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(54) **Title**: PANEL COMMUNICATION VIA ILLUMINATED BEZEL

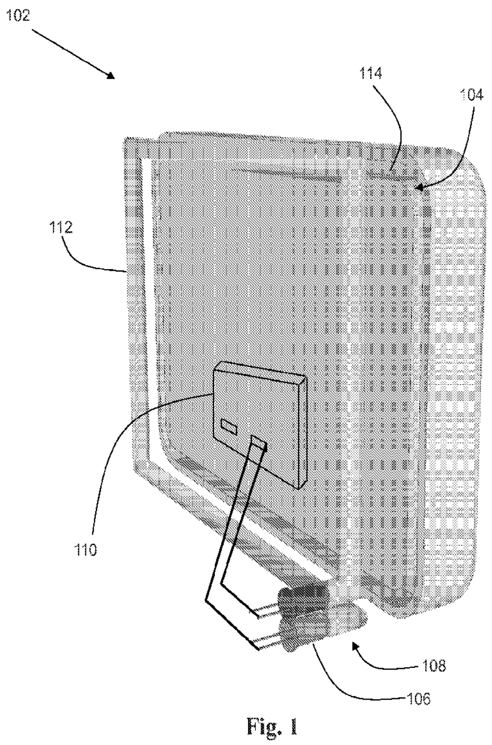

Fig. 1

(57) **Abstract**: The interface panel (102) has a bezel (104) extending around a perimeter of the interface panel (102). The interface panel has a light source (106) for generating a light. The interface panel has a light diffuser (108) coupled to the light source (106)and configured to distribute the light generated by the light source. The light diffuser (108) is disposed in the bezel (104) and extends around the perimeter of the panel. The interface panel (102) has a light source controller (110) coupled to the light source. The light source controller (110) is configured to control the light source (106) to generate the light to communicate a predefined message via the light diffuser (108).

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PANEL COMMUNICATION VIA ILLUMINATED BEZEL

FIELD OF INVENTION

[0001] The present invention relates to interface panels and more particularly to communicating via an illuminated bezel of an interface panel.

BACKGROUND

[0002] Interface panels are used in a variety of industries and applications for controlling various mechanical devices and software applications. Interface panels have buttons and other types of controls for receiving input from a user as well as LEDs for conveying information to a user. In certain applications, such as in an industrial power application, interface panels may be combined to form a larger control center.

[0003] The LEDs consume valuable space on the interface panel, however, which could be otherwise used for additional interface buttons and other types of controls. In addition, in applications where several interface panels are combined to form a larger control center, it may be difficult to distinguish a message being communicated via a first interface panel from a message being communicated via a second interface panel.

SUMMARY OF THE INVENTION

[0004] In a system for communicating via an illuminated bezel of an interface panel, an interface panel has a bezel extending around a perimeter of the interface panel. A light diffuser is coupled to a light source and is configured to distribute the light generated by the light source. The light diffuser is disposed in the bezel and extends around the perimeter of the panel. A light source controller, coupled to the light source, is configured to control the light source to generate the light to communicate a predefined message via the light diffuser.

[0005] An interface panel has a bezel extending around a perimeter of the interface panel. The interface panel has a light source for generating a light. The interface panel has a light diffuser coupled to the light source and configured to distribute the light generated by the light source. The light diffuser is disposed in the bezel and extends around the perimeter of the interface panel. The interface panel has a light source controller coupled to the light source. The light source controller is configured to control the light source to generate the light to communicate a predefined message via the light diffuser.

[0006] In a method for communicating via an illuminated bezel of a panel, a computer receives notification to communicate a message. The computer determines at least one parameter, based on the message, for generating a light. The computer controls a light source to generate a light, according to the at least one determined parameter, to illuminate a bezel of an interface panel to communicate the message.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] In the accompanying drawings, structures are illustrated that, together with the detailed description provided below, describe exemplary embodiments of the claimed invention. Like elements are identified with the same reference numerals. It should be understood that elements shown as a single component may be replaced with multiple components, and elements shown as multiple components may be replaced with a single component. The drawings are not to scale and the proportion of certain elements may be exaggerated for the purpose of illustration.

[0008] **Figure 1** is a rear view of an example system, according to one embodiment of the present invention.

