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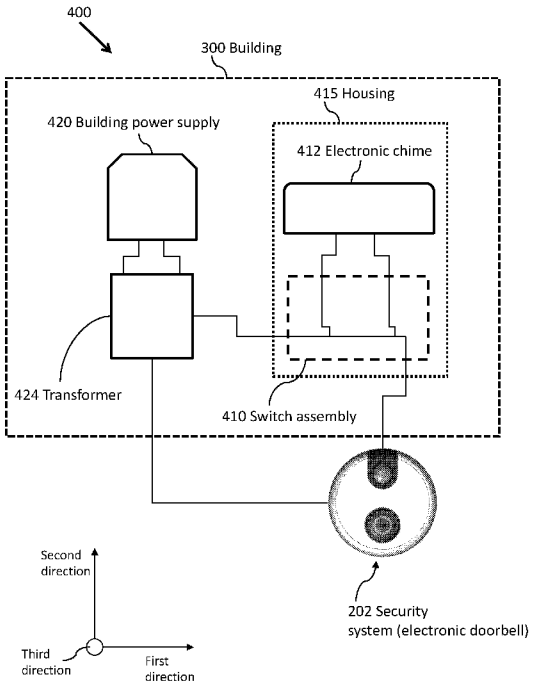

Figure 4

(57) Abstract: A doorbell system can be used to block a first electricity that is less than a first threshold from entering an electronic chime. By blocking the first electricity from entering the electronic chime, the electronic chime is not allowed to emit a notification sound. The doorbell system can also be used to allow a second electricity that is greater than the first threshold to enter the electronic chime. By allowing the second electricity to enter the electronic chime, this can allow the electronic chime to emit a notification sound in response to a visitor being present.

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DOORBELL COMMUNICATION AND ELECTRICAL SYSTEMS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of and is a continuation of U.S. Nonprovisional Patent Application No. 15/673,896; filed August 10, 2017; and entitled DOORBELL COMMUNICATION AND ELECTRICAL SYSTEMS; the entire contents of which are incorporated herein by reference.

U.S. Nonprovisional Patent Application No. 15/673,896 claims the benefit of and is a continuation of U.S. Nonprovisional Patent Application No. 14/588,881; filed January 2, 2015; and entitled DOORBELL COMMUNICATION AND ELECTRICAL SYSTEMS; the entire contents of which are incorporated herein by reference.

U.S. Nonprovisional Patent Application No. 14/588,881 claims the benefit of and is a continuation of U.S. Nonprovisional Patent Application No. 14/474,210; filed September 1, 2014; and entitled DOORBELL COMMUNICATION AND ELECTRICAL SYSTEMS; the entire contents of which are incorporated herein by reference.

U.S. Nonprovisional Patent Application No. 14/474,210 claims the benefit of and is a continuation of U.S. Nonprovisional Patent Application No. 14/474,209; filed September 1, 2014; and entitled DOORBELL COMMUNICATION AND ELECTRICAL METHODS; the entire contents of which are incorporated herein by reference.

This application claims the benefit of and is a continuation-in-part of U.S. Nonprovisional Patent Application No. 14/861,613; filed September 22, 2015; and entitled DOORBELL COMMUNICATION SYSTEMS AND METHODS; the entire contents of which are incorporated herein by reference.

U.S. Nonprovisional Patent Application No. 14/861,613 claims the benefit of and is a continuation-in-part of U.S. Nonprovisional Patent Application No. 14/671,677; filed March 27, 2015; and entitled DOORBELL DIAGNOSTICS; the entire contents of which are incorporated herein by reference.

BACKGROUND

Field

Various embodiments disclosed herein relate to doorbell systems. Certain embodiments relate to doorbell electrical systems.

Description of Related Art

Buildings often have doorbells located at points of entry so visitors can alert occupants of the building of the visitor's arrival. The doorbells typically have chimes inside the building that emit a notification sound in response to a visitor pressing a doorbell button. Oftentimes, the chimes are available as analog chimes and digital chimes.

Analog chimes typically include two flat metal bar resonators, which are struck by plungers operated by two solenoids. Analog chimes typically require electricity for a short duration of time to produce the notable "ding-dong" sound, which is the result of the plungers striking the metal bars.

Digital chimes often employ a circuit board containing music data and a speaker. As such, digital chimes can be capable of playing a wider variety of sounds over the typical "ding-dong" sound. To achieve this, the digital chimes may require electricity over a longer period of time than their analog predecessors.

However, the notification sound emitted by analog and digital chimes can typically only be heard within a short distance from the chime itself. For example, a homeowner located remotely from her home likely would not be able to hear the notification sound, and thus, would not be aware that a visitor is ringing her doorbell. Thus, there is a need for devices and methods that are compatible with analog and digital chimes to alert remotely located individuals that a visitor seeks the attention of the building occupant.

