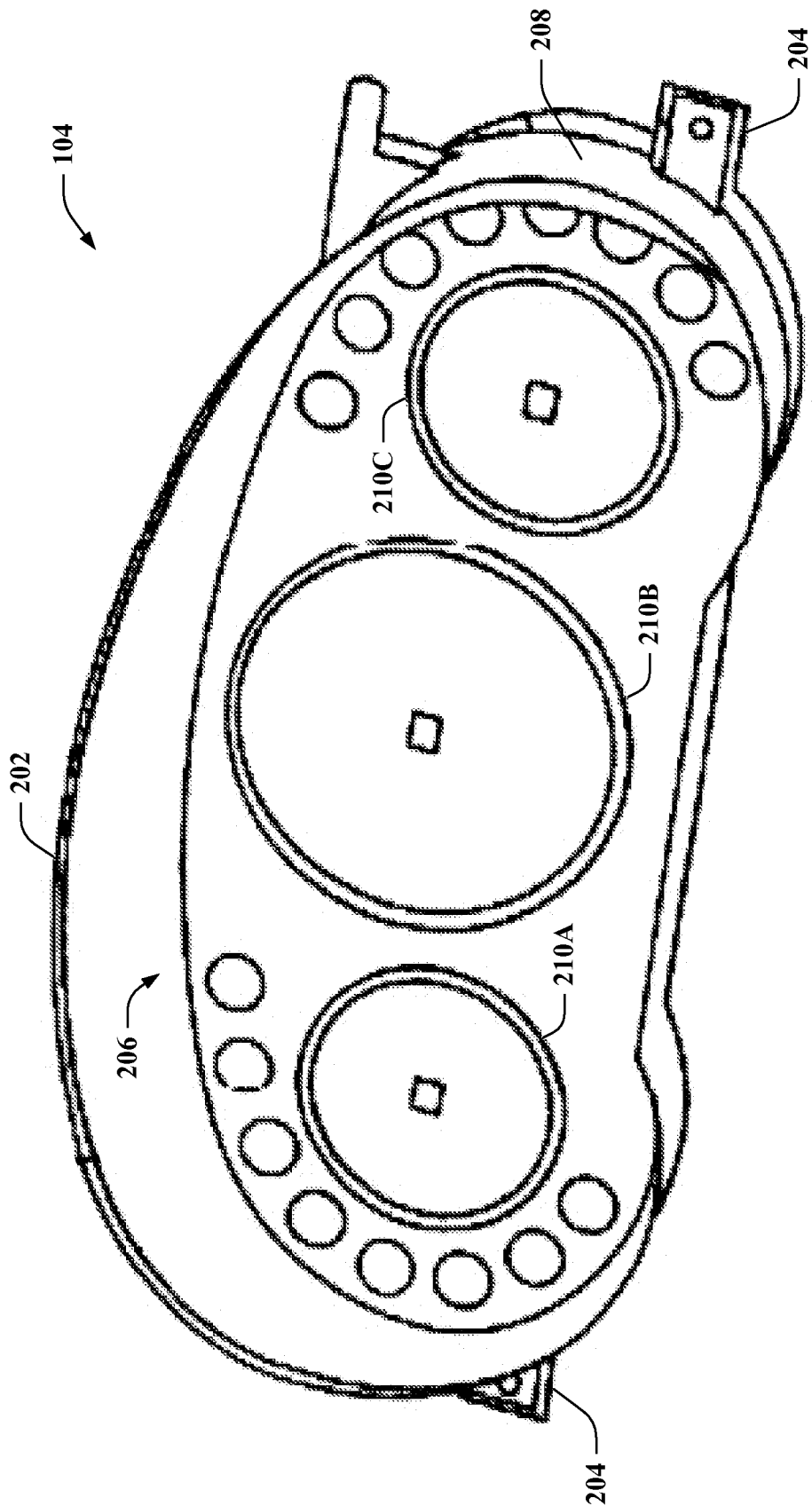


FIG. 2