[0009] **Figure 2** is a front view of an example interface panel, according to one embodiment of the present invention.

[0010] **Figure 3** is a flow chart illustrating an example method for communicating via an illuminated bezel of a panel, according to one embodiment of the present invention.

[0011] **Figure 4** is a block diagram of an example computer system for implementing a light source controller, according to one embodiment of the present invention.

DETAILED DESCRIPTION

[0012] **Figure 1** is a rear view of an example system 100 according to one embodiment of the present invention. System 100 has an interface panel 102 for enabling a user to interface with a software application or with some mechanical equipment or machinery. For example, interface panel 102 may be used in an industrial setting for controlling an industrial motor. In an example embodiment, multiple interface panels 102 may be combined to form a larger control panel for controlling one or more software applications or mechanical devices. Interface panel 102 may include various types of buttons and controls for receiving input from a user as well as LED and other types of light displays for communicating messages to the user, on the front face (not shown) of interface panel 102.

[0013] Interface panel 102 has a bezel 104 extending around the perimeter of interface panel 102. Bezel 104 is a channel or a groove configured in size and shape so as to receive light diffuser 108. After the bezel 104 receives light diffuser 108 during assembly, light diffuser 108 becomes integrated with interface panel 102. Light diffuser

108 may be secured in place within bezel 104 by an adhesive, for example. Alternatively, Light diffuser 108 may be secured in place within bezel 104 mechanically.

[0014] Light diffuser 108 is configured in such a way that when light is delivered to a front end 112, the light is transported around the perimeter of interface panel 102, throughout the length of light diffuser 108. Further, light diffuser 108 is configured in such a way that as the delivered light is being transported around interface panel 102, the light is being evenly distributed throughout light diffuser 108 in order to evenly illuminate the perimeter of interface panel 102. In an example embodiment, light diffuser 108 is a light pipe.

[0015] A light source 106 is coupled to light diffuser 108 at front end 112 for generating a light and for delivering the light to light diffuser 108. Light source 106 can be an LED, or a plurality of LEDs, for example. In an example embodiment, light source 106 is configured to deliver a single color of light. In an example embodiment, light source 106 is configured to deliver multiple colors of light, either simultaneously or independently.

[0016] System 100 has a light source controller 110 coupled to light source 106. Light source controller 110 is configured to control light source 106 to generate the light to communicate a predefined message via light diffuser 108. In other words, a user is able to interpret a light being delivered around the perimeter of interface panel 102 to be a predefined message. Light source controller 110 is configurable to control light source 106 according to a user defined preference.

[0017] In an example embodiment, light source controller 110 is configured to control light source 106 to generate a first color light to communicate a first message and a second color light to communicate a second message. For example, light source controller 110 may control light source 106 to generate a green color light to indicate that an associated mechanical device is operating properly. Similarly, light source controller 110 may control light source 106 to generate a red color light to indicate that the associated mechanical device is operating in an error or fault state and that the associated mechanical device may need to be serviced or may require attention.

[0018] In an example embodiment, light source controller 110 may be configured to set light source 106 to flash on and off repeatedly rather then generating a continuous light. In an example embodiment, light source controller 110 may be configured to control the frequency at which light source 106 flashes. In other words, light source controller 110 may control light source 106 to flash at a first frequency to communicate a first message and to flash at a second frequency to communicate a second message. For example, light source controller 110 may control light source 106 to flash at 60Hz when an associated mechanical device has a potential problem that may require future attention while light source controller 110 may control light source 106 to flash at 120Hz when an associated mechanical device has a severe problem that may require immediate attention.

[0019] In an example embodiment, light source controller 110 may be configured to control light source 106 in order to accommodate various international standards. For example, a flashing color may indicate a first message according to a first country's standard while the same flashing color may indicate a second message according to a second country's standard. Thus, depending on which country light source controller 110 is configured to operate in, light source controller 110 may adjust the light color generated by light source 106 for a given message.

[0020] In an example embodiment, light source controller 110 may be configurable by a user or a systems administrator to control light source 106 according to user defined parameters. For example, a user may define a certain color scheme which that user prefers. Accordingly, light source controller 110 may be configured to control light source 106 according to the user's preferences.

