US008306639B2

(12) **United States Patent**
Diehl et al.

(10) **Patent No.: US 8,306,639 B2**
(45) **Date of Patent: Nov. 6, 2012**

(54) **HOME AUTOMATION GROUP SELECTION BY COLOR**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 407 days.

(21) Appl. No.: **12/795,381**

(22) Filed: **Jun. 7, 2010**

(65) **Prior Publication Data**

US 2011/0098831 A1 Apr. 28, 2011

Related U.S. Application Data

(60) Provisional application No. 61/254,709, filed on Oct. 25, 2009.

(51) **Int. Cl.**
G06F 19/00 (2011.01)

(52) **U.S. Cl.** **700/90**; 307/38; 315/307

(58) **Field of Classification Search** 715/38, 715/734, 751; 341/176, 23, 34; 345/173, 345/156; 700/90; 315/307; 307/8
See application file for complete search history.

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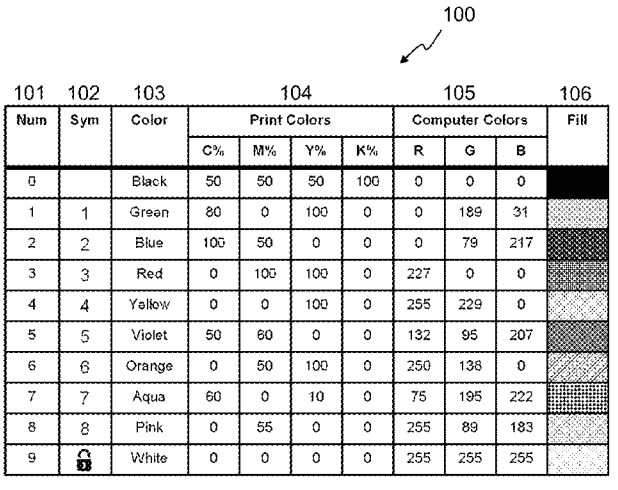
(57) **ABSTRACT**

A networked device is disclosed comprising means for controlling a state of the networked device, means for connecting to a network, means for allowing a user to select a color from a plurality of colors, the plurality of colors having at least one locking color and one or more non-locking colors, and means for generating a selected color code corresponding to the color selected by the user, each color of the plurality of colors having a corresponding color code. The networked device submits the selected color code over the network for use by the network controller in configuring the device and changes the state of the networked device in response to a command from the network only if the color selected by the user is one of the one or more non-locking colors. In some embodiments the networked device also responds to requests for status information from the network independent of the color selected by the user. In some embodiments, the networked device further comprises means for allowing the user enter a local control command wherein the means for controlling the networked device changes the state of the networked device in response to the local control command only if the color selected by the user is one of the one or more non-locking colors. And in some embodiments that means for controlling the networked device controls the On/Off state.

21 Claims, 9 Drawing Sheets



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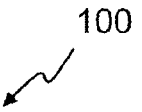
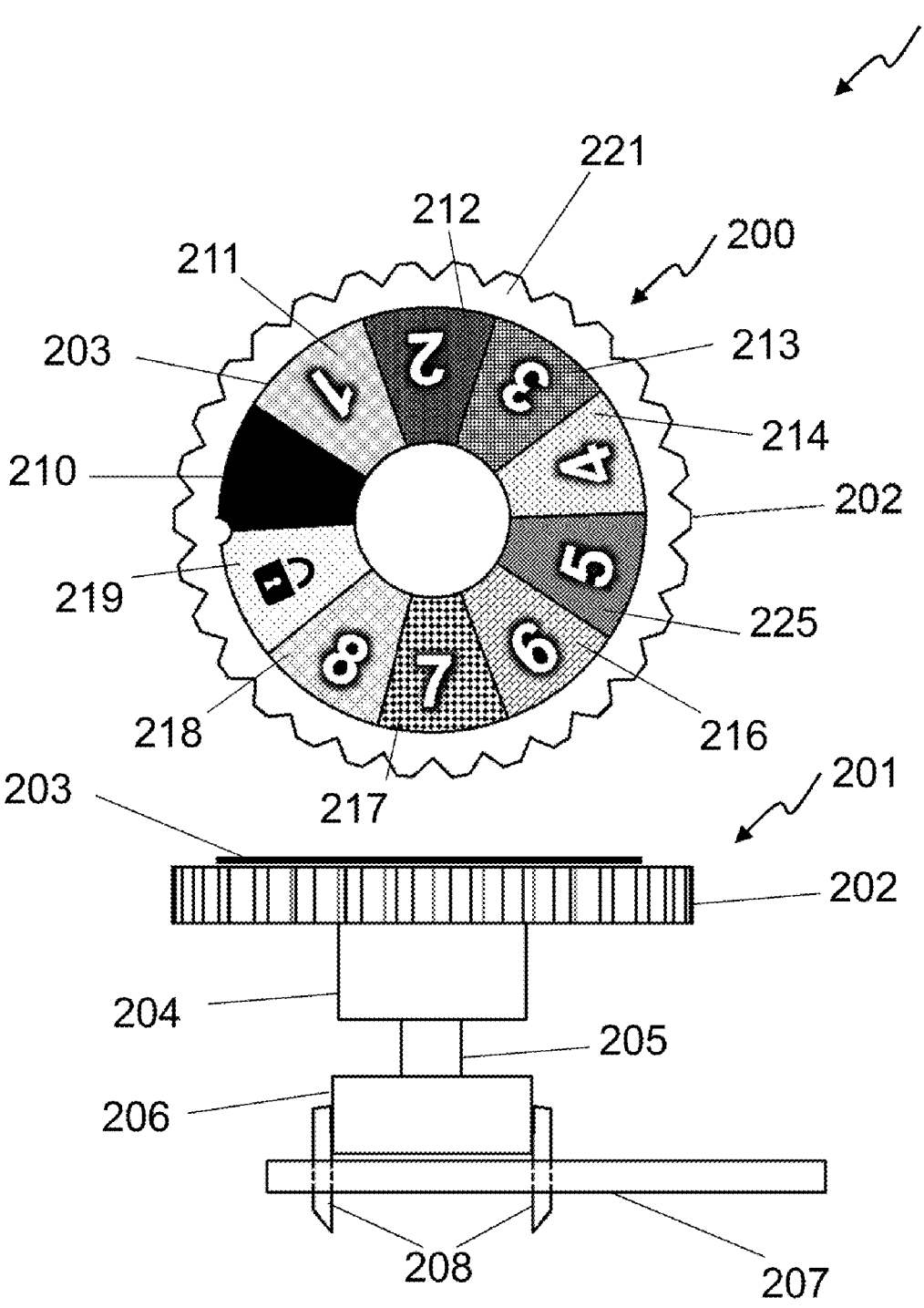


101	102	103	104				105			106
Num	Sym	Color	Print Colors				Computer Colors			Fill
			C%	M%	Y%	K%	R	G	B	
0		Black	50	50	50	100	0	0	0	
1	1	Green	80	0	100	0	0	189	31	
2	2	Blue	100	50	0	0	0	79	217	
3	3	Red	0	100	100	0	227	0	0	
4	4	Yellow	0	0	100	0	255	229	0	
5	5	Violet	50	60	0	0	132	95	207	
6	6	Orange	0	50	100	0	250	138	0	
7	7	Aqua	60	0	10	0	75	195	222	
8	8	Pink	0	55	0	0	255	89	183	
9		White	0	0	0	0	255	255	255	

FIG. 1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221
212
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225
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204
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206
208
207