SUMMARY

The disclosure includes embodiments that include a doorbell system that comprise an electronic doorbell comprising a camera and a button, wherein the camera is configurable to visually detect a visitor and the button is configurable to enable the visitor to sound an electronic chime, an electronic switch assembly electrically coupled to the electronic doorbell and a transformer, and an electronic chime electrically coupled to the electronic switch assembly, wherein the electronic chime comprises a speaker configurable to emit a notification sound in response to the visitor pressing the button of the electronic doorbell. The electronic switch

assembly may define a first state and a second state. The first state may occur in response to a first electricity that is less than a first threshold, and the second state may occur in response to a second electricity that is greater than the first threshold. In the first state the electronic switch assembly may block the first electricity from passing through the electronic chime so that the electronic chime does not emit a notification sound. In the second state the electronic switch assembly may allow the second electricity to pass through the electronic chime so that the electronic chime emits the notification sound.

In several embodiments, the electronic chime may comprise a digital chime having a first printed circuit board configured to enable the electronic chime to emit the notification sound from the speaker based on digital music data. The electronic doorbell may also comprise a second printed circuit board configured to block the second electricity from entering the second printed circuit board of the electronic doorbell in response to the visitor pressing the button.

In the first state, the electronic switch assembly may allow the first electricity to pass through the electronic switch assembly. In several embodiments, the electronic switch assembly may be mechanically coupled to the electronic chime. Some embodiments of the doorbell system may comprise a plastic housing. The electronic chime and the electronic switch assembly may be located inside the plastic housing. The electronic doorbell may be located outside of the plastic housing and in a remote location relative to the plastic housing.

Several embodiments of the doorbell system may further include a remote computing device configured to receive a predetermined amount of time from a user. The predetermined amount of time may define an amount of time that the second electricity is maintained above the first threshold.

In some embodiments, the electronic switch assembly may comprise a first electronic switch and a second electronic switch that is electrically coupled to the first electronic switch. In response to the first electricity: 1) the first electronic switch may allow the first electricity to flow through the electronic switch assembly and may not allow the first electricity to flow to the electronic chime, and 2) the second electronic switch may not allow the first electricity to flow to the electronic chime. In response to the second electricity, the first and second electronic switches may allow the second electricity to flow through the electronic chime. In several embodiments, the first electronic switch may comprise a double pole, single throw switch, and the second electronic switch may comprise a single pole, single throw switch.

In some embodiments, when the first electronic switch is in a first position, the first electronic switch may electrically connect the transformer and the electronic doorbell, and when the first electronic switch is in a second position, the first electronic switch may electrically connect the transformer and the electronic chime. As well, when the second electronic switch is in an open position, the second electronic switch may electrically disconnect the electronic doorbell and the electronic chime, and when the second electronic switch is in a closed position, the second electronic switch may electrically connect the electronic doorbell and the electronic chime. In some embodiments, when the first electronic switch is in the first position, the second electronic switch is in the open position, and when the first electronic switch is in the second position, the second electronic switch is in the closed position.

In several embodiments, when the first electronic switch is in a first position, the first electronic switch may electrically connect the transformer and the electronic doorbell, and when the first electronic switch is in a second position, the first electronic switch electrically connects the electronic chime and the electronic doorbell. As well, when the second electronic switch is in an open position, the second electronic switch electrically disconnects the transformer and the electronic chime, and when the second electronic switch is in a closed position, the second electronic switch electrically connects the transformer and the electronic chime. In some embodiments, when the first electronic switch is in the first position, the second electronic switch is in the open position. Furthermore, when the first electronic switch is in the second position, the second electronic switch may be in the closed position.

In some embodiments, the electronic switch assembly comprises a first electronic switch, a second electronic switch electrically connected to the first electronic switch, and a third electronic switch electrically connected to the first and second electronic switches, wherein in response to the first electricity: 1) the first electronic switch allows the first electricity to flow through the electronic switch assembly and does not allow the first electricity to flow to the electronic chime, and 2) the second and third electronic switches do not allow the first electricity to flow to the electronic chime. As well, in response to the second electricity: 1) the first electronic switch does not allow the second electricity to flow through the electronic switch assembly, and 2) the second and third electronic switches allow the second electricity to flow to the electronic chime. In several embodiments, the first electronic switch comprises a first single

pole, single throw switch, the second electronic switch comprises a second single pole, single throw switch, and the third electronic switch comprises a third single pole, single throw switch.

In some embodiments, when the first electronic switch is in a closed position, the first electronic switch electrically connects the transformer and the electronic doorbell, and when the first electronic switch is in an open position, the first electronic switch electrically disconnects the transformer and the electronic doorbell. When the second electronic switch is in a closed position, the second electronic switch electrically connects the transformer and the electronic chime, and when the second electronic switch is in an open position, the second electronic switch electrically disconnects the transformer and the electronic chime. Accordingly, when the third electronic switch is in a closed position, the third electronic switch electrically connects the electronic doorbell and the electronic chime, and when the third electronic switch is in an open position, the third electronic switch electrically disconnects the electronic doorbell and the electronic chime.