[0021] It should be understood that light source controller 110 can be implemented as a microcontroller, a desktop computer, a laptop computer, a handheld computer, a tablet computer, a server, or other similar type of computing device capable of providing instructions to, and controlling, light source 106.

[0022] **Figure 2** is a front view of an example interface panel 202 having a light diffuser 204 surrounding the perimeter of interface panel 202. Interface panel 202 has a plurality of buttons 206a-e for controlling various functions of an associated mechanical device or software application. Interface panel 202 has a plurality of LEDs 208a-c for communicating messages to a user. In an example embodiment, the same messages communicated to a user by LEDs 208a-c may be communicated to the user by light diffuser 204. Accordingly, in an example embodiment, LEDs 208a-c may be removed from interface panel 202 in order to make room for additional buttons.

[0023] **Figure 3** is a flow chart illustrating an example method for communicating via an illuminated bezel of a panel. At step 302, light source controller 110 receives a notification to communicate a message. The notification may come from an associated mechanical device or it may come from a software application or system. The notification may be an error or some other type of warning. Alternatively, the notification may be sent to simply inform a user of a current status or condition of a mechanical device.

[0024] At step 304, light source controller 110 determines at least one parameter, based on the message, for generating a light. In an example embodiment, light source controller 110 may determine multiple parameters for generating the light. A parameter for generating a light may include a color, a flash frequency, or another similar type of parameter for defining how a light is illuminated and presented to a user. Light source controller 110 may determine the parameter by cross referencing the received notification with a parameters database stored in memory. Messages to be communicated may be pre-associated with specific parameters in a parameters database based on user preference or based on country specific standards, for example. For example, an error message may be pre-associated with the color red and with a flash frequency of 120 Hz in the parameters database while a maintenance warning message may be associated with the color yellow and with a flash frequency of 60 Hz in the parameters database. Thus, light source controller 110 may be configured to control light source 106 to operate according to a user preference by configuring the parameters database.

[0025] At step 306, light source controller 110 controls light source 106 to generate a light, according to the at least one determined parameter, to illuminate bezel 104 of interface panel 102 to communicate the message.

[0026] **Figure 4** is a block diagram of an example computer system 400 for implementing a light source controller 110. Computer system 400 is intended to represent various forms of digital computers, including laptops, desktops, handheld computers, tablet computers, servers, and other similar types of computing devices.

Computer system 400 includes a processor 402, memory 404, a storage device 406, and a communication port 422, connected by an interface 408 via a bus 410.

[0027] Processor 402 processes instructions, via memory 404, for execution within computer system 400. In an example embodiment, multiple processors along with multiple memories may be used. In an example embodiment, multiple computer systems 400 may be connected, with each device providing portions of the necessary operations.

[0028] Memory 404 may be volatile memory or non-volatile memory. Memory 404 may be a computer-readable medium, such as a magnetic disk or optical disk. Storage device 406 may be a computer-readable medium, such as floppy disk devices, a hard disk device, and optical disk device, a tape device, a flash memory, or other similar solid state memory device, or an array of devices, including devices in a storage area network of other configurations. A computer program product can be tangibly embodied in a computer readable medium such as memory 404 or storage device 406.

[0029] Computer system 400 can be coupled to one or more input and output devices such as a display 414, a scanner 418, a printer 416, and a mouse 420.

[0030] To the extent that the term "includes" or "including" is used in the specification or the claims, it is intended to be inclusive in a manner similar to the term "comprising" as that term is interpreted when employed as a transitional word in a claim. Furthermore, to the extent that the term "or" is employed (e.g., A or B) it is intended to mean "A or B or both." When the applicants intend to indicate "only A or B but not both" then the term "only A or B but not both" will be employed. Thus, use of the term "or" herein is the inclusive, and not the exclusive use. See, Bryan A. Garner, A Dictionary of Modern Legal Usage 624 (2d. Ed. 1995). Also, to the extent that the terms "in" or "into" are used in the specification or the claims, it is intended to additionally mean “on” or “onto.” Furthermore, to the extent the term “connect” is used in the specification or claims, it is intended to mean not only “directly connected to,” but also “indirectly connected to” such as connected through another component or components.