FIG. 2

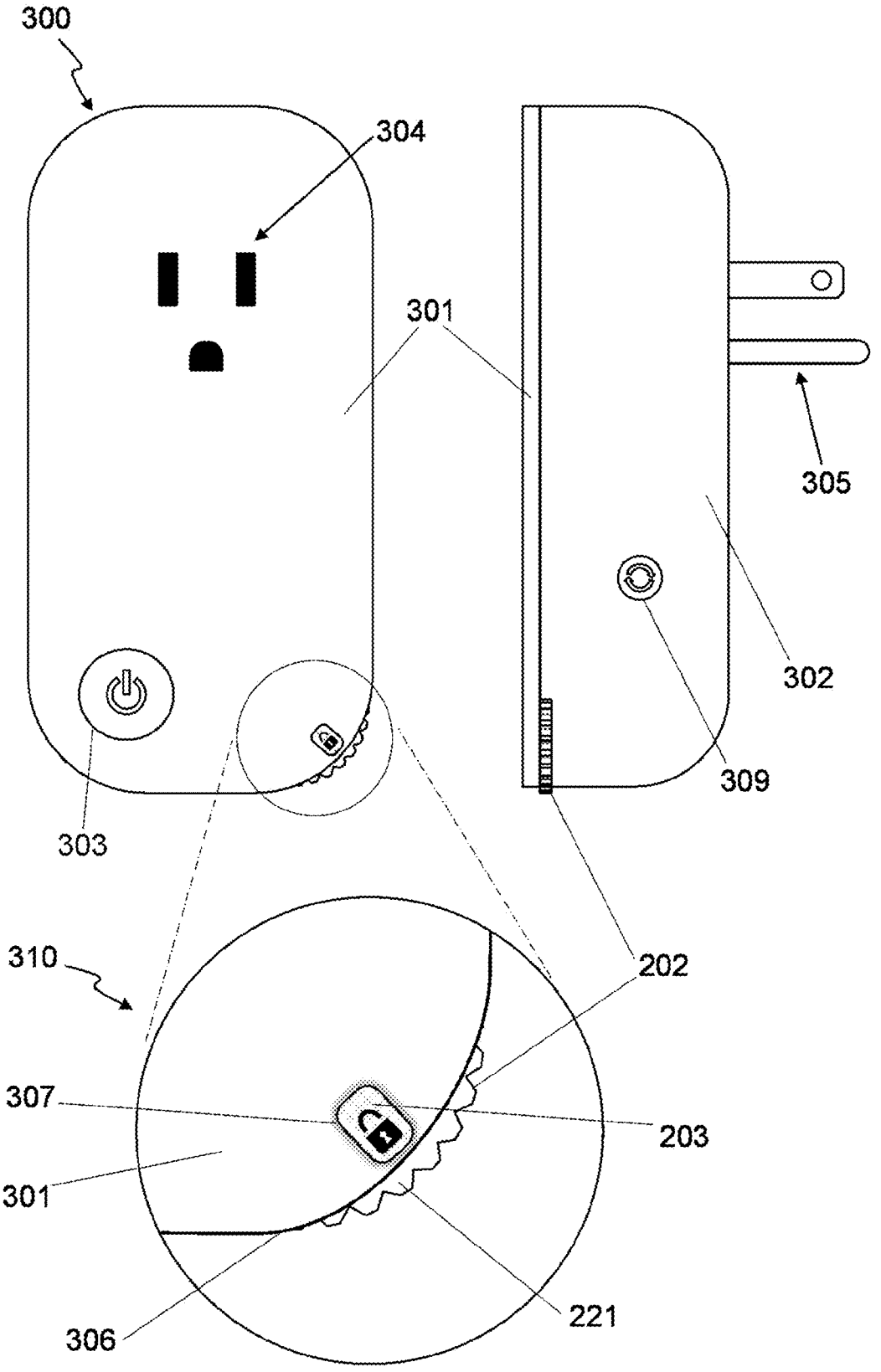


FIG. 3

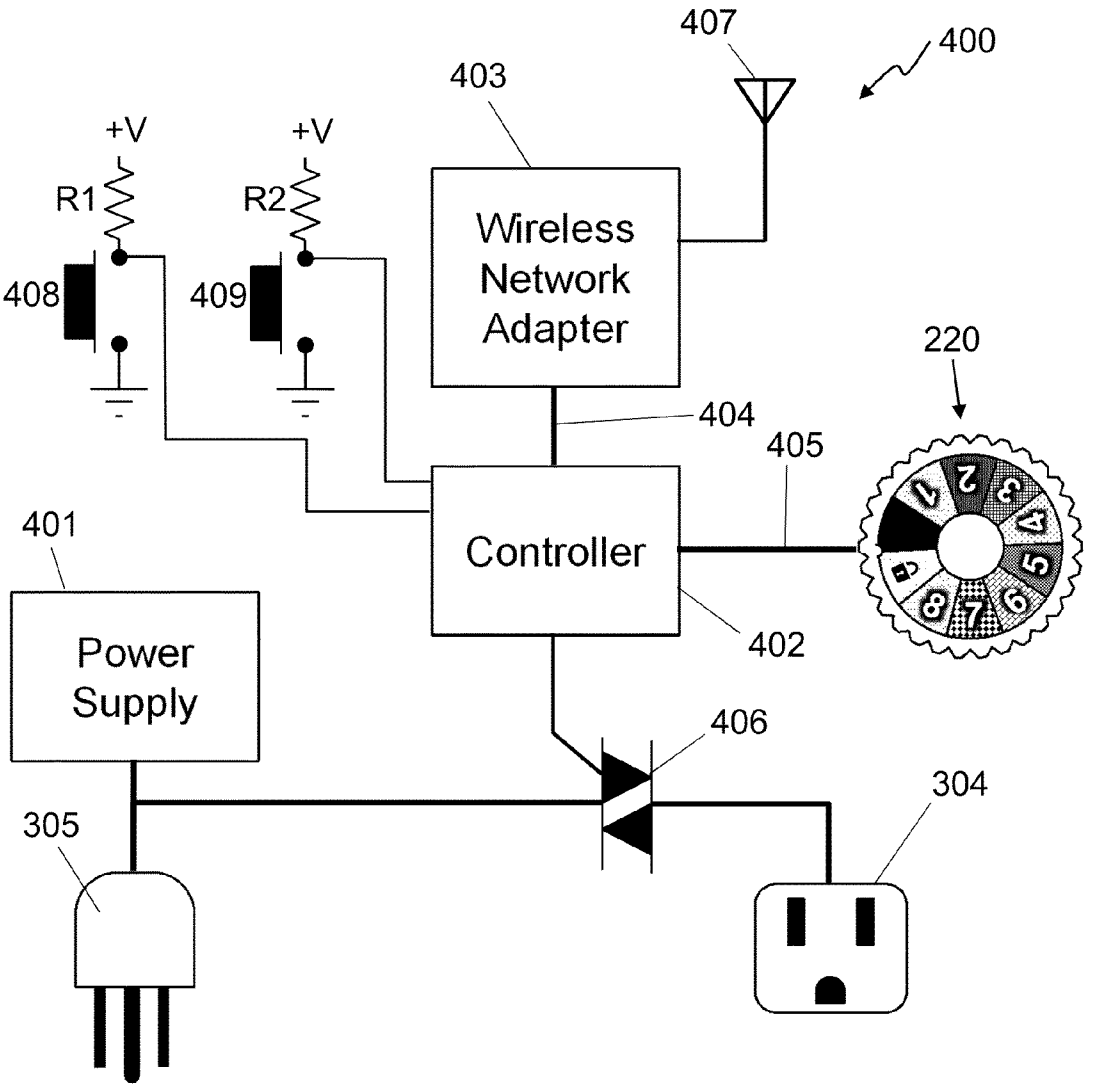

407
400
403
+V
+V
R1
R2
Wireless
Network
Adapter
408
409
220
404
405
401
Controller
Power
Supply
402
406
304
305