Furthermore, in several embodiments of the doorbell system, when the first electronic switch is in the closed position, the second and third electronic switches are each in the open position. As well, when the first electronic switch is in the open position, the second and third electronic switches are each in the closed position.

Some embodiments include a doorbell system that includes an electronic doorbell comprising a camera and a button, wherein the camera is configurable to visually detect a visitor and the button is configurable to enable the visitor to sound an electronic chime, a printed circuit board electrically coupled to the electronic doorbell and a transformer, and an electronic chime electrically coupled to the printed circuit board and mechanically coupled to the printed circuit board. The electronic chime may comprise a speaker configurable to emit a notification sound in response to the visitor pressing the button of the electronic doorbell. The printed circuit board may be configured to block a first electricity that is less than a first threshold from entering the electronic chime. The first electricity does not cause the electronic chime to emit the notification sound. As well, the printed circuit board may be configured to allow the first electricity to pass through the printed circuit board.

In some embodiments, the printed circuit board is configured to allow a second electricity that is greater than the first threshold to enter the electronic chime. The second electricity may cause the electronic chime to emit the notification sound.

In several embodiments the printed circuit board comprises a base portion that defines a length that extends along a first direction and a width that extends along a second direction that is opposite the first direction. In some embodiments the length may be greater than the width. The printed circuit board may further comprise three tabs that extend from the length along the second direction. In some embodiments, each of the three tabs includes an aperture that extends through each of the three tabs along a third direction that is opposite the first direction and the second direction. In several embodiments, each of the apertures is configured to receive a threaded fastener, and wherein the printed circuit board is mechanically coupled to the electronic chime via three threaded fasteners.

In some embodiments, the printed circuit board is a first printed circuit board. The electronic doorbell may comprise a second printed circuit board configured to block the second electricity from entering the second printed circuit board of the electronic doorbell in response to the visitor pressing the button.

Furthermore, some embodiments include a method for using a doorbell system, wherein the doorbell system comprises an electronic doorbell, an electronic chime, and a remote computing device. The method may include obtaining the electronic doorbell that comprises a camera and a button, wherein the button is configurable to enable a visitor to sound an electronic chime, wherein the electronic chime comprises a speaker configurable to emit a notification sound in response to the visitor pressing the button of the electronic doorbell, electrically coupling an electronic switch assembly to the electronic chime; electrically coupling the electronic doorbell to the electronic switch assembly, configuring the electronic switch assembly so that a first electricity that is less than a first threshold passes through the electronic switch assembly without entering the electronic chime, wherein the first electricity does not cause the electronic chime to emit the notification sound, wherein the electronic switch assembly blocks the first electricity from passing through the electronic chime in response to the first electricity being less than the first threshold. Several embodiments include configuring the electronic switch assembly so that the electronic switch assembly causes a second electricity that is greater than the first threshold to pass through the electronic chime to cause the electronic chime to emit the notification sound, wherein the electronic switch assembly causes the second electricity to pass through the electronic chime in response to the second electricity being greater than the first threshold.

In several embodiments, the method may further include mechanically coupling the electronic switch assembly to the electronic chime. As well, some embodiments may include configuring an electrical circuit so that a third electricity passes from a transformer to the electronic doorbell to the electronic switch assembly and then back to the transformer without entering the electronic chime in response to the third electricity being less than first threshold. Some embodiments may also include configuring the electrical circuit so that a fourth electricity passes from the transformer to the electronic doorbell and to the electronic switch assembly. The fourth electricity may be diverted from the electronic switch assembly into the electronic chime and then back into the electronic switch assembly in response to the fourth electricity being greater than the first threshold. The electronic doorbell and the electronic switch assembly may be in series in the electrical circuit.

In many embodiments, the electronic chime comprises a digital chime having a first printed circuit board, and the method may further include configuring the first printed circuit board to enable the electronic chime to emit the notification sound from the speaker based on digital music data. In several embodiments, the electronic doorbell comprises a second printed circuit board, and the method may further include routing at least a portion of the first electricity through the second printed circuit board of the electronic doorbell. The method may further include blocking the second electricity from entering the second printed circuit board of the electronic doorbell in response to the visitor pressing the button. As well, the method may include causing the second electricity to be greater than the first threshold in response to the visitor pressing the button of the electronic doorbell.

In several embodiments the doorbell system comprises a plastic housing. The method may further include placing the electronic chime and the electronic switch assembly inside the plastic housing. As well, the method may include placing the electronic doorbell outside of the plastic housing and in a remote location relative to the plastic housing.