[0031] Some portions of the detailed descriptions are presented in terms of algorithms and symbolic representations of operations on data bits within a memory. These algorithmic descriptions and representations are the means used by those skilled in the art to convey the substance of their work to others. An algorithm is here, and generally, conceived to be a sequence of operations that produce a result. The operations may include physical manipulations of physical quantities. Usually, though not necessarily, the physical quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a logic and the like.

[0032] It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be borne in mind, however, that these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise, it is appreciated that throughout the description, terms like processing, computing, calculating, determining, displaying, or the like, refer to actions and processes of a computer system, logic, processor, or similar electronic device that manipulates and transforms data represented as physical (electronic) quantities.

[0033] While the present application has been illustrated by the description of embodiments thereof, and while the embodiments have been described in considerable detail, it is not the intention of the applicants to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the application, in its broader aspects, is not limited to the specific details, the representative apparatus and method, and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of the applicant's general inventive concept.

CLAIMS

What is claimed is:

1. A system for communicating via an illuminated bezel of a panel, the system comprising:

an interface panel comprising a bezel extending around a perimeter of the interface panel;

a light source for generating a light;

a light diffuser coupled to the light source and configured to distribute the light generated by the light source, the light diffuser disposed in the bezel and extending around the perimeter of the interface panel; and

a light source controller coupled to the light source, the light source controller configured to control the light source to generate the light to communicate a predefined message via the light diffuser.

2. The system of claim 1, wherein the light source comprises at least one LED.

3. The system of claim 1, wherein the light source is configured to generate a plurality of colors of light.

4. The system of claim 3, wherein the light source controller is further configured to control the light source to generate a first color light to communicate a first message and a second color light to communicate a second message.

5. The system of claim 1, wherein the light source controller is further configured to control the light source to flash at a first frequency to communicate a first message and to flash at a second frequency to communicate a second message.

6. The system of claim 1, wherein the light diffuser is a light pipe.

7. The system of claim 1, wherein the light source controller is configurable to control the light source according to a user defined preference.

8. An interface panel comprising:

a bezel extending around a perimeter of the interface panel;

a light source for generating a light;

a light diffuser coupled to the light source and configured to distribute the light generated by the light source, the light diffuser disposed in the bezel and extending around the perimeter of the interface panel; and

a light source controller coupled to the light source, the light source controller configured to control the light source to generate the light to communicate a predefined message via the light diffuser.

9. The interface panel of claim 8, wherein the light source comprises at least one LED.

10. The interface panel of claim 8, wherein the light source is configured to generate a plurality of colors of light.

11. The interface panel of claim 8, wherein the light source controller is further configured to control the light source to generate a first color light to communicate a first message and a second color light to communicate a second message.

12. The interface panel of claim 8, wherein the light source controller is further configured to control the light source to flash at a first frequency to communicate a first message and to flash at a second frequency to communicate a second message.

13. The interface panel of claim 8, wherein the light diffuser is a light pipe.

14. The interface panel of claim 8, wherein the light source controller is configurable to control the light source according to a user defined preference.

15. A method for communicating via an illuminated bezel of an interface panel, the method comprising the steps of:

a computer receiving notification to communicate a message;

the computer determining at least one parameter, based on the message, for generating a light; and

the computer controlling a light source to generate a light, according to the at least one determined parameter, to illuminate a bezel of an interface panel to communicate the message.