FIG. 4

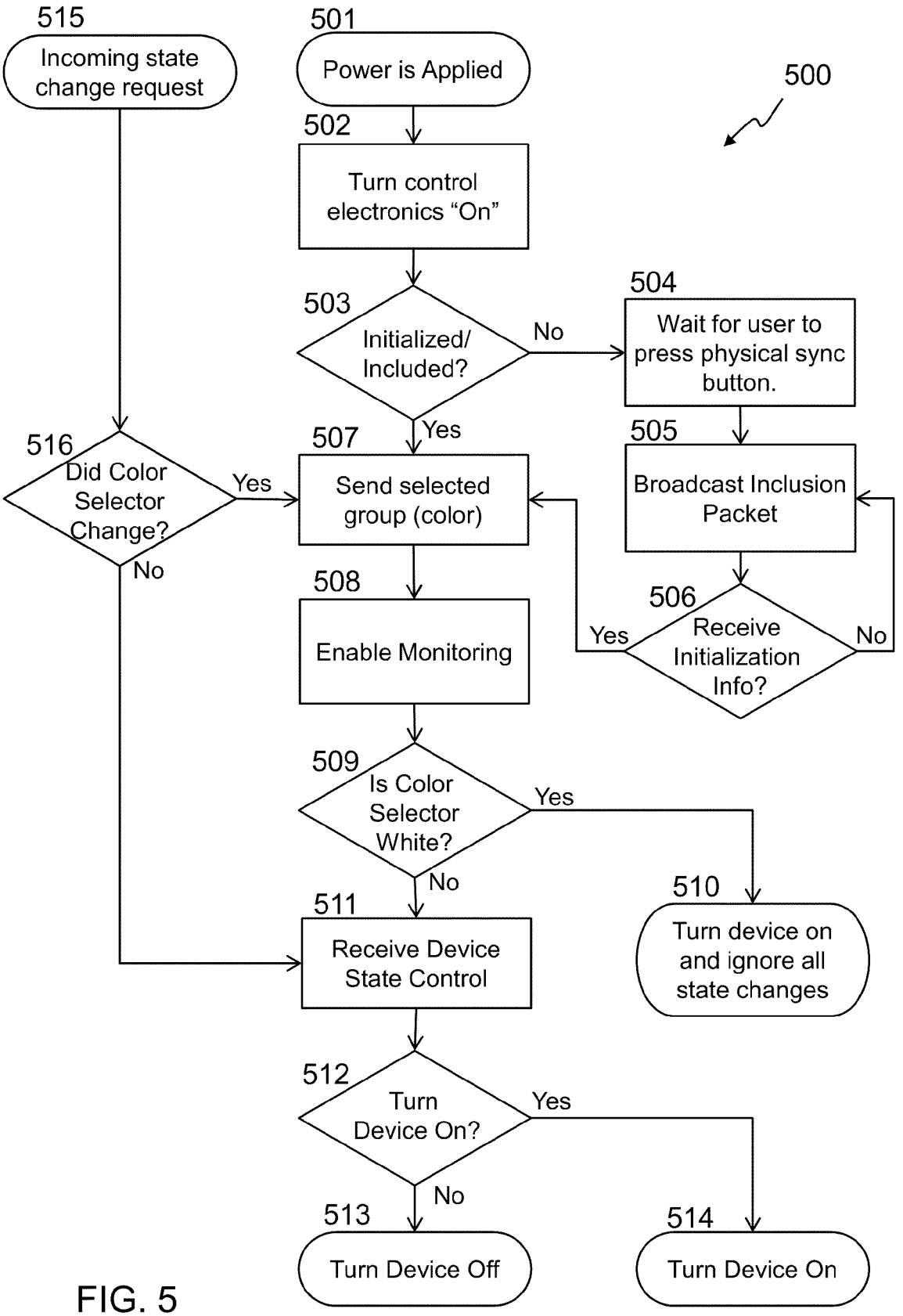
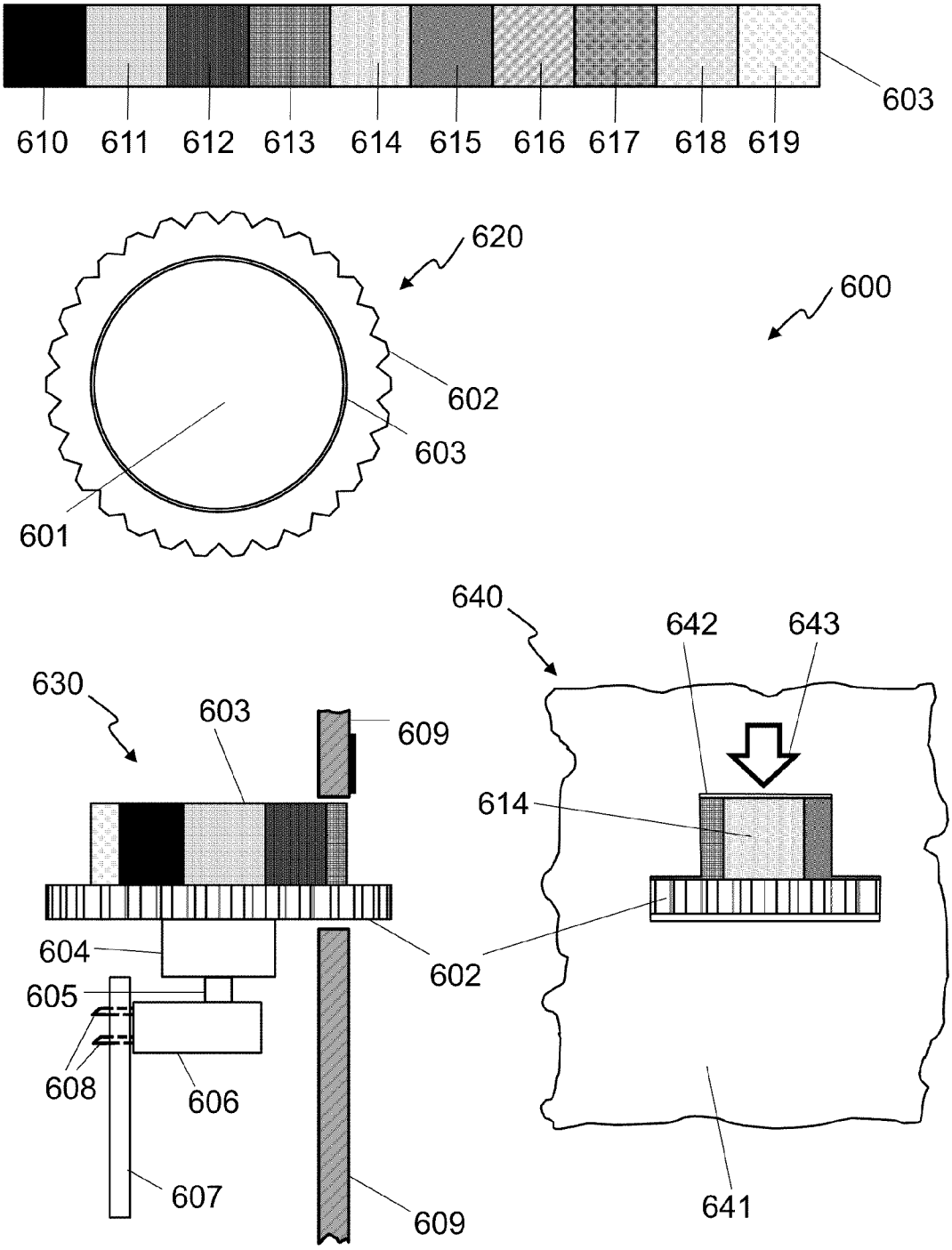

515
Incoming state change request
501
Power is Applied
500
502
Turn control electronics "On"
503
Initialized/ Included?
No
504
Wait for user to press physical sync button.
Yes
505
Broadcast Inclusion Packet
516
Did Color Selector Change?
Yes
507
Send selected group (color)
No
508
Enable Monitoring
506
Receive Initialization Info?
Yes
No
509
Is Color Selector White?
Yes
No
510
Turn device on and ignore all state changes
511
Receive Device State Control
512
Turn Device On?
Yes
No
513
Turn Device Off
514
Turn Device On

FIG. 5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619
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630
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602
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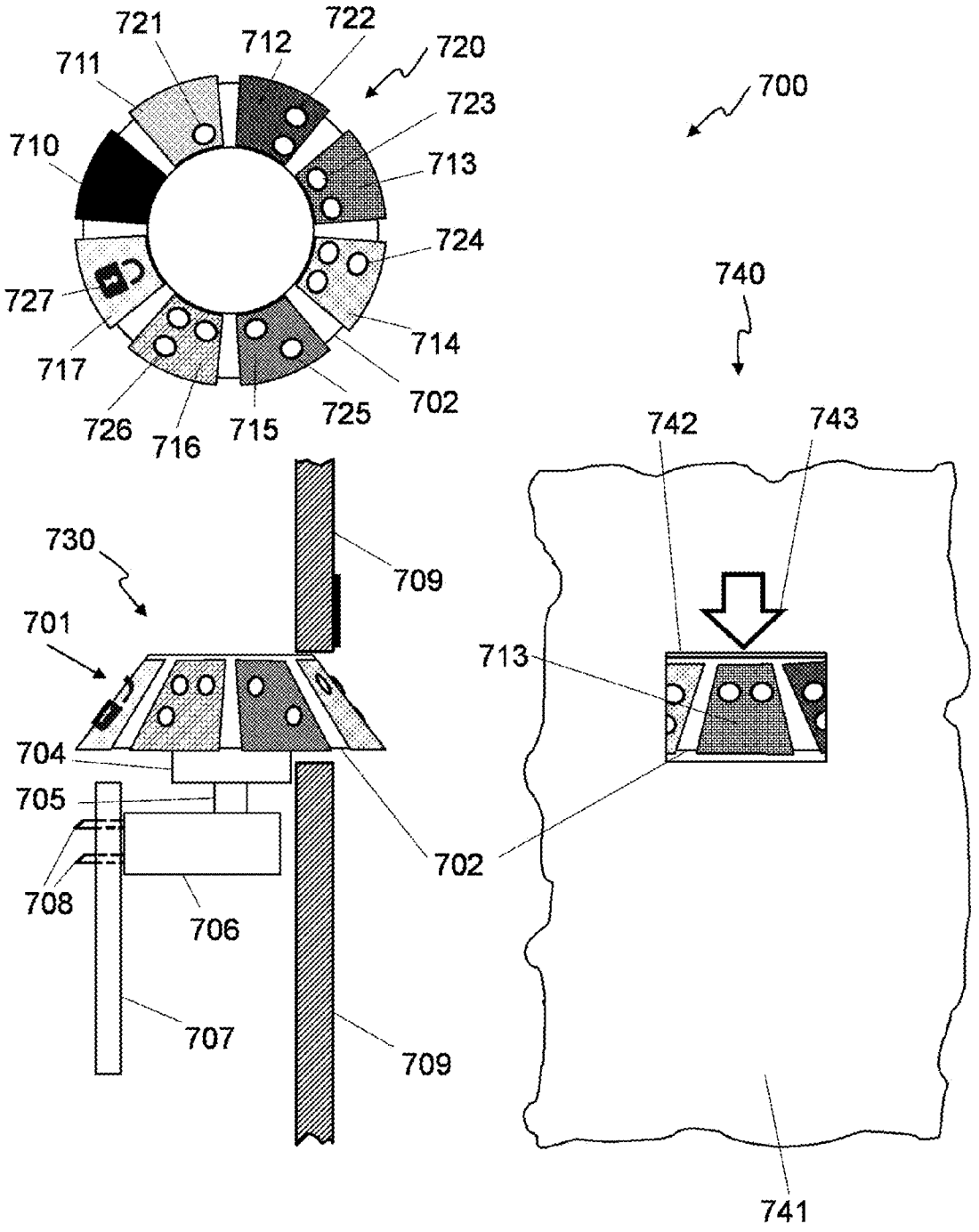
606
607
609
641