Several embodiments may further include using the electronic switch assembly to block transformer electrical power from entering the electronic chime while the first electricity is less than the first threshold. As well, the method may include using the electronic switch assembly to divert the transformer electrical power from the electronic switch assembly into the electronic chime while the second electricity is greater than the first threshold.

In some embodiments, the first threshold is a first electrical power threshold. In several embodiments the first threshold is a first electrical voltage threshold. In some embodiments the first threshold is a first electrical current threshold.

In several embodiments, the method may further include setting a predetermined amount of time via the remote computing device prior to the second electricity exceeding the first threshold. The method may include sending the predetermined amount of time wirelessly from the remote computing device to the electronic doorbell. Once the second electricity is greater than the first threshold, the method may further include maintaining the second electricity above the first threshold for the predetermined amount of time.

Some embodiments include another method for using a doorbell system, wherein the doorbell system comprises an electronic doorbell, an electronic chime, and a remote computing device. The method may include obtaining the electronic doorbell that comprises a camera and a button, wherein the button is configurable to enable a visitor to sound an electronic chime, wherein the electronic chime comprises a speaker configurable to emit a notification sound in response to the visitor pressing the button of the electronic doorbell. The method may include mechanically coupling a printed circuit board to the electronic chime and electrically coupling the printed circuit board to the electronic chime. As well, the method may include electrically coupling the electronic doorbell to the printed circuit board and configuring the printed circuit board so that the printed circuit board allows a first electricity to pass through the printed circuit board in response to the first electricity being less than the threshold. The method may also include configuring the printed circuit board so that the printed circuit board blocks the first electricity from entering the electronic chime in response to the first electricity being less than the first threshold, wherein the first electricity does not cause the electronic chime to emit the notification sound.

In several embodiments, the printed circuit board may be a first printed circuit board, and the electronic doorbell may comprise a second printed circuit board. The method may further include routing at least a portion of the first electricity through the second printed circuit board of the electronic doorbell. The method may also include configuring the second printed circuit board to block the second electricity from entering the second printed circuit board of the electronic doorbell in response to the visitor pressing the button.

In some embodiments, the method may further include configuring the printed circuit board so that the printed circuit board causes a second electricity that is greater than the first threshold to enter the electronic chime to cause the electronic chime to emit the notification sound. The printed circuit board may cause the second electricity to pass through the electronic chime in response to the second electricity being greater than the first threshold.

Several embodiments may further include using the remote computing device to set a predetermined amount of time for the second electricity to stay above the first threshold. As well, the methods may include wirelessly sending the predetermined amount from the remote computing device to the electronic doorbell. In response to the second electricity being greater than the first threshold, the method may include using the electronic doorbell to maintain the second electricity above the first threshold for the predetermined amount of time.

In some embodiments, the doorbell system may include a plastic housing, and the electronic chime and the electronic switch assembly may be located inside the plastic housing and the electronic doorbell may be located outside of the plastic housing and in a remote location relative to the plastic housing.

Some embodiments include using a doorbell system. The doorbell system may comprise an electronic doorbell, an electronic chime, and a remote computing device. The method may include obtaining the electronic doorbell that comprises a camera and a button. The button may be configurable to enable a visitor to sound an electronic chime, wherein the electronic chime comprises a speaker configurable to emit a notification sound in response to the visitor pressing the button of the electronic doorbell. The method may include mechanically coupling a printed circuit board to the electronic chime and electrically coupling the printed circuit board to the electronic chime. As well, the method may include electrically coupling the electronic doorbell to the printed circuit board. The method may also include configuring the electronic switch assembly so that the electronic switch assembly causes a second electricity that is greater than the first threshold to pass through the electronic chime to cause the electronic chime to emit the notification sound. The electronic switch assembly may cause the second electricity to pass through the electronic chime in response to the second electricity being greater than the first threshold.

In several embodiments, the printed circuit board is a first printed circuit board, and the electronic doorbell comprises a second printed circuit board. The method may further include

routing at least a portion of the first electricity through the second printed circuit board of the electronic doorbell. The method may also include configuring the second printed circuit board to block the second electricity from entering the second printed circuit board of the electronic doorbell in response to the visitor pressing the button.

Many embodiments may further include maintaining the second electricity above the first threshold for a predetermined amount of time. In several embodiments, the method may include setting the predetermined amount of time via the remote computing device prior to the second electricity exceeding the first threshold, and sending the predetermined amount of time wirelessly from the remote computing device to the electronic doorbell.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages are described below with reference to the drawings, which are intended to illustrate, but not to limit, the invention. In the drawings, like reference characters denote corresponding features consistently throughout similar embodiments.

Figure 1 illustrates a front view of a communication system, according to some embodiments.

Figure 2 illustrates a computing device running software, according to some embodiments.

Figure 3 illustrates an embodiment in which a security system is connected to a building, according to some embodiments.

Figure 4 illustrates a schematic view of a doorbell system, according to some embodiments.