16. The method of claim 15, wherein the at least one parameter is color.

17. The method of claim 15, wherein the at least one parameter is flash frequency.

18. The method of claim 15, wherein the message is a system error notification.

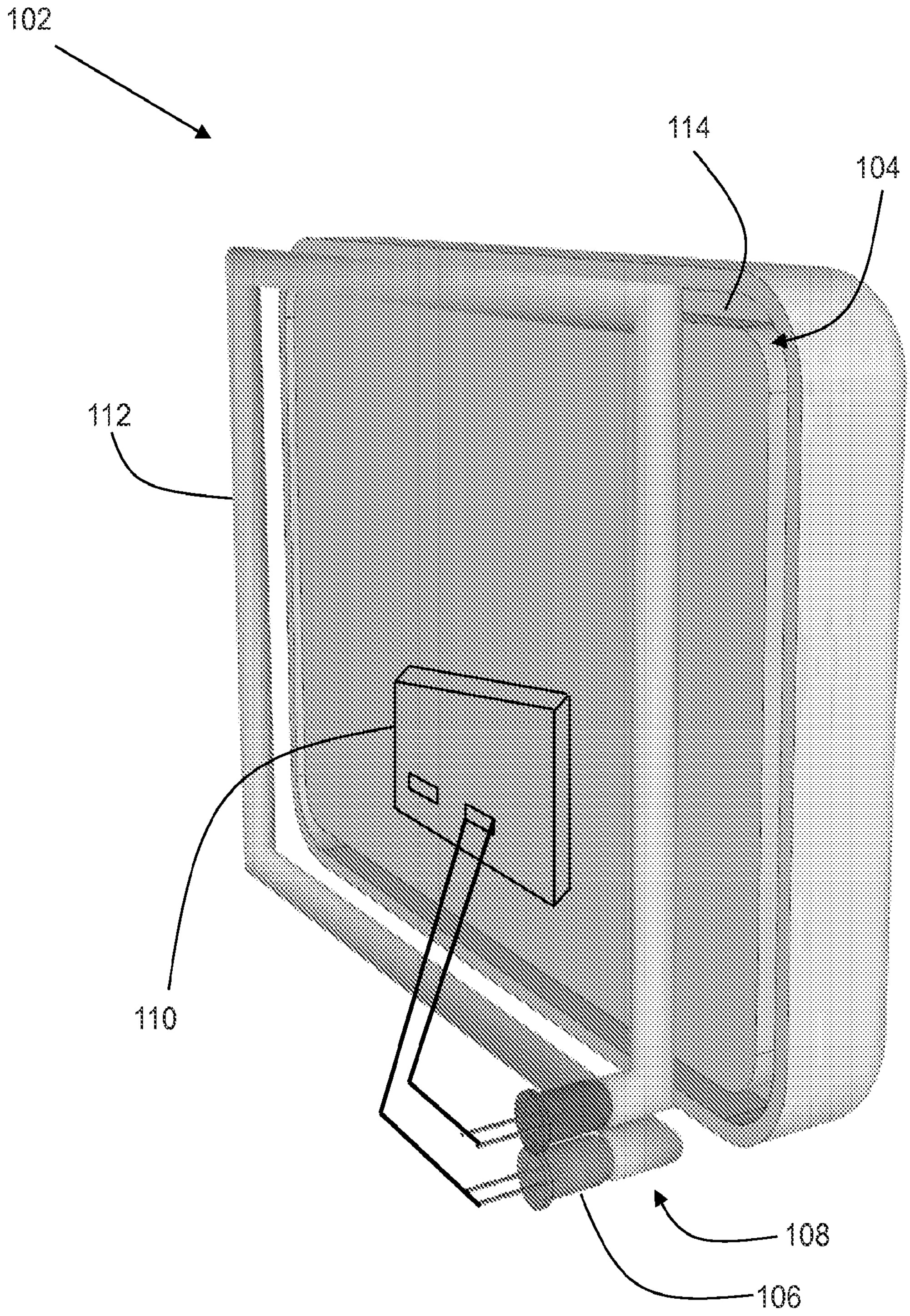

Fig. 1

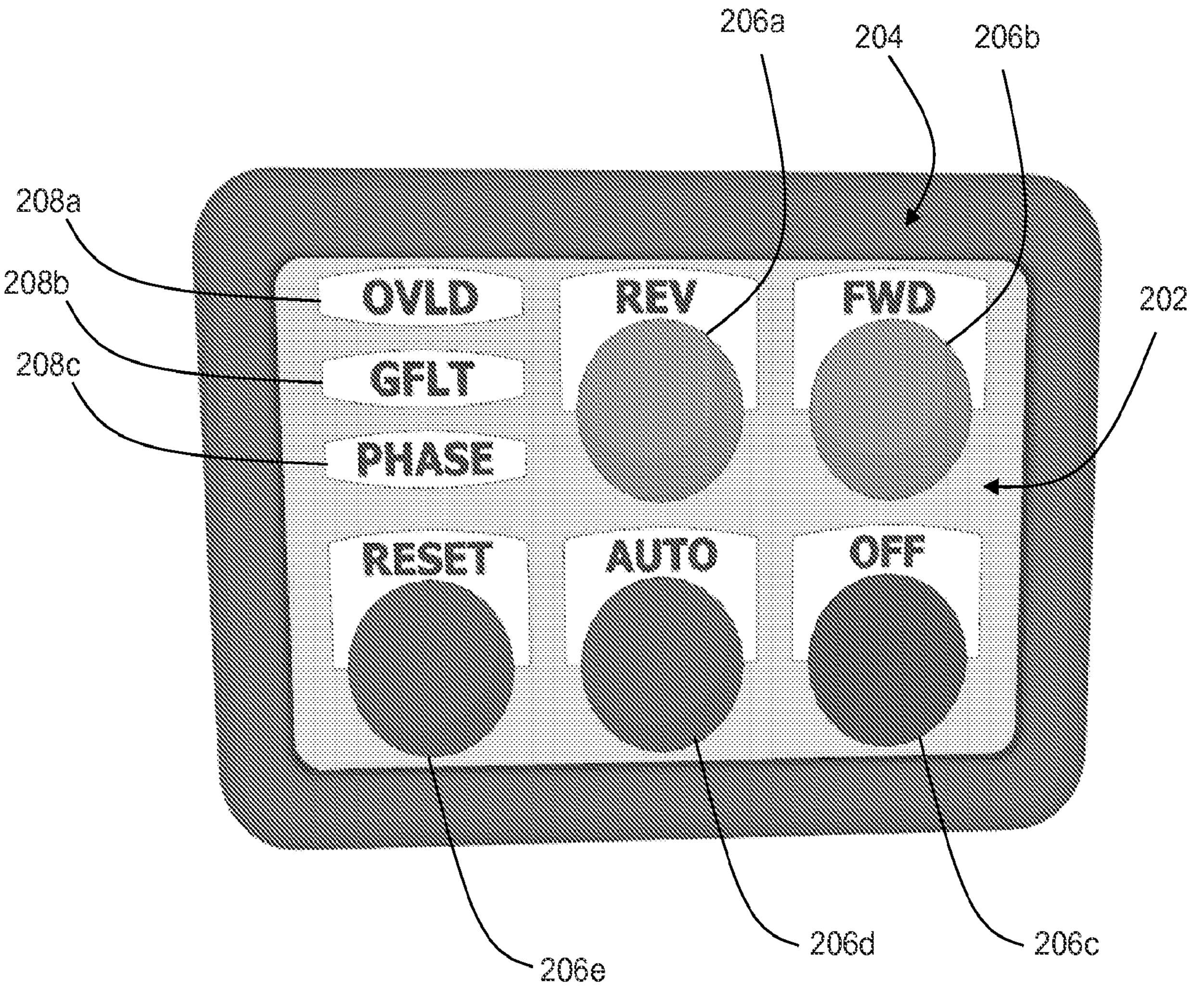
206a
204
206b
208a
208b
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Fig. 2