FIG. 6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712
722
720
711
723
710
713
724
727
714
717
702
726
716
715
725
700
740
742
743
730
709
701
713
704
705
702
708
706
707
709
741

FIG. 7

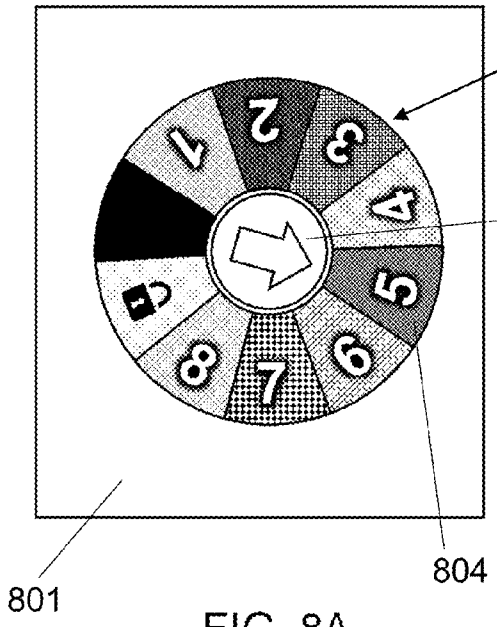

FIG. 8A

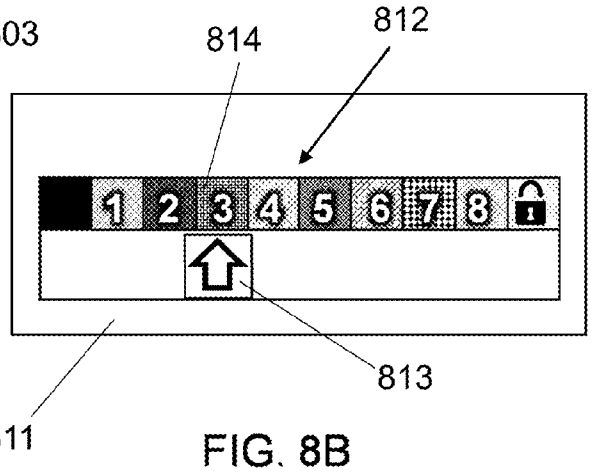

FIG. 8B

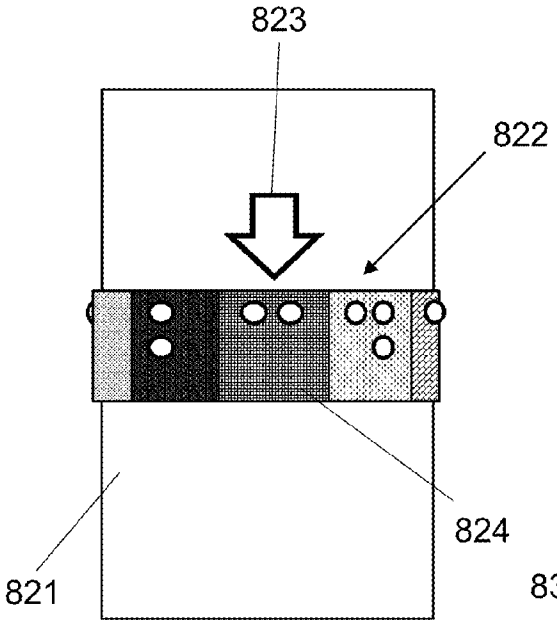

FIG. 8C

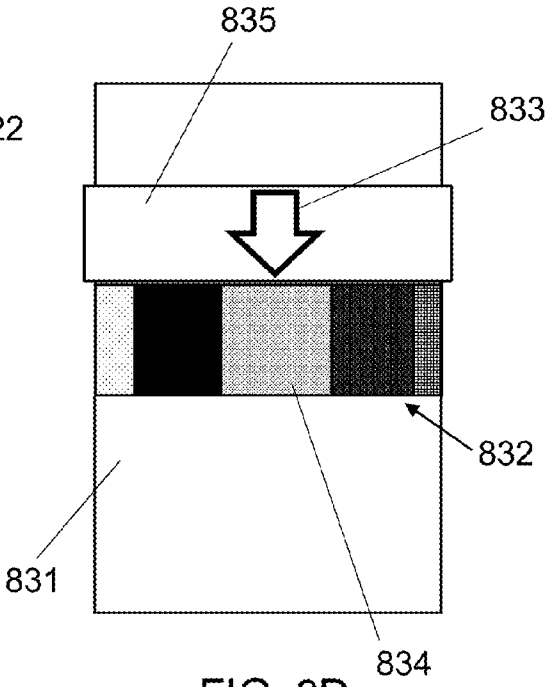

FIG. 8D

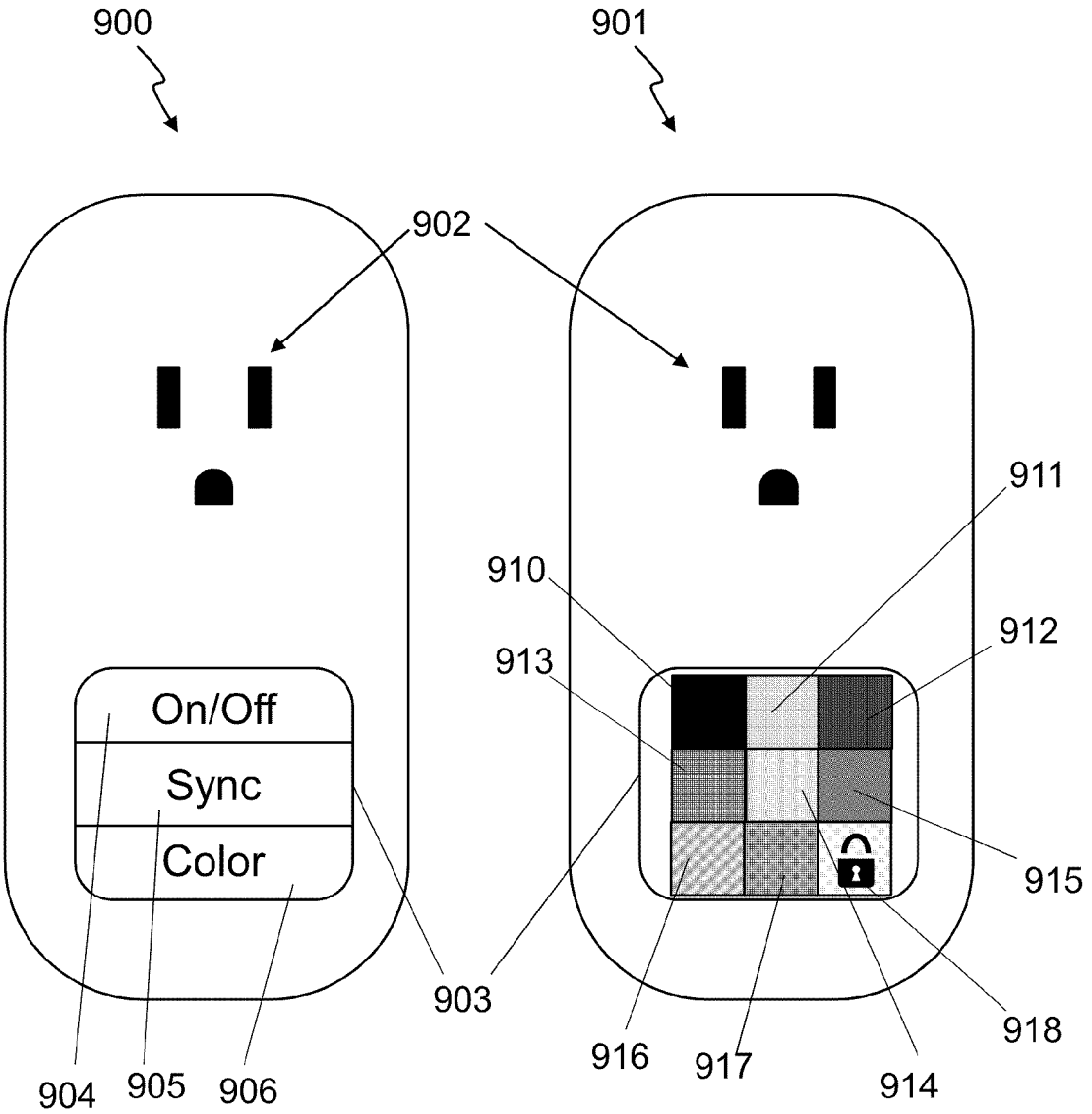
900
901
902
On/Off
Sync
Color
903
904
905
906
910
911
912
913
914
915
916
917
918

FIG. 9

HOME AUTOMATION GROUP SELECTION BY COLOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Patent Application Ser. No. 61/254,709 entitled "HYBRID LIGHT" and filed on Oct. 25, 2009, then entire contents of which is hereby incorporated by reference.