Figure 5 illustrates a schematic view of the doorbell system from Figure 4 with a switch assembly in a first state, according to some embodiments.

Figure 6 illustrates a schematic view of the doorbell system from Figure 4 with the switch assembly in a second state, according to some embodiments.

Figure 7 illustrates a schematic view of a doorbell system, according to some embodiments.

Figure 8 illustrates a schematic view of the switch assembly from Figure 7 with the switch assembly in a first state, according to some embodiments.

Figure 9 illustrates a schematic view of the switch assembly from Figure 7 with the switch assembly in a second state, according to some embodiments.

Figure 10 illustrates a schematic view of a doorbell system, according to some embodiments.

Figure 11 illustrates a schematic view of the switch assembly from Figure 10 with the switch assembly in a first state, according to some embodiments.

Figure 12 illustrates a schematic view of the switch assembly from Figure 10 with the switch assembly in a second state, according to some embodiments.

Figure 13 illustrates an electronic switch assembly, according to some embodiments.

Figures 14-16 illustrate flow-charts of various methods of using a doorbell system, according to some embodiments.

DETAILED DESCRIPTION

Although certain embodiments and examples are disclosed below, inventive subject matter extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses, and to modifications and equivalents thereof. Thus, the scope of the claims appended hereto is not limited by any of the particular embodiments described below. For example, in any method or process disclosed herein, the acts or operations of the method or process may be performed in any suitable sequence and are not necessarily limited to any particular disclosed sequence. Various operations may be described as multiple discrete operations in turn, in a manner that may be helpful in understanding certain embodiments; however, the order of description should not be construed to imply that these operations are order dependent. Additionally, the structures, systems, and/or devices described herein may be embodied as integrated components or as separate components.

For purposes of comparing various embodiments, certain aspects and advantages of these embodiments are described. Not necessarily all such aspects or advantages are achieved by any particular embodiment. Thus, for example, various embodiments may be carried out in a manner that achieves or optimizes one advantage or group of advantages as taught herein without necessarily achieving other aspects or advantages as may also be taught or suggested herein.

Buildings often have doorbell buttons located at points of entry. The doorbell buttons may be electrically connected to a chime located inside the building. Accordingly, when a visitor

presses the doorbell button, this may cause a notification sound to be emitted from the chime to thereby alert the building occupants of the visitor's arrival. It should be appreciated that the chime may be available as an analog chime or digital chime.

Digital chimes may include a circuit board containing music data and a speaker configured to play a song. Digital chimes may require electricity over a longer period of time than analog chimes. Accordingly, digital chimes may require additional electrical components that may not be available in an analog chime system. As such, various embodiments described herein provide methods of use and systems of electronic doorbells and digital doorbell chimes.

DOORBELL SYSTEM EMBODIMENTS

Communication systems can provide a secure and convenient way for a remotely located individual to communicate with a person who is approaching a sensor, such as a proximity sensor or motion sensor, or with a person who rings a doorbell, which can be located in a doorway, near an entrance, or within 15 feet of a door. Some communication systems allow an individual to hear, see, and talk with visitors who approach at least a portion of the communication system and/or press a button, such as a doorbell's button. For example, communication systems can use a computing device to enable a remotely located person to see, hear, and/or talk with visitors. Computing devices can include computers, laptops, tablets, mobile devices, smartphones, cellular phones, and wireless devices (e.g., cars with wireless communication). Example computing devices include the iPhone, iPad, iMac, MacBook Air, and MacBook Pro made by Apple Inc. Communication between a remotely located person and a visitor can occur via the Internet, cellular networks, telecommunication networks, and wireless networks.

Figure 1 illustrates a front view of a communication system embodiment. The communication system 200 can include a security system 202 (e.g., a doorbell) and a computing device 204. Although the illustrated security system 202 includes many components in one housing, several security system embodiments include components in separate housings. The security system 202 can include a camera assembly 208 and a doorbell button 212. The camera assembly 208 can be a video camera, which in some embodiments is a webcam. The security system 202 can include a diagnostic light 216 and a power indicator light 220. In some embodiments, the diagnostic light 216 is a first color (e.g., blue) if the security system 202 and/or

the communication system 200 is connected to a wireless Internet network and is a second color (e.g., red) if the security system 202 and/or the communication system 200 is not connected to a wireless Internet network. In some embodiments, the power indicator 220 is a first color if the security system 202 is connected to a power source. The power source can be power supplied by the building to which the security system 202 is attached. In some embodiments, the power indicator 220 is a second color or does not emit light if the security system 202 is not connected to the power source.

The security system 202 (e.g., a doorbell) can include an outer housing 224, which can be water resistant and/or waterproof. The outer housing can be made from metal or plastic, such as molded plastic with a hardness of 60 Shore D. In some embodiments, the outer housing 224 is made from brushed nickel or aluminum.