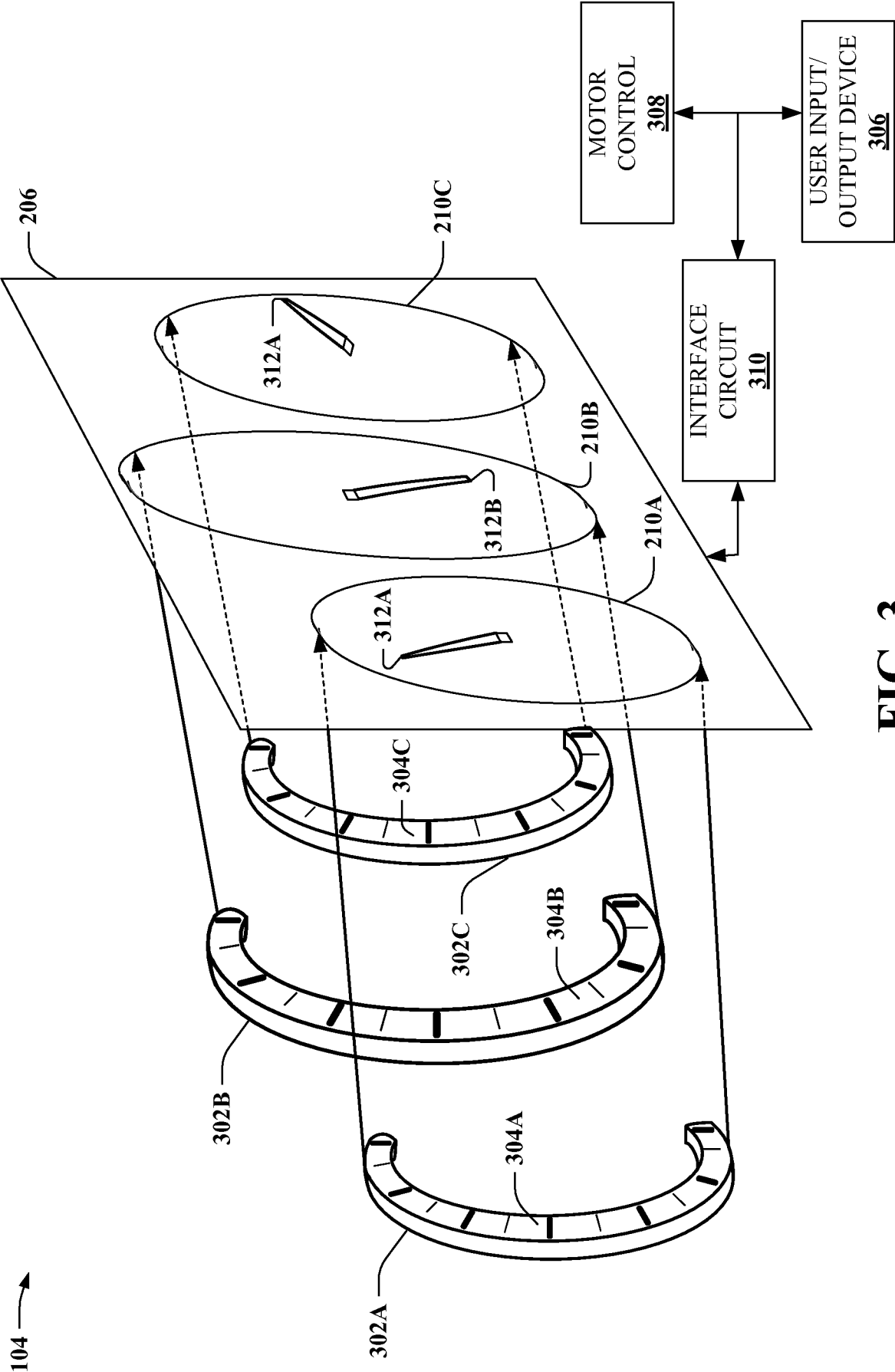


FIG. 3

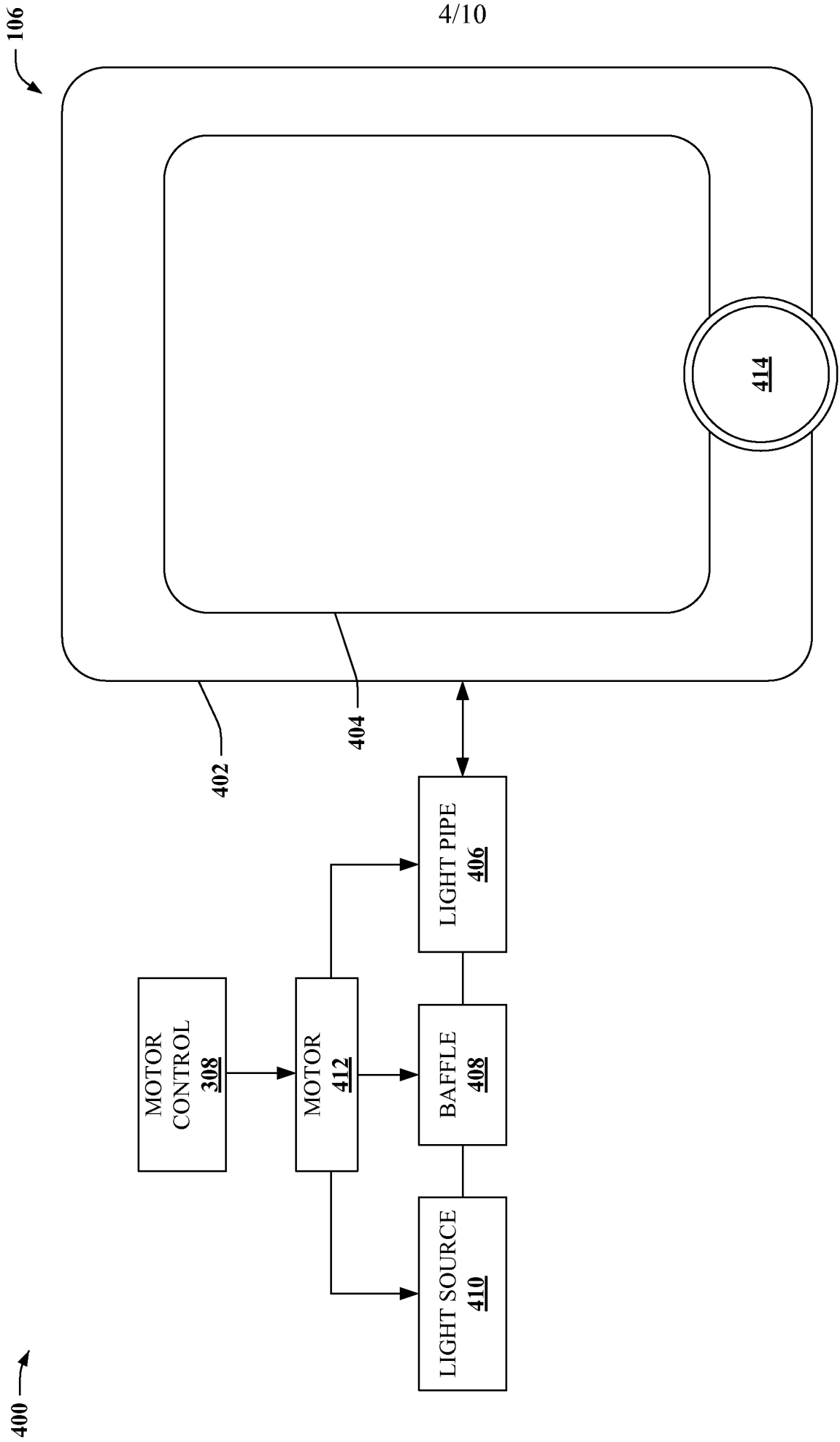