BACKGROUND

1. Technical Field

The present subject matter relates to home automation networking. It further relates to initialization and setup of networked home automation devices.

2. Description of Related Art

Providing home automation functionality using networking means is well known in the art. Control of lighting and appliances can be accomplished using systems from many different companies such as X10, Insteon® and Echelon. These systems all require some kind of initialization and setup of the devices to communicate properly on the network. In some cases some of the initialization and setup is predefined in the device with no mechanism for the user to easily configure the device for their particular installation. But in many cases, a way for the user to configure the device at the time of installation is required.

US Pat. App. No. 2009/0237006 filed Mar. 18, 2008 by inventors Champion et al. shows a method and apparatus for identifying a group of devices where a controller receives a color identifying value over a communication channel from a management network and then combines the light emitted by the at least two LEDs into an identifying color that identifies a group of devices. In U.S. Pat. No. 4,918,690 issues on Apr. 17, 1990, the inventors Markkula et al. describe a network for sensing, communicating and controlling where each cell in the network is assigned a group identification number.

Inventor Dolin describes an apparatus and method for network node identification and network configuration in U.S. Pat. No. 5,519,878 issued on May 21, 1996. In Dolin's system, each device in the home automation network contains a unique ID that is obtained at the time of installation and then placed on a machine readable medium such as a bar code sticker. The bar code stickers for each device are then placed on paper floor plan to show the physical location of that device. The paper floor plan with the stickers is then read by an automatic configuration device to determine the physical location of each device for future use.

However, neither Champion et al., Markkula et al. nor Dolin address the ability of a user to set the network group or other parameters using a control mechanism on the device itself.

In US Pat. App. No. 2009/0267540, inventors Chemel at al. show an intelligent LED lighting system with mesh networking connectivity. Chemel et al. describe a power management module (PMM) with light module identification. Each light module may have identifying information programmed into it, and can communicate that information to the PMM, which can in turn store and communicate that information to a user or installer to aid in replacement or commissioning. The information may be stored in a nonvolatile memory onboard the light module, and communicated via a digital bus to the PMM. The information may be stored passively on the light module, such as via a series of jumpers or dip switches, and can be read by the PMM. The passive storage may include electrical contacts with encoded bit pattern stored in an optics holder. The passive storage may include passive RFID.

X10 markets a series of home automation control modules such as the PLM03 Lamp Module Receiver. Many X10 modules include two rotary control dials that the user can set at installation to allow each separate module to be independently controlled. One dial is for the "House Code" and can be set to a letter ranging from "A" to "P" while the other dial is for the "Unit Number" which can be set to a number ranging from 1 to 16.

It should be noted that neither the system described by Chemel et al. nor X10 devices address simplifying the way that the user can identify the location or other parameters of a device.

It therefore is important to provide a new method for the user to very easily configure a networked device for the home. The method should be very easy to remember and provide a simple means to configure at least the location or other basic parameter important to the networking of the device.

SUMMARY

Various embodiments of the present subject matter disclose methods and apparatus for configuring a networked device. One disclosed method comprises generating a selected color code corresponding to a color selected from a plurality of colors, each color of the plurality of colors having a corresponding color code and sending the selected color code over a network. In some embodiments, the plurality of colors have at least one locking color and one or more non-locking colors and the networked device changes a state of the networked device in response to a command received over the network only if the color selected is one of the one or more non-locking colors. In at least one embodiment, the command received over the network is an On/Off command and the state of the network device being changed is an On/Off state. In some embodiments the state of the networked device is set to On if the color selected is the at least one locking color. And in some embodiments the networked device responds to a request for status information from the network independent of the color selected. In another embodiment the networked light bulb receives a local control action and changes the state of the networked lighting apparatus in response to the local control action only if the color selected is one of the one or more non-locking colors. In some embodiments the local control command is an On/Off command and the state of the network device being changed by the local control command is an On/Off state.

One embodiment is a networked device comprising means for controlling a state of the networked device, means for connecting to a network, means for allowing a user to select a color from a plurality of colors, the plurality of colors having at least one locking color and one or more non-locking colors, and means for generating a selected color code corresponding to the color selected by the user, each color of the plurality of colors having a corresponding color code. In that embodiment the networked device submits the selected color code over the network but changes the state of the networked device in response to a command from the network only if the color selected by the user is one of the one or more non-locking colors. In some embodiments the networked device also responds to requests for status information from the network independent of the color selected by the user. In some embodiments, the networked device further comprises means for allowing the user enter a local control command wherein the means for controlling the networked device changes the state of the networked device in response to the

local control command only if the color selected by the user is one of the one or more non-locking colors. And in some embodiments that means for controlling the networked device controls the On/Off state.

In another embodiment, a networked device is comprised of a controller, a network adapter communicatively coupled to the controller, and a color selection mechanism communicatively coupled to the controller. The color selection mechanism allows a user to select a color from a plurality of colors, the plurality of colors having at least one locking color and one or more non-locking colors. The color selection mechanism communicates information corresponding to the color selected by the user to the controller and the controller converts the information communicated by the color selection mechanism to a color code corresponding to the color selected by the user. The controller communicates the color code to the network adapter and the network adapter sends the color code out over the network. If the network adapter receives a message from the network to change a state of the networked device it is communicated to the controller, but the controller changes the state of the networked device in response to the message to change the state of the networked device communicated by the network adapter only if the color selected by the user is one of the one or more non-locking colors.

In some embodiments, the network adapter connects to a wireless network such as Wi-Fi, Z-wave or Zigbee and in some embodiments the controller and the network adapter are integrated on a single integrated circuit. In other embodiments, the network adapter receives a status request message over the network and communicates it to the controller; and the controller responds to the status request message by communicating a response message to the network adapter to send out over the network, the controller responding independent of the color selected by the user. Yet another embodiment includes a local control interface communicatively coupled to the controller, the local control interface allows the user to enter a local control command to request a change to the state of the networked device and the controller changes the state of the networked device in response to the local control command only if the color selected by the user is one of the one or more non-locking colors.

In some embodiments the color selection mechanism may be a graphical user interface. In some embodiments the color selection mechanism may have a rotary switch with a rotatable shaft and an output communicatively coupled to the controller and a color wheel having a center, an edge and a colored area, the center of the color wheel coupled to the shaft of the rotary switch and the colored area divided into sections, each section imprinted with a section color selected from the plurality of colors. As the color wheel is rotated by user manipulation of the edge, the colored area of the color wheel and the rotatable shaft of the rotary switch also rotate and the output of the rotary switch communicates current rotational position information corresponding to the color selected by the user to the controller. The position of the color wheel may be indicated by a selection mark in close physical proximity to the section of the colored area of the color wheel imprinted with the section color corresponding to the color selected by the user at the current position. In other embodiments, the position of the color wheel may be indicated by the color of section of the colored area that is visible through an aperture in an outer housing of the networked device and the color wheel is mounted so that a portion of the edge protrudes from the outer housing of the networked device allowing the user is able to manipulate the edge to rotate the color wheel about the axis. In some embodiments the color wheel may also include visible tactilely recognizable symbols.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute part of the specification, illustrate various embodiments of the invention. Together with the general description, the drawings serve to explain the principles of the invention. In the drawings:

FIG. **1** shows a table of color definitions used in this disclosure;

FIG. **2** shows an embodiment of a of color selection mechanism;

FIG. **3** shows a networked single outlet AC power socket;

FIG. **4** shows a block diagram of the electronics for one embodiment;

FIG. **5** is a flowchart describing how the color selection means is used in the configuration of a networked home automation device;

FIG. **6** shows an alternative embodiment of a of color selection mechanism;

FIG. **7** shows a different alternative embodiment of a of color selection mechanism;

FIGS. **8**A, **8**B, **8**C and **8**D show additional embodiments of color selection mechanism; and

FIG. **9** shows an embodiment using a touch sensitive graphical user interface.