Rubber seals can be used to make the outer housing 224 water resistant or waterproof. The security system 202 can be electrically coupled to a power source, such as wires electrically connected to a building's electrical power system. In some embodiments, the security system 202 includes a battery for backup and/or primary power.

Wireless communication 230 can enable the security system 202 (e.g., a doorbell) to communicate with the computing device 204. Some embodiments enable communication via cellular and/or WiFi networks. Some embodiments enable communication via the Internet. Several embodiments enable wired communication between the security system 202 and the computing device 204. The wireless communication 230 can include the following communication means: radio, WiFi (e.g., wireless local area network), cellular, Internet, Bluetooth, telecommunication, electromagnetic, infrared, light, sonic, and microwave. Other communication means are used by some embodiments. In some embodiments, such as embodiments that include telecommunication or cellular communication means, the security system 202 can initiate voice calls or send text messages to a computing device 204 (e.g., a smartphone, a desktop computer, a tablet computer, a laptop computer).

Some embodiments include computer software (e.g., application software), which can be a mobile application designed to run on smartphones, tablet computers, and other mobile devices. Software of this nature is sometimes referred to as "app" software. Some embodiments include software designed to run on desktop computers and laptop computers.

The computing device 204 can run software with a graphical user interface. The user interface can include icons or buttons. In some embodiments, the software is configured for use with a touch-screen computing device such as a smartphone or tablet.

Figure 2 illustrates a computing device 204 running software. The software includes a user interface 240 displayed on a display screen 242. The user interface 240 can include a security system indicator 244, which can indicate the location of the security system that the user interface is displaying. For example, a person can use one computing device 204 to control and/or interact with multiple security systems, such as one security system located at a front door and another security system located at a back door. Selecting the security system indicator 244 can allow the user to choose another security system (e.g., the back door security system rather than the front door security system).

The user interface 240 can include a connectivity indicator 248. In some embodiments, the connectivity indicator can indicate whether the computing device is in communication with a security system, the Internet, and/or a cellular network. The connectivity indicator 248 can alert the user if the computing device 204 has lost its connection with the security system 202; the security system 202 has been damaged; the security system 202 has been stolen; the security system 202 has been removed from its mounting location; the security system 202 lost electrical power; and/or if the computing device 204 cannot communicate with the security system 202. In some embodiments, the connectivity indicator 248 alerts the user of the computing device 204 by flashing, emitting a sound, displaying a message, and/or displaying a symbol.

In some embodiments, if the security system 202 loses power, loses connectivity to the computing device 204, loses connectivity to the Internet, and/or loses connectivity to a remote server, a remote server 206 sends an alert (e.g., phone call, text message, image on the user interface 240) regarding the power and/or connectivity issue. In several embodiments, the remote server 206 can manage communication between the security system 202 and the computing device. In some embodiments, information from the security system 202 is stored by the remote server 206. In several embodiments, information from the security system 202 is stored by the remote server 206 until the information can be sent to the computing device 204, uploaded to the computing device 204, and/or displayed to the remotely located person via the computing device 204. The remote server 206 can be a computing device that stores information from the security

system 202 and/or from the computing device 204. In some embodiments, the remote server 206 is located in a data center.

In some embodiments, the computing device 204 and/or the remote server 206 attempts to communicate with the security system 202. If the computing device 204 and/or the remote server 206 is unable to communicate with the security system 202, the computing device 204 and/or the remote server 206 alerts the remotely located person via the software, phone, text, a displayed message, and/or a website. In some embodiments, the computing device 204 and/or the remote server 206 attempts to communicate with the security system 202 periodically; at least every five hours and/or less than every 10 minutes; at least every 24 hours and/or less than every 60 minutes; or at least every hour and/or less than every second.

In some embodiments, the server 206 can initiate communication to the computer device 204 and/or to the security system 202. In several embodiments, the server 206 can initiate, control, and/or block communication between the computing device 204 and the security system 202.

In several embodiments, a user can log into an "app," website, and/or software on a computing device (e.g., mobile computing device, smartphone, tablet, desktop computer) to adjust the security system settings discussed herein.

In some embodiments, a computing device can enable a user to watch live video and/or hear live audio from a security system due to the user's request rather than due to actions of a visitor. Some embodiments include a computing device initiating a live video feed (or a video feed that is less than five minutes old).

In some embodiments, the user interface 240 displays an image 252 such as a still image or a video of an area near and/or in front of the security system 202. The image 252 can be taken by the camera assembly 208 and stored by the security system 202, server 206, and/or computing device 204. The user interface 240 can include a recording button 256 to enable a user to record images, videos, and/or sound from the camera assembly 208, microphone of the security system 202, and/or microphone of the computing device 204.