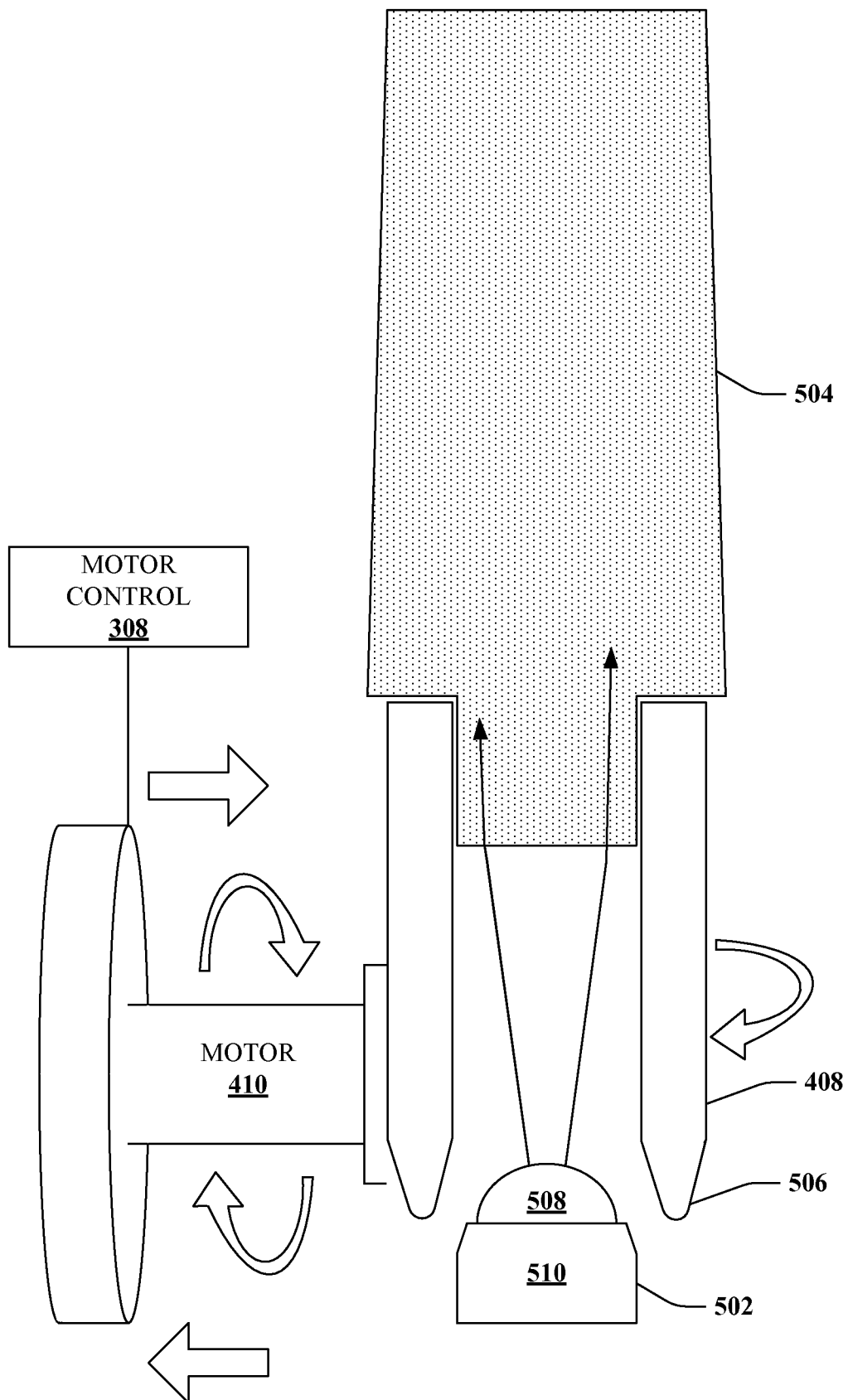