DETAILED DESCRIPTION

In the following detailed description, numerous specific details are set forth by way of examples in order to provide a thorough understanding of the relevant teachings. However, it should be apparent to those skilled in the art that the present teachings may be practiced without such details. In other instances, well known methods, procedures and components have been described at a relatively high-level, without detail, in order to avoid unnecessarily obscuring aspects of the present concepts. A number of descriptive terms and phrases are used in describing the various embodiments of this disclosure. These descriptive terms and phrases are used to convey a generally agreed upon meaning to those skilled in the art unless a different definition is given in this specification. Some descriptive terms and phrases are presented in the following paragraphs for clarity.

The term "network" refers to a bidirectional communication medium and protocol to allow a plurality of devices to communicate with each other.

The term "networked device" refers to any device that can communicate over a network.

Reference now is made in detail to the examples illustrated in the accompanying drawings and discussed below.

FIG. **1** is a table **100** indicating some embodiments of the colors that could be used with the subject of the present disclosure. The first column **101** contains reference numbers **0**-**9** to be used to referring to each color. Some embodiments may use fewer than 10 colors while others may use more than 10 colors. The second column **102** contains symbols that may optionally be imprinted on top of the color to help people who may have difficulty distinguishing between different colors. In this embodiment, the first color has no symbol, the next 8 colors use an Arabic numeral as the symbol, and the final symbol is a padlock. Other symbols may be used in other embodiments. The third column **103** contains the color names for the colors of this embodiment. Other colors could be used in other embodiments. The next four columns **104**, entitled

"Print Colors", give one possible set of colors to be mixed for 4-color printing processes. The four columns **104** represent the percentage of the maximum amount of ink for the cyan (C %), magenta (M %), yellow (Y %), and black (K %) and can range from 0% to 100%. Other mixes might be used for some embodiments depending on the specific inks, print stock and exact desired color. The next three columns **105**, entitled "Computer Colors", give a possible representation for the indicated colors for use on a computer screen. The three columns **105** represent a color value for each of red (R), green (G) and blue (B) and range from 0 to 255 to allow the value for each component color to be stored in a single 8 bit storage location as is common in computer systems. The final (rightmost) column **106**, entitled "Fill", gives a cross-hatch pattern to be used in the following black and white figures to indicate the color that would fill a particular area.

FIG. **2** shows one particular embodiment of a color selection mechanism **220** to allow a user to select a color. Top view **200** shows the color wheel **221** from the top and side view **201** shows the color wheel **221** from the side with some associated structure that has been omitted from the top view **200** for clarity. The color selection mechanism **220** has color wheel **221** with an edge **202** and a hub **204**. The edge **202** may be knurled or textured to give better grip as it is rotated by the user. A colored area **203** is included on the color wheel **221**. In this embodiment, the colored area **203** is implemented as a label attached to the top of the color wheel **221** with adhesive so that the center of the colored area **203** is coincident with the center of the color wheel **221**. The colored area **203** is divided into sections **210**-**219**, each section imprinted with a different color as defined in FIG. **1**. In this embodiment, section **210** is imprinted with color **0** and no identifying symbol. In this embodiment, color **0** is black. Section **211** is imprinted with color **1** and the symbol "**1**". Section **212** is imprinted with color **2** and the symbol "**2**". Section **213** is imprinted with color **3** and the symbol "**3**". Section **214** is imprinted with color **4** and the symbol "**4**". Section **215** is imprinted with color **5** and the symbol "**5**". Section **216** is imprinted with color **6** and the symbol "**6**". Section **217** is imprinted with color **7** and the symbol "**7**". Section **218** is imprinted with color **8** and the symbol "**8**". Section **219** is imprinted with color **9** and the symbol of a padlock. In this embodiment color **9** is white. The colors imprinted on the colored area **203** represent nine non-locking colors **0**-**8** and one locking color **9** which is white. Other embodiments may use more or less than ten colors. The color wheel hub **204** is attached to the shaft **205** of a rotary dip switch **206** that may be mounted on a printed circuit board **207**. As the color wheel **221** is turned, it turns the shaft **205** of the rotary dip switch **206** which generates a color code depending on the rotational angle of the shaft **205**. The color code is then available on the pins **208** (not all pins are shown) of the rotary dip switch **206**. The pins **208** may be connected to pull-up resistors and a controller located on the same printed circuit board (or elsewhere in the networked device). In one embodiment the rotary dip switch is a BCD encoder that generates 4 bits of output that can either be connected to ground or left as an open circuit so that as each output is connected to a pull-up resistor, the output represents a binary number between 0000 and 1010. Other methods of encoding the angular position of the color wheel **221** could also be used such as individual switch outputs for each rotary position, an analog to digital converter measuring a voltage across a potentiometer, an optical shaft encoder, a magnetic detector, two-axis hall-effect sensors or other well-known methods of detecting the angular position of a disk or shaft.

FIG. **3** shows the color selection mechanism **220** implemented in a networked device **300**. In this embodiment the networked device **300** is a controllable single outlet AC power socket but other embodiments may implement the disclosed subject matter in other appliances including, but not limited to, a multi-outlet power strip, a kitchen appliance such as a coffee maker, a garage door opener, an audio-video component, a computer peripheral, a lighting fixture, an electric heater, a fan, or any type of electrical device, either AC or battery powered. The networked device **300** of this embodiment has a front bezel **301**, a rear case **302**, a power switch **303**, a sync button **309**, a socket **304** and a plug **305**. Circuitry is inside the networked device **300** including a controller, a network adapter, and a thyristor (not shown) that is able to control whether or not AC power from the plug **305** is allowed to pass to the socket **304**. The color selection mechanism **220** is located at the bottom right of the networked device **300** and is shown in greater detail in the enhanced view **310**. The edge **202** of the color wheel **221** protrudes beyond the outer rim **306** of the bezel **301** and case **302** of the networked device **300**. This allows the user to apply a rotational force to the color wheel **221**. As the color wheel **221** rotates, different sections of the colored area **203** of the color wheel **221** are visible through an aperture **307** in the bezel **301**. In FIG. **3**, the current position of the color wheel **221** is such that white (locked) section of the colored area **203** is visible. The color selection mechanism **220** may be designed to provide a detent at each section of the colored area **203** to make it clear what color is currently selected.

FIG. **4** shows a block diagram of the control electronics **400** used in the networked device **300**. The plug **305** provides AC power to the power supply **401** which generates the necessary power for the rest of the electronics. A wireless network adapter **403** receives radio frequency signals through antenna **407** and is connected to controller **402** by a digital bus **404**. In some embodiments, the wireless network adapter may connect to a Z-wave, Zigbee (802.15) or Wi-Fi (802.11) wireless network. Other embodiments may use a wired or power line network adapter instead of a wireless network adapter. In some embodiments, the controller **402** is implemented as a microcontroller and in some embodiments, the controller, wireless network adapter, and digital bus may be integrated onto a single chip such as the Zensys ZM3102. A user interface is provided through several locally manipulatable controls. In this embodiment, a power button **408** is connected to a voltage source through a resistor **402** and a sync button **409** is connected to a voltage source through a resistor R**2**. Both buttons **408** and **409** are connected to the controller **402**. A color selection device **220** is also connected to the controller **402** providing rotational position information through connection **405**. The controller **402** converts the rotational position information to the color code corresponding to the color selected by the user. In other embodiments the user interface may be provided using other means such as a graphical user interface on a display or a keypad or any other device or combination of devices that allows the user to provide input to the controller **402**. The controller **402** can control a thyrister **406** to determine whether or not the socket **304** is powered. Other embodiments may use a relay or other controllable power switch.

FIG. **5** shows a flow chart **500** for the operation of the networked device **300** of the current subject matter. The exact order of operations and details shown in this flow chart **500** may differ between embodiments but one skilled in the art can see how the concepts presented herein would still apply. After power is applied **501**, the networked device **300** turns **400** the control electronics on. The controller **402** then checks **503** to see if the device has been previously initialized and included into the network. If the device has not yet been initialized and

included into the network, it waits **504** until the user presses the sync button **409**. Once the sync button **409** has been pressed, the controller **402** broadcasts **505** an inclusion packet over the network to let a network controller know that there is a new device on the network that needs to be initialized and configured. The controller **402** then waits **506** for some period of time to receive initialization information from the network controller. If no initialization information is received, the controller rebroadcasts **505** an inclusion packet and waits again, repeating this process until initialization information is received **506**. Once initialization information has been received, the controller **402** generates the color code from information received from the color selection mechanism **220** and sends **507** the color code out to the network controller. The network controller uses the color code to help further configure the device and create a more user-friendly user interface for the entire network. One way the network controller may use the color code is to allow the user to assign a particular color to a room and set all the networked devices located in that room to the same color. An alternative use is to differentiate all similar devices using a different color so that the user can easily tell which device is which as they interact with the network controller. In yet another use, the color can be used to group devices together that interact such as all the audio-visual devices. In some embodiments, a specific color, such as black, may be interpreted by the network controller as meaning that the device is not assigned to a particular group and the controller can ask the user which group the device should be assigned to. In other embodiments that require more than 8 distinct color assignments, the network controller may allow the user to select from a plurality of additional colors, beyond the colors directly available from the color selection mechanism of the device, so that the user can have a larger choice of colors available for device assignment.