In several embodiments, the user interface 240 includes a picture button 260 to allow the user to take still pictures and/or videos of the area near and/or in front of the security system 202. The user interface 240 can also include a sound adjustment button 264 and a mute button 268. The user interface 240 can include camera manipulation buttons such as zoom, pan, and light

adjustment buttons. In some embodiments, the camera assembly 208 automatically adjusts between Day Mode and Night Mode. Some embodiments include an infrared camera and/or infrared lights to illuminate an area near the security system 202 to enable the camera assembly 208 to provide sufficient visibility (even at night).

In some embodiments, buttons include diverse means of selecting various options, features, and functions. Buttons can be selected by mouse clicks, keyboard commands, and touching a touch screen. Many embodiments include buttons that can be selected without touch screens.

In some embodiments, the user interface 240 includes a quality selection button, which can allow a user to select the quality and/or amount of the data transmitted from the security system 202 to the computing device 204 and/or from the computing device 204 to the security system 202.

In some embodiments, video can be sent to and/or received from the computing device 204 using video chat protocols such as FaceTime (by Apple Inc.) or Skype (by Microsoft Corporation). In some embodiments, these videos are played by videoconferencing apps on the computing device 204 instead of being played by the user interface 240.

The user interface 240 can include a termination button 276 to end communication between the security system 202 and the computing device 204. In some embodiments, the termination button 276 ends the ability of the person located near the security system 202 (i.e., the visitor) to hear and/or see the user of the computing device 204, but does not end the ability of the user of the computing device 204 to hear and/or see the person located near the security system 202.

In some embodiments, a button 276 is both an answer button (to accept a communication request from a visitor) and is a termination button (to end communication between the security system 202 and the computing device 204). The button 276 can include the word “Answer” when the system is attempting to establish two-way communication between the visitor and the user. Selecting the button 276 when the system is attempting to establish two-way communication between the visitor and the user can start two-way communication. The button 276 can include the words “End Call” during two-way communication between the visitor and the user. Selecting the button 276 during two-way communication between the visitor and the user can terminate two-way communication. In some embodiments, terminating two-way

communication still enables the user to see and hear the visitor. In some embodiments, terminating two-way communication causes the computing device 204 to stop showing video from the security system and to stop emitting sounds recorded by the security system.

In some embodiments, the user interface 240 opens as soon as the security system detects a visitor (e.g., senses indications of a visitor). Once the user interface 240 opens, the user can see and/or hear the visitor even before "answering" or otherwise accepting two-way communication, in several embodiments.

Some method embodiments include detecting a visitor with a security system. The methods can include causing the user interface to display on a remote computing device 204 due to the detection of the visitor (e.g., with or without user interaction). The methods can include displaying video from the security system and/or audio from the security system before the user accepts two-way communication with the visitor. The methods can include displaying video from the security system and/or audio from the security system before the user accepts the visitor's communication request. The methods can include the computing device simultaneously asking the user if the user wants to accept (e.g., answer) the communication request and displaying audio and/or video of the visitor. For example, in some embodiments, the user can see and hear the visitor via the security system before opening a means of two-way communication with the visitor.

In some embodiments, the software includes means to start the video feed on demand. For example, a user of the computing device might wonder what is happening near the security system 202. The user can open the software application on the computing device 204 and instruct the application to show live video and/or audio from the security device 202 even if no event near the security system 202 has triggered the communication.

In several embodiments, the security device 202 can be configured to record when the security device 202 detects movement and/or the presence of a person. The user of the computing device 204 can later review all video and/or audio records when the security device 202 detected movement and/or the presence of a person.

Referring now to Figure 1, in some embodiments, the server 206 controls communication between the computing device 204 and the security system 202, which can be a doorbell with a camera, a microphone, and a speaker. In several embodiments, the server 206 does not control communication between the computing device 204 and the security system 202.

In some embodiments, data captured by the security system and/or the computing device 204 (such as videos, pictures, and audio) is stored by another remote device such as the server 206. Cloud storage, enterprise storage, and/or networked enterprise storage can be used to store video, pictures, and/or audio from the communication system 200 or from any part of the communication system 200. The user can download and/or stream stored data and/or storage video, pictures, and/or audio. For example, a user can record visitors for a year and then later can review conversations with visitors from the last year. In some embodiments, remote storage, the server 206, the computing device 204, and/or the security system 202 can store information and statistics regarding visitors and usage.

Figure 3 illustrates an embodiment in which a security system 202 is connected to a building 300, which can include an entryway 310 that has a door 254. A door lock 250 can be configured to lock and unlock the door 254. Electrical wires 304 can electrically couple the security system 202 to the electrical system of the building 300 so that the security system 202 can receive electrical power from the building 300.

A wireless network 308 can allow devices to wirelessly access the Internet. The security system 202 can access the Internet via the wireless network 308. The wireless network 308 can transmit data from the security system 202 to the Internet, which can transmit the data to remotely located computing devices 204. The Internet and wireless networks can transmit data from remotely located computing devices 204 to the security system 202. In some embodiments, a security system 202 connects to a home's WiFi.