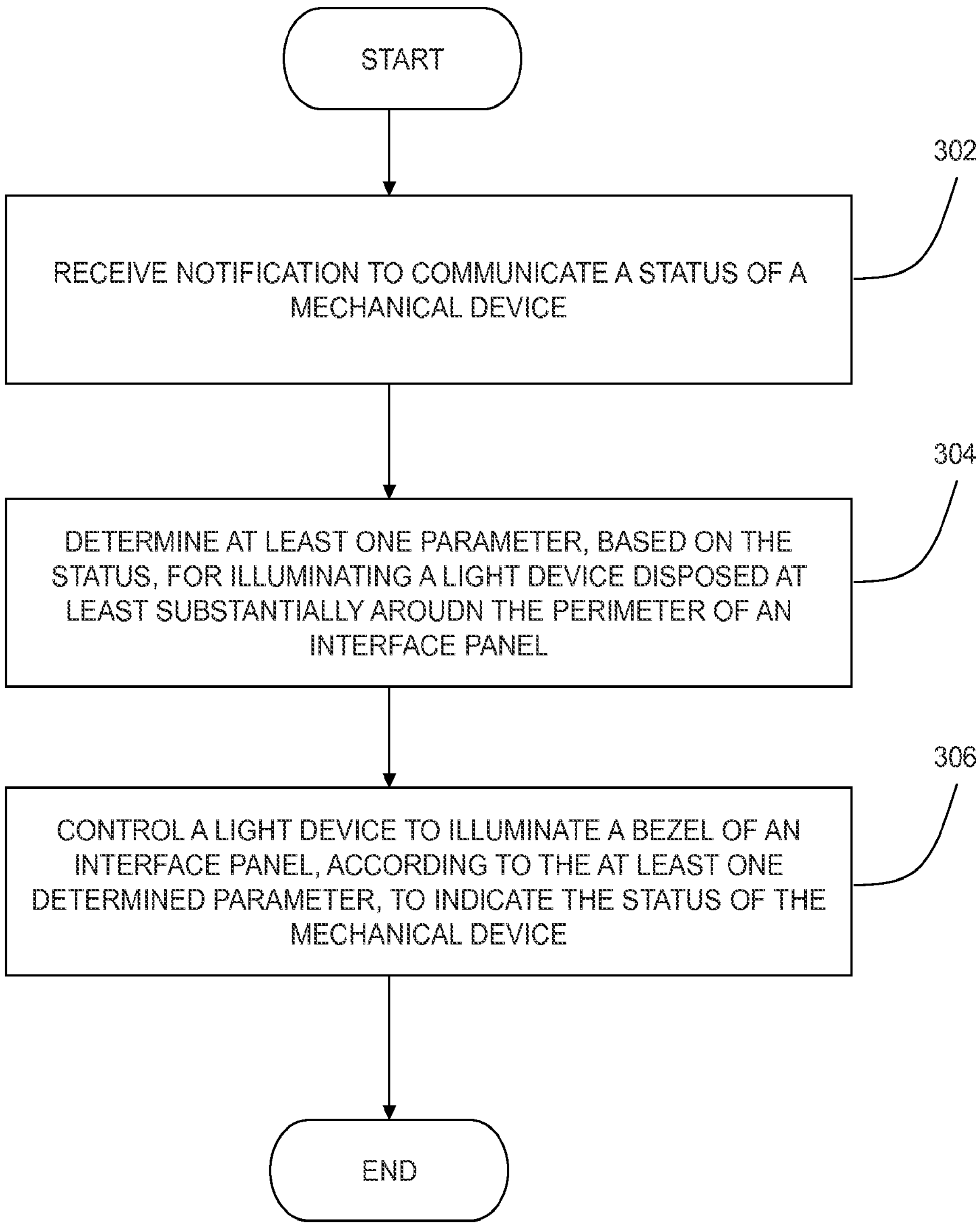
START
302
RECEIVE NOTIFICATION TO COMMUNICATE A STATUS OF A MECHANICAL DEVICE
304
DETERMINE AT LEAST ONE PARAMETER, BASED ON THE STATUS, FOR ILLUMINATING A LIGHT DEVICE DISPOSED AT LEAST SUBSTANTIALLY AROUDN THE PERIMETER OF AN INTERFACE PANEL
306
CONTROL A LIGHT DEVICE TO ILLUMINATE A BEZEL OF AN INTERFACE PANEL, ACCORDING TO THE AT LEAST ONE DETERMINED PARAMETER, TO INDICATE THE STATUS OF THE MECHANICAL DEVICE
END