After the color code has been transmitted **507**, the controller **402** may enable monitoring **508** of the status of the device. A networked device may allow the network controller or other network devices to query its current state, current power usage, current condition of its consumables used by the networked device, diagnostic information or other information available to the networked device that other devices on the network might find useful. The controller **402** then determines **509** if the color selected is the locking color, in this case white. If the locking color has been selected, the controller then turns (or leaves) the device in an operating "on" state but ignores **510** all control requests that may come in over the network. In some embodiments, the controller may also ignore all local control requests such as the user pressing the power button **408** if the locking color has been selected.

If the color selected **509** on the color selection mechanism **420** is not white, the controller **402** then is enabled to receive **511** control packets over the network. If the control packet tells the controller **402** to turn the device On **512**, the controller **402** controls the thyristor **406** to allow the socket **304** to be energized **514**. If the control packet tells the controller **402** to turn the device Off **512**, the controller **402** controls the thyristor **406** to isolate the socket **304** from electrical power, turning it off **513**. Depending on the capability of the networked device, many states other than the On/Off state may be controlled. On occasion new incoming state change requests may be received **515**. Those state change requests may come over the network or they may be received from a local user interface on the device. Whenever a new state change request is received **515**, the controller **402** checks to see if the color selected by the user on the color selection device **220** has changed **516**. In some embodiments, the act of changing the color may generate a state change request. If the color has changed **516**, the controller **402** sends the new color out over the network to let the network controller know that the user has changed the color code on the device. The controller then proceeds through the same set of steps **508-514** as described in the initial power-up sequence. If the color has not changed **516**, there is no need to rebroadcast the color code or recheck to see if the color is white, so the controller simply receives **511** the control packet and takes appropriate action **512-514**.

FIG. **6** shows an alternative embodiment of a color selection mechanism **600** to allow a user to select a color. Top view **620** shows the color wheel from the top and side view **630** shows the color wheel from the side with some associated structure that has been omitted from the top view **620** for clarity. The color wheel mechanism **600** has a color wheel with a raised disc **601**, an edge **602** extending out beyond the raised disc, and a hub **604**. The edge **602** may be knurled or textured to give better grip as it is rotated by the user. A colored area **603** is included on the color wheel. In this embodiment, the colored area **603** is implemented as a label that is wrapped around the raised disc **601** and attached with adhesive. The colored area **603** is divided into sections **610-619**, each section imprinted with a different color as defined in FIG. **1**. In this embodiment, section **610** is imprinted with color **0**, section **611** is imprinted with color **1**, section **612** is imprinted with color **2**, section **613** is imprinted with color **3**, section **614** is imprinted with color **4**, section **615** is imprinted with color **5**, section **616** is imprinted with color **6**, section **617** is imprinted with color **7**, section **618** is imprinted with color **8**, and section **619** is imprinted with color **9**. In this embodiment, no symbols are included with the colors although other similar embodiments may include visible or tactilely recognizable symbols on one or more of the sections **610-619**. The colors imprinted on the colored area **603** represent nine non-locking colors **0-8** and one locking color **9** which is white. The color wheel hub **604** is attached to the shaft **605** of a rotary dip switch **606** that may be mounted on a printed circuit board **607**. As the color wheel is turned, it turns the shaft **605** of the rotary dip switch **606** which generates a set of open or closed switches depending on the rotational angle of the shaft **605**. The color code is then available on the pins **608** (not all pins are shown) of the rotary dip switch **606**. The pins **608** may be connected to pull-up resistors and a controller located on the same printed circuit board (or elsewhere in the networked device). In one embodiment the rotary dip switch is a BCD encoder that generates 4 bits of output that can either be connected to ground or left as an open circuit so that as each output is connected to a pull-up resistor, the output represents a binary number between 0000 and 1010. Other methods of encoding the angular position of the color wheel could also be used such as such as individual switch outputs for each rotary position, an analog to digital converter measuring a voltage across a potentiometer, an optical shaft encoder, a magnetic detector, two-axis hall-effect sensors or other well-known methods of detecting the angular position of a disk or shaft.

A cross section of a wall **609** of the networked device shows the edge **602** protruding through the wall and a portion of the colored area **603** visible through an opening in the wall **609**. Exterior view **640** shows the outside of the networked device with the wall **641** having an opening **642**. In this embodiment, the opening **642** has a wider section at the bottom to allow the edge **602** to protrude from the wall **641** while keeping the upper portion of the opening **642** narrower so that can be mostly filled with one section of the color wheel. In the position shown, section **614** is filling most of opening **642**. To help make it even clearer which color is

selected, an indicator arrow **643** is included on the wall **641** pointing at the current color. The color selection mechanism **600** may be designed to provide a detent at each section **610-619** of the colored area **603** to make it easy for the user to center the desired section. in the opening **642**.

FIG. **7** shows another alternative embodiment of a color selection mechanism **700** to allow a user to select a color. Top view **720** shows the color wheel from the top and side view **730** shows the color wheel from the side with some associated structure that has been omitted from the top view **720** for clarity. The color wheel mechanism **700** has a color wheel with an angled side **701**, an edge **702** at the outermost part of the angled side **701**, and a hub **704**. The angle of the angled side **701** may range from 0 (parallel with the axis) to nearly 90 degrees (nearly flat as shown in FIG. **2**). The edge **702** may be knurled or textured to give better grip as it is rotated by the user. A plurality of colored sections **710-717** are included on the angled side **701**. The colored sections **710-717** may be immediately adjacent to each other or may have some space with a neutral color between them as is shown in this embodiment. This embodiment has eight sections, each section a different color as defined in FIG. **1**. In this embodiment, section **710** is color **0**, section **711** is color **1**, section **712** is color **2**, section **713** is color **3**, section **714** is color **4**, section **715** is color **5**, section **716** is color **6**, and section **717** is color **9**. In this embodiment, visible and tactilely recognizable symbols are also included on some of the sections. Section **711** has the braille symbol for one **721**, section **712** has the braille symbol for two **722**, section **713** has the braille symbol for three **723**, section **714** has the braille symbol for four **724**, section **715** has the braille symbol for five **725**, section **716** has the braille symbol for six **726**, and section **717** has a raised padlock symbol **727**. Other embodiments may use other tactilely recognizable symbols. Yet other embodiments may not include tactilely recognizable symbols. In other embodiments the tactilely recognizable symbols may not be readily visible and other visible symbols may or may not be included. The colors on the angled edge **701** represent seven non-locking colors **0-6** and one locking color **9** which is white. The color wheel hub **704** is attached to the shaft **705** of a rotary dip switch **706** that may be mounted on a printed circuit board **707**. As the color wheel is turned, it turns the shaft **705** of the rotary dip switch **706** which generates information depending on the rotational angle of the shaft **705**. The information is then available on the pins **708** (not all pins are shown) of the rotary dip switch **706**. The pins **708** may be connected to pull-up resistors and a controller located on the same printed circuit board (or elsewhere in the networked device). In one embodiment the rotary dip switch is an octal encoder that generates 3 bits of output that can either be connected to ground or left as an open circuit so that as each output is connected to a pull-up resistor, the output represents a binary number between 000 and 111. Other methods of encoding the angular position of the color wheel could also be used such as such as individual switch outputs for each rotary position, an analog to digital converter measuring a voltage across a potentiometer, an optical shaft encoder, a magnetic detector, two-axis hall-effect sensors or other well-known methods of detecting the angular position of a disk or shaft.

A cross section of a wall **709** of the networked device shows the edge **702** protruding through the wall and a portion of the angled side **701** visible through an opening in the wall **709**. Exterior view **740** shows the outside of the networked device with the wall **741** having an opening **742**. In the position shown, section **713** is filling most of opening **742**. To help make it even clearer which color is selected, and indicator arrow **743** is included on the wall **741** pointing at the current color. The color selection mechanism **700** may be designed to provide a detent at each section **710-717** to make it easy for the user to center the desired section in the opening **742**.

FIGS. **8**A, **8**B, **8**C and **8**D show additional alternative embodiments of a color selection mechanism. FIG. **8**A shows a networked device **801** with a non-moveable color wheel **802** imprinted or affixed to the networked device **801**. A rotatable selector **803** can be turned by the user to select a color. The section **804** of the non-moveable color wheel **802** with the color "**5**" is selected at the current position of the rotatable selector **803**. Means to convert the angular position of the rotatable selector **803** to a color code would also be included.