FIG. 4

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**FIG. 5**

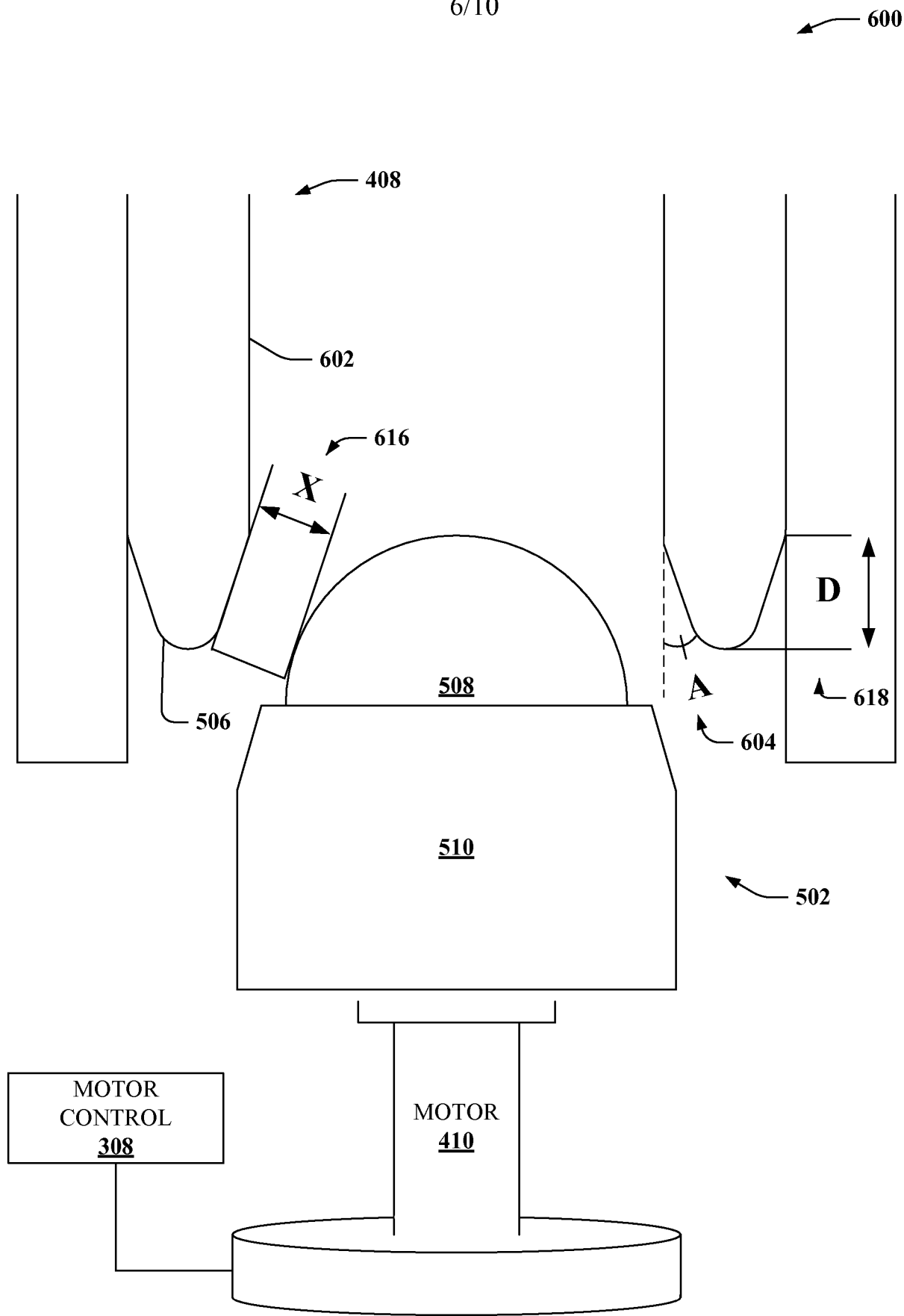


FIG. 6

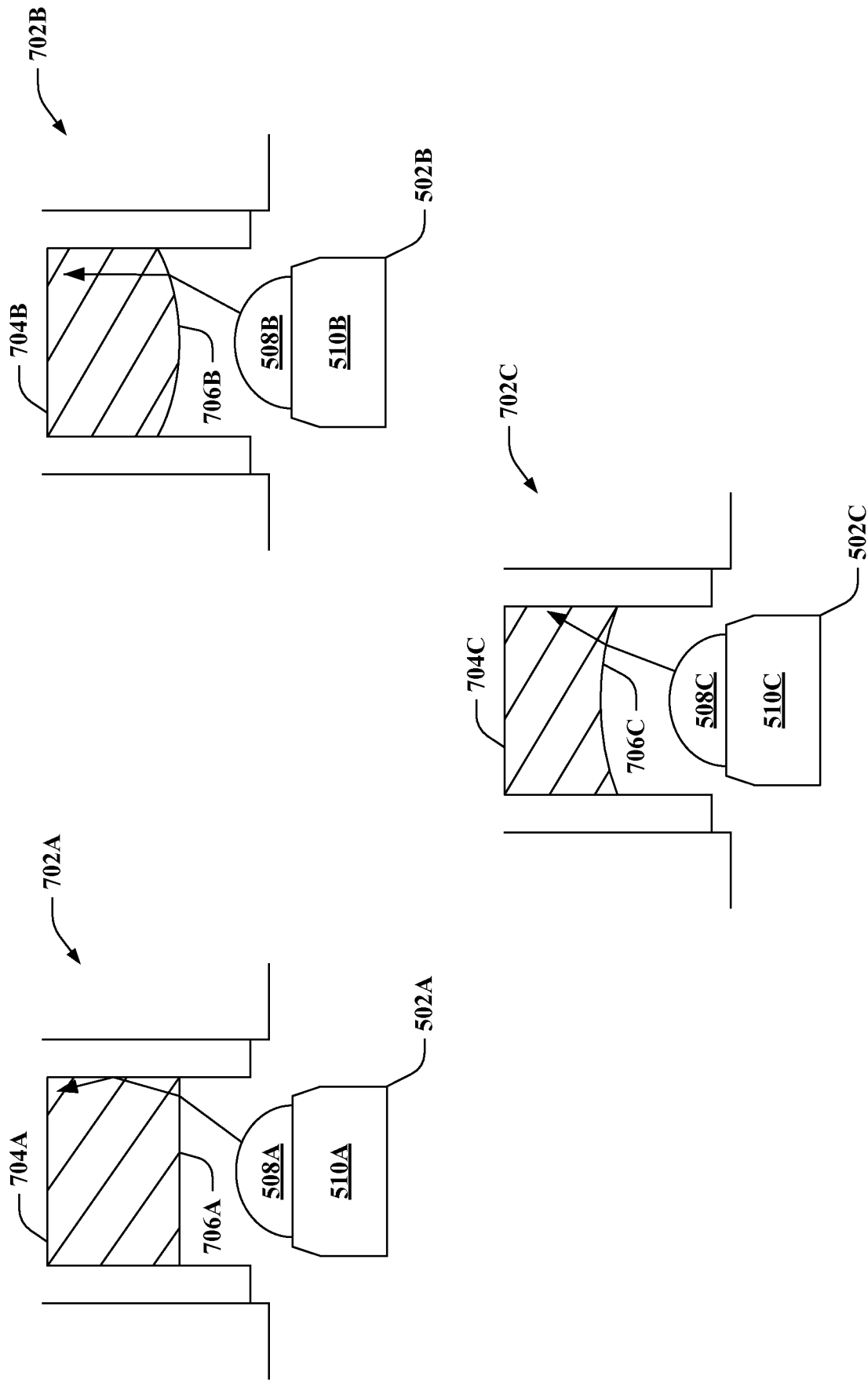


FIG. 7

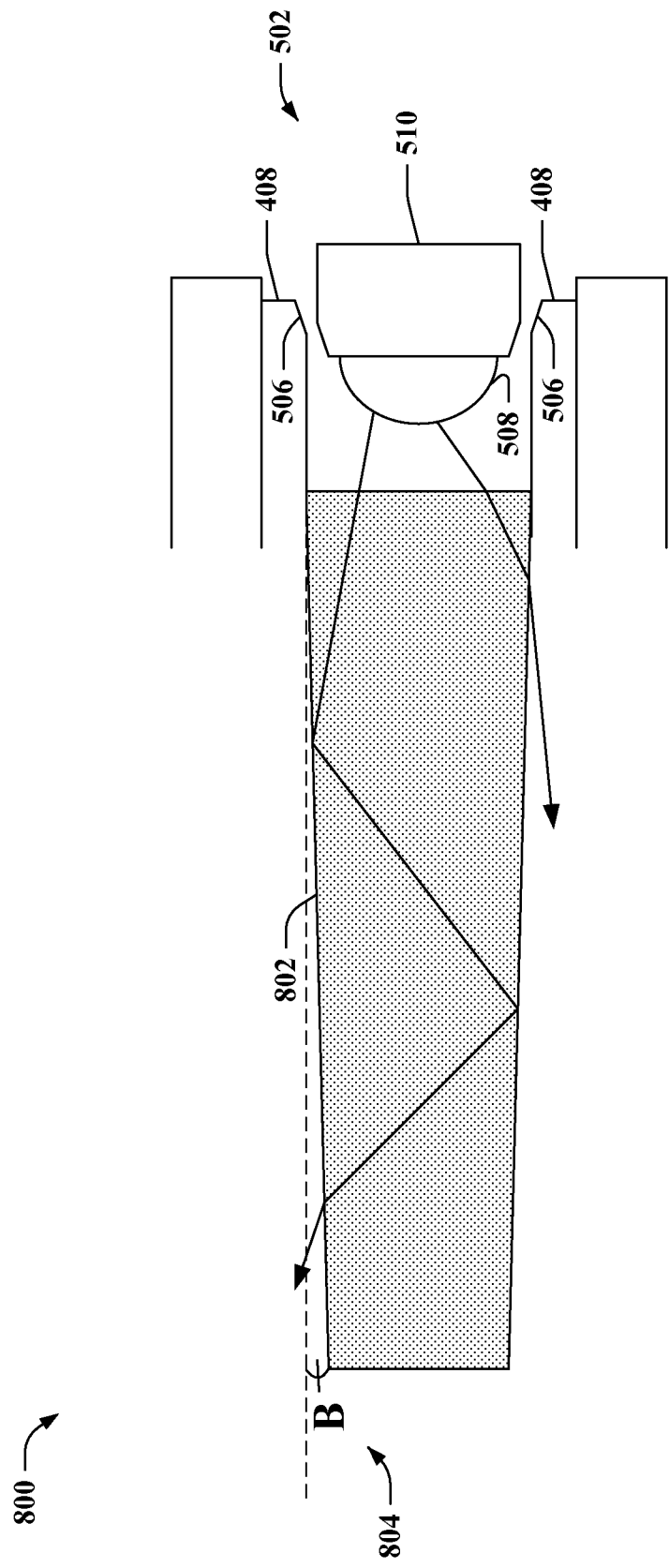


FIG. 8

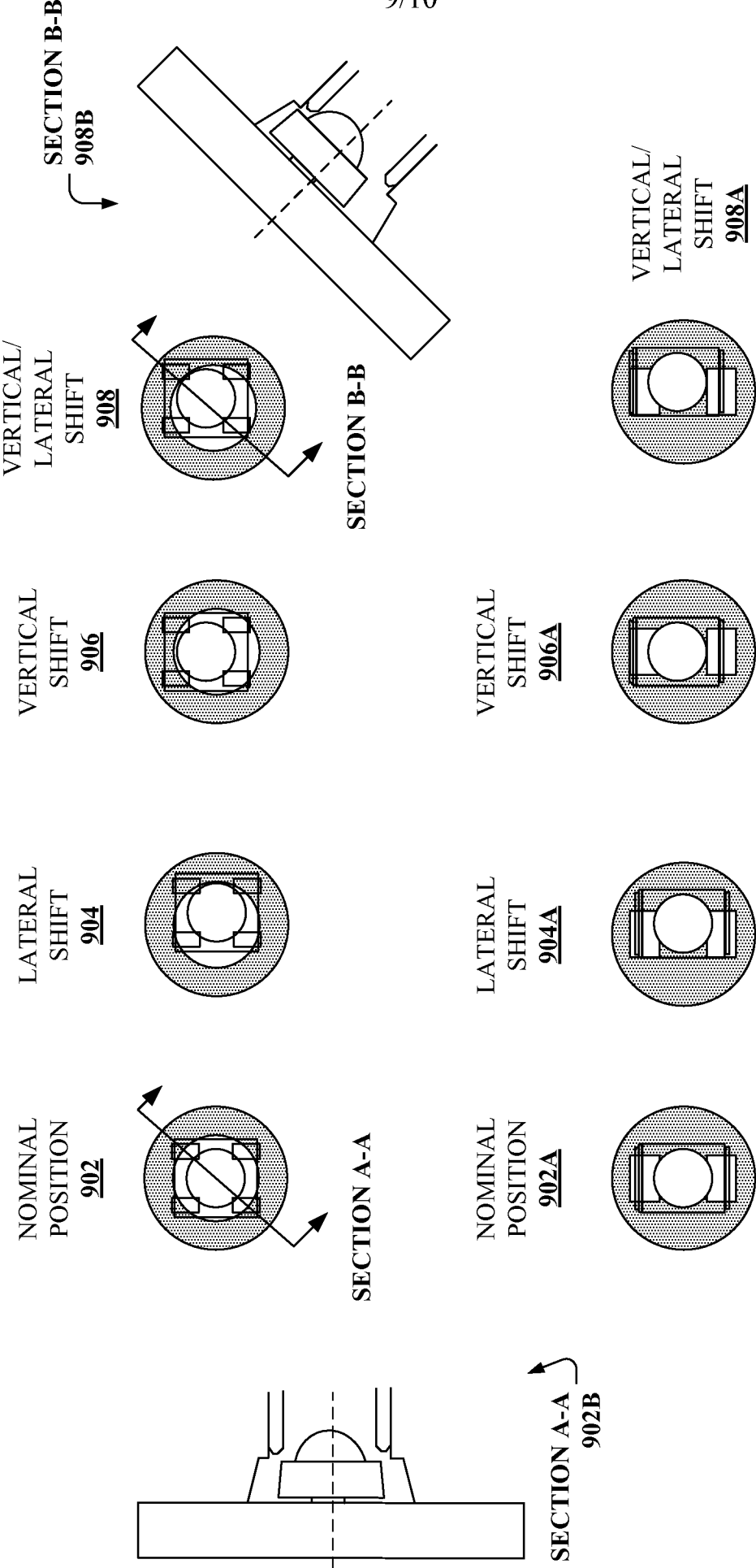


FIG. 9

1000 →

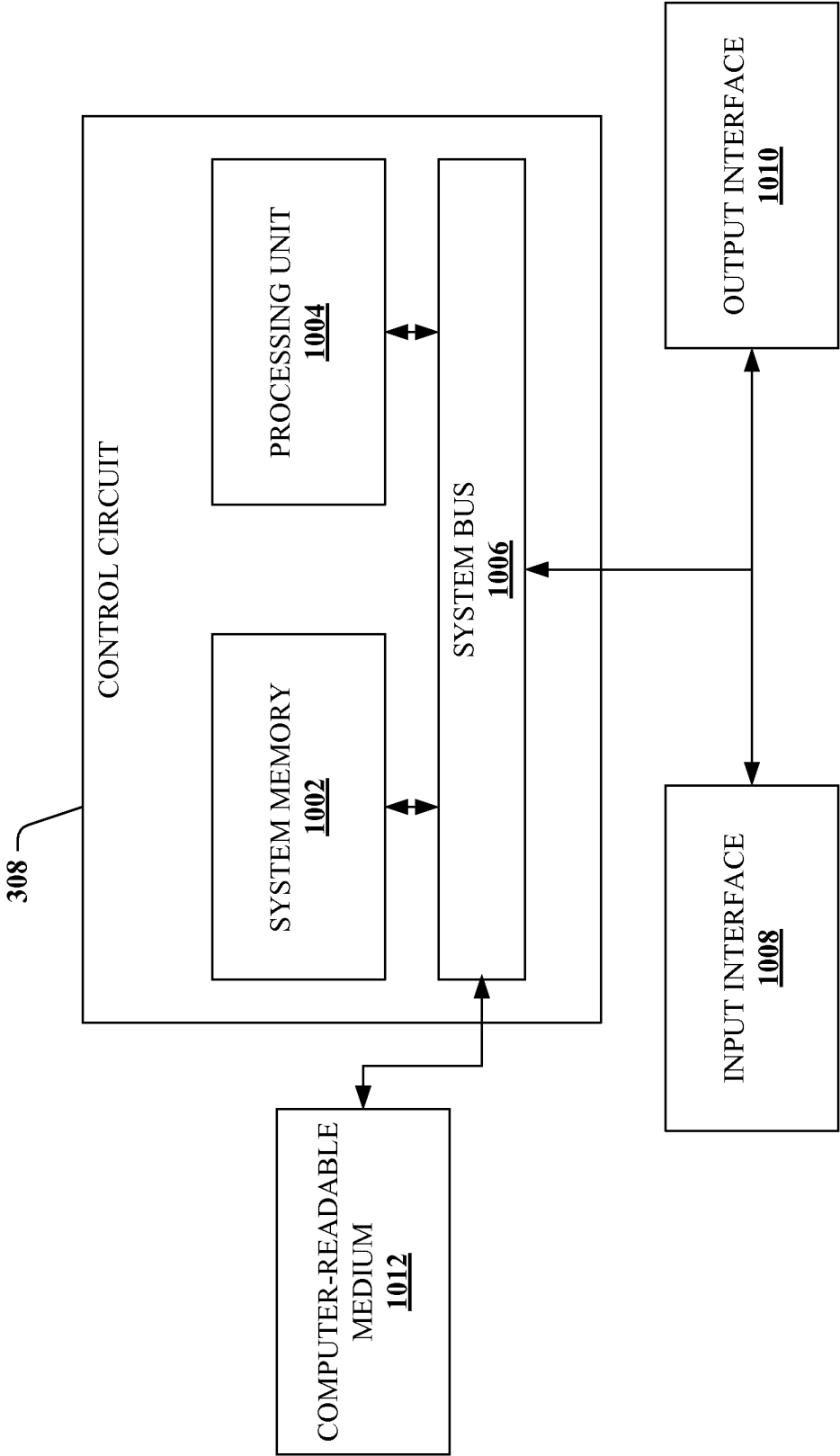


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 07/88734