Fig. 3

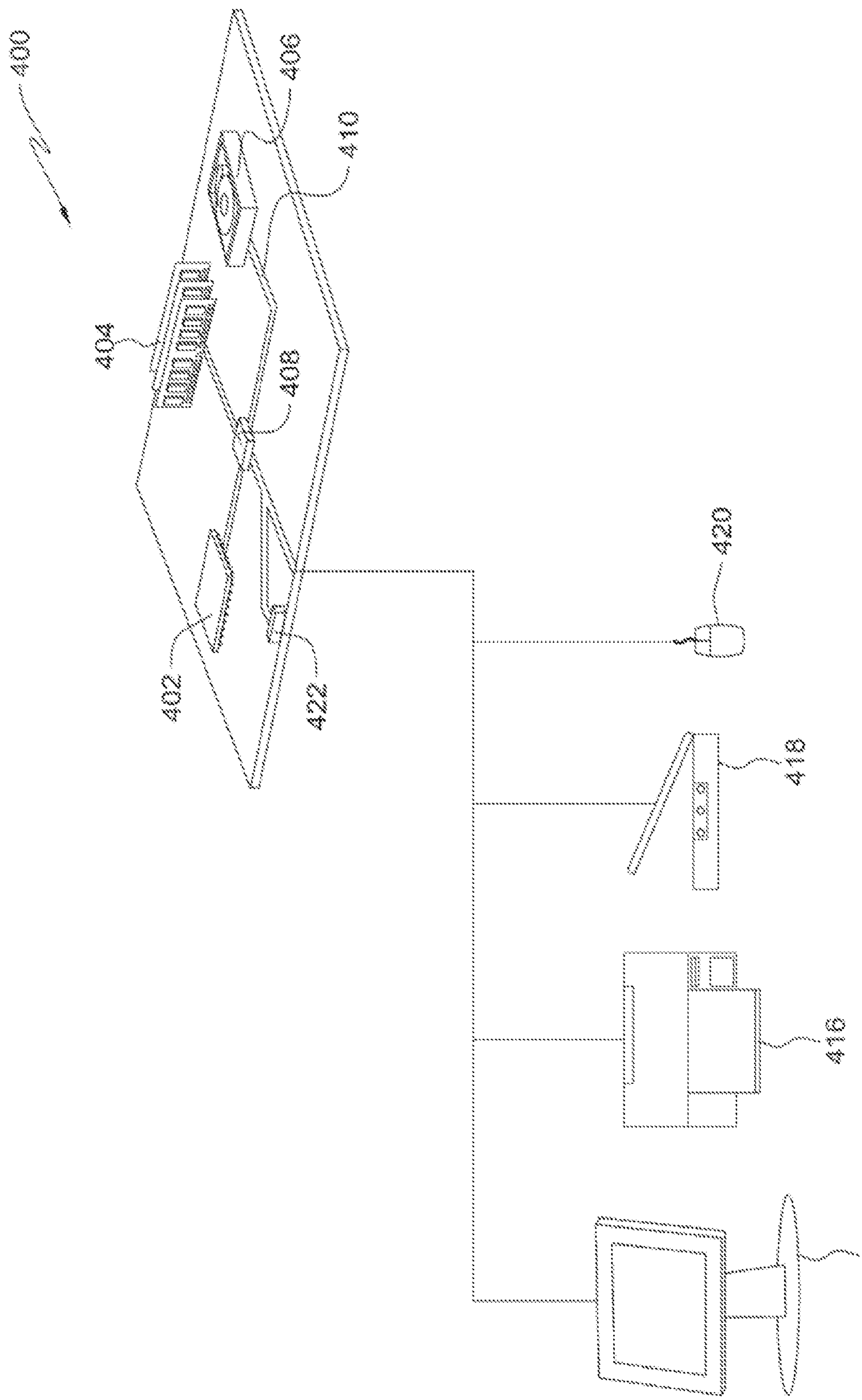

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/072059

A. CLASSIFICATION OF SUBJECT MATTER
INV. G09F9/30 G09F9/35 G09F27/00 G09F13/00
ADD. G09F13/18 G09F13/22

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)
G09F H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011/051019 A1 (HARDACKER ROBERT [US] ET AL) 3 March 2011 (2011-03-03) paragraph [0020] - paragraph [0023] paragraph [0032] paragraph [0036] - paragraph [0051] figures 1-4 -----	1-18
X	US 2011/018462 A1 (LOWE KENNETH [US] ET AL) 27 January 2011 (2011-01-27) paragraph [0026] - paragraph [0030] figures 1-9 -----	1-18
X	US 2011/018849 A1 (LOWE KENNETH ROY [US] ET AL) 27 January 2011 (2011-01-27) paragraph [0034] - paragraph [0035] figures 1-12 ----- -/--	1-18

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* 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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"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	Date of mailing of the international search report
10 April 2013	18/04/2013

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/072059

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2009/289874 A1 (HA KYUNG-MI [KR]) 26 November 2009 (2009-11-26) the whole document -----	1-18

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Form PCT/ISA/210 (continuation of second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/072059

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