FIG. **8**B shows a linear color selector. Networked device **811** has a color label **812** affixed. Sliding selector **813** can be moved back and forth by the user to select a color. A linear slide switch moved by the sliding selector **813** can be used to generate a color code.

FIG. **8**C shows a networked device with a cylindrical element **821**. Rotating color sleeve **822** can be rotated about the cylindrical element **821**. Selection indicator **823** points at the currently selected color on the rotating color sleeve **822**. The currently selected color in FIG. **8**C is color "**3**", the color of section **824**. FIG. **8**D also shows a networked device with a cylindrical element **831**. Rotating selector sleeve **835** with a selector indicator **833** can be rotated about the cylindrical element **831**. Fixed color ring **832** is affixed to the cylindrical element **831** adjacent to the rotating selector sleeve **835**. Selection indicator **833** points at the currently selected color on the fixed color sleeve **832**. In FIG. **8**D the currently selected color is color "**1**", the color of section **834**.

One embodiment may use multicolored LEDs, a set or red, green and blue LEDs, or other colored lights to indicate the color chosen to the user. The user may push a button to cycle between the different colors or a capacitive sensing switch or other proximity or touch device could be used to select a color. In other embodiment, voice recognition might be used to detect the color being spoken, or a video camera could be used and a color sample put into the view of the video camera. Any method for the user to enter a color selection could be used in some embodiments.

FIG. **9** shows a networked device **900**, **901** with a touch sensitive display **903** used for a graphic user interface (GUI). The networked device **900** on the left shows the look of the GUI at one point in time where it allows the user to turn the power on/off if a first section **904** of the screen is touched. If a second section **905** of the screen is touched, the networked device **900** tries to connect to the network. And if a third section **906** of the screen is touched, a second level of menu is shown on the touch sensitive display **903**. The view of the networked device **901** on the right shows the second level of menu that is used to select the color. Nine different sections **910-918** of the touch sensitive display **903** are created, each with a different color. Some may have visible symbols as well. If the user touches one of the sections **910-918**, the color of that section is taken as the user selected color. A controller can then convert the information about which section was touched to the appropriate color code.

Unless otherwise indicated, all numbers expressing quantities of elements, optical characteristic properties, and so forth used in the specification and claims are to be understood as being modified in all instances by the term "about." Accordingly, unless indicated to the contrary, the numerical parameters set forth in the preceding specification and attached claims are approximations that can vary depending upon the desired properties sought to be obtained by those skilled in the art utilizing the teachings of the present invention. At the very least, and not as an attempt to limit the

application of the doctrine of equivalents to the scope of the claims, each numerical parameter should at least be construed in light of the number of reported significant digits and by applying ordinary rounding techniques. Notwithstanding that the numerical ranges and parameters setting forth the broad scope of the invention are approximations, the numerical values set forth in the specific examples are reported as precisely as possible. Any numerical value, however, inherently contains certain errors necessarily resulting from the standard deviations found in their respective testing measurements.

The recitation of numerical ranges by endpoints includes all numbers subsumed within that range (e.g. 1 to 5 includes 1, 1.5, 2, 2.75, 3, 3.80, 4, and 5).

As used in this specification and the appended claims, the singular forms "a", "an", and "the" include plural referents unless the content clearly dictates otherwise. Thus, for example, reference to an element described as "an LED" may refer to a single LED, two LEDs or any other number of LEDs. As used in this specification and the appended claims, the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise.

As used herein, the term "coupled" includes direct and indirect connections. Moreover, where first and second devices are coupled, intervening devices including active devices may be located there between.

Any element in a claim that does not explicitly state "means for" performing a specified function, or "step for" performing a specified function, is not to be interpreted as a "means" or "step" clause as specified in 35 U.S.C. §112, ¶ 6. In particular the use of "step of" in the claims is not intended to invoke the provision of 35 U.S.C. §112, ¶ 6.

The description of the various embodiments provided above is illustrative in nature and is not intended to limit the invention, its application, or uses. Thus, variations that do not depart from the gist of the invention are intended to be within the scope of the embodiments of the present invention. Such variations are not to be regarded as a departure from the intended scope of the present invention.

What is claimed is:

1. A networked device comprising:
- means for controlling a state of the networked device;
- means for connecting to a network;
- means for allowing a user to select a color from a plurality of colors, the plurality of colors having at least one locking color and one or more non-locking colors; and
- means for generating a selected color code corresponding to the color selected by the user, each color of the plurality of colors having a corresponding color code; wherein
- the means for connecting to the network sends the selected color code over the network; and
- the means for controlling the state of the networked device changes the state of the networked device in response to a message from the network only if the color selected by the user is one of the one or more non-locking colors.

2. The networked device of claim **1** in which the means for controlling the state of the networked device controls an On/Off state of the networked device.

3. The networked device of claim **1** in which the networked device responds to a request for status information from the network independent of the color selected by the user.

4. The networked device of claim **1** further comprising:
- means for allowing the user enter a local control command; wherein
- the means for controlling the state of the networked device changes the state of the networked device in response to the local control command only if the color selected by the user is one of the one or more non-locking colors.

5. The networked device of claim **4** in which the means for controlling the state of the networked device controls an On/Off state of the networked device.

6. A networked device comprising:
- a controller;
- a network adapter communicatively coupled to the controller; and
- a color selection mechanism communicatively coupled to the controller, the color selection mechanism allowing a user to select a color from a plurality of colors, the plurality of colors having at least one locking color and one or more non-locking colors; wherein
- the color selection mechanism communicates information corresponding to the color selected by the user to the controller;
- the controller converts the information communicated by the color selection mechanism to a color code corresponding to the color selected by the user,
- the controller communicates the color code to the network adapter,
- the network adapter sends the color code out over a network,
- the network adapter receives a message from the network to change a state of the networked device and communicates it to the controller, and
- the controller changes the state of the networked device in response to the message to change the state of the networked device communicated by the network adapter only if the color selected by the user is one of the one or more non-locking colors.

7. The networked device of claim **6** in which the network utilizes communication over an AC power line.

8. The networked device of claim **6** in which the network utilizes radio frequency communication.

9. The networked device of claim **6** in which the controller and the network adapter are integrated on a single integrated circuit.

10. The networked device of claim **6** in which the state of the networked device being controlled is an On/Off state of the networked device.

11. The networked device of claim **6** in which
- the network adapter receives a status request message over the network and communicates it to the controller; and
- the controller responds to the status request message by communicating a response message to the network adapter to send out over the network, the controller responding independent of the color selected by the user.

12. The networked device of claim **6** further comprising:
- a local control interface communicatively coupled to the controller, the local control interface allowing the user to enter a local control command to request a change to the state of the networked device; wherein
- the controller changes the state of the networked device in response to the local control command only if the color selected by the user is one of the one or more non-locking colors.

13. The networked device of claim **12** in which the state of the networked device to which the local control command requests a change is an On/Off state of the networked device.

14. The networked device of claim **6** in which the color selection mechanism is a graphical user interface.

15. The networked device of claim **6**, the color selection mechanism comprising:
- an electrical component with a rotatable shaft and an output communicatively coupled to the controller; and

a color wheel having a center, an edge and a colored area, the center of the color wheel coupled to the rotatable shaft of the electrical component and the colored area divided into sections, each section imprinted with a section color selected from the plurality of colors; such that as the color wheel is rotated by user manipulation of the edge, the colored area of the color wheel and the rotatable shaft of the electrical component also rotate; and

the output of the electrical component with a rotatable shaft communicates current rotational position information corresponding to the color selected by the user to the controller.

16. The networked device of claim **15** wherein the electrical component with a rotatable shaft is a rotary switch.

17. The networked device of claim **15** wherein the electrical component with a rotatable shaft is a potentiometer and the controller further comprising an analog to digital converter, the input of the analog to digital converter electrically connected to a voltage divider circuit that changes as the shaft of the potentiometer rotates.

18. The networked device of claim **15**, the color selection mechanism further comprising:

a selection mark in close physical proximity to the section of the colored area of the color wheel imprinted with the section color corresponding to the color selected by the user at the current rotational position.

19. The networked device of claim **15** further comprising an outer housing with an aperture; wherein

the color wheel is mounted in the networked device so that,

a portion of the edge of the color wheel protrudes from the outer housing of the networked device, whereby the user is able to manipulate the edge to rotate the color wheel about its center;

a portion of the colored area is visible through the aperture in the outer housing of the networked device; and

a majority of the portion of the colored area visible through the aperture in the outer housing of the networked device is the section of the colored area imprinted with the section color corresponding to the color code selected by the user at the current rotational position.

20. The networked device of claim **15** in which at least one section of the colored area is also imprinted with a visible symbol.

21. The networked device of claim **15** in which at least one section of the colored area has a tactilely recognizable symbol.

* * * * *