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - B60Q 1/00; B64D 47/06 (2008.01)

USPC - 362/489, 559

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC: 362/489, 559

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 362/26, 459, 489, 508-512, 523, 524, 543-546, 548, 551, 559; and search terms listed below.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWest (PGPB,USPT,USOC,EPAB,JPAB); Google Scholar

Search terms: vehicle, automobile, display, (motor or servo or stepper), light pipe, luminous, luminosity, illuminate, LED, baffle, chamfer, instrument, cluster, console, resolution

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 2005/0128751 A1 (ROBERGE et al.) 16 June 2005 (16.06.2005), entire document, especially FIG. 4	1-2, 4-7, 10, 12-20 ----- 3, 8, 9, 11
Y	US 2004/0223342 A1 (KLIPSTEIN et al.) 11 November 2004 (11.11.2004), FIG. 31 and para. [0262]-[0266]	3, 9, 11
Y	US 6,229,137 B1 (BOHN) 8 May 2001 (08.05.2001), col. 10, ln. 8-19	8
A	US 7,097,316 B2 (SUMIYOSHI) 29 August 2006 (29.08.2006), entire document.	1-20
A	US 6,598,988 B1 (NOLL et al.) 29 July 2003 (29.07.2003), entire document.	1-20
A	US 5,825,338 A (SALMON et al) 20 October 1998 (20.10.1998), entire document.	1-20
A	US 5,272,463 A (FURUYA et al.) 21 December 1993 (21.12.1993), entire document.	1-20

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

31 March 2008 (31.03.2008)

Date of mailing of the international search report

29 APR 2008

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents

P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774