As illustrated in Figure 3, one computing device 204 (e.g., a laptop, a smartphone, a mobile computing device, a television) can communicate with multiple security systems 202. In some embodiments, multiple computing devices 204 can communicate with one security system 202. In some embodiments, the security system 202 can communicate (e.g., wirelessly 230) with a television 306, which can be a smart television. Users can view the television 306 to see a visitor and/or talk with the visitor.

Figures 4-12 illustrate several embodiments of doorbell systems that include electronic switch assemblies for blocking and/or allowing electricity to enter an electronic chime 412 (e.g. a digital chime). In the example shown in Figure 4, the doorbell system 400 includes a security system 202 (e.g. electronic doorbell) that comprises a camera and a button. The camera may be configurable to visually detect a visitor. As well, the button may be configurable to enable the

visitor to sound an electronic chime 412. In this manner, the electronic chime 412 may comprise a speaker configurable to emit a notification sound 430 in response to the visitor pressing the button of the security system 202

The doorbell system 400 may also include an electronic switch assembly 410 electrically coupled to the security system 202 and a transformer 424. As well, the electronic chime 412 may be electrically coupled to the electronic switch assembly 410. In many embodiments, the electronic chime 412 may also be mechanically coupled to the electronic switch assembly 410.

It should be appreciated that the electronic switch assembly 410 also may be referred to as a printed circuit board. The printed circuit board may be configured to enable the electronic chime 412 to emit the notification sound 430 from the speaker based on digital music data.

With reference to Figures 5-6, 8-9 and 11-12 the electronic switch assembly 410 may define a first state and a second state. The first state may occur in response to a first electricity 450 that is less than a first threshold. In the first state the electronic switch assembly 410 may block the first electricity 450 from passing through the electronic chime 412 so the electronic chime 412 does not emit the notification sound 430. Stated differently, the printed circuit board may be configured to block the first electricity 450 that is less than the first threshold from entering the electronic chime 412. In this regard, the electronic switch assembly 410 may allow the first electricity 450 to pass through the electronic switch assembly 410 from the security system 202 through the electronic switch assembly 410 to the transformer 424, without entering the electronic chime 412. It should be appreciated that the first threshold may be the amount of electricity required to activate the electronic chime 412 to emit the notification sound 430.

Furthermore, the second state may occur in response to a second electricity 452 that is greater than the first threshold. In the second state the electronic switch assembly 410 may allow the second electricity 452 to pass through the electronic chime 412 so that the electronic chime 412 emits the notification sound 430. In other words, the electronic switch assembly 410, or printed circuit board, may be configured to allow the second electricity 452 that is greater than the first threshold to enter the electronic chime 412. The second electricity 452 may cause the electronic chime 412 to emit the notification sound 430.

Referring now to Figure 5, the switch assembly 410 can be placed inside of a housing 415, which can also contain the electronic chime 412. The switch assembly 410 and the electronic chime 412 can be mechanically coupled to the housing 415. The housing 415 can be a

plastic housing with a hollow internal portion that contains the electronic chime 412 and the switch assembly 410. At least one screw can mechanically couple the switch assembly inside of the housing 415.

The electronic doorbell (e.g., the security system 202) can be located outside of the housing 415. In some embodiments, the electronic doorbell is placed outside of a building 300 (shown in Figure 3) while the housing 415 is placed inside of the building 300. The electronic doorbell and the housing 415 can be coupled to walls of the building 300. The electronic doorbell can be in a remote location relative to the housing 415 (e.g., the doorbell is located outside while the plastic housing 415 is located inside of the building). The doorbell, the electronic chime 412, and the switch assembly 410 can all be configured to be electrically coupled to the same building power supply 420 even when the doorbell is located in the remote location relative to the housing 415.

Some embodiments may implement switches to execute routing the first electricity 450 and second electricity 452. For example, as illustrated in Figures 7-9, the electronic switch assembly 410 may comprise a first electronic switch 414a and a second electronic switch 416a that is electrically coupled to the first electronic switch 414a. The first and second switches 414a and 416a may perform different functions in response to receiving the first electricity 450a or the second electricity 452a. For example, and as illustrated in Figure 8, in response to the first electricity 450a, the first electronic switch 414a may allow the first electricity 450a to flow through the electronic switch assembly 410a and may not allow the first electricity 450a to flow through the electronic chime 412. As well, in response to the first electricity 450a, the second electronic switch 416a does not allow the first electricity 450a to flow through the electronic chime 412. Furthermore, as illustrated in Figure 9, in response to the second electricity 452a, the first and second electronic switches 414a and 416a allow the second electricity 452a to flow through the electronic chime 412.

As further illustrated in Figures 8-9, the first and second switches 414a and 416a may be configured to implement different operations based on their respective positions. For example, as illustrated in Figure 8, when the first electronic switch 414a is in a first position, the first electronic switch 414a may electrically connect the transformer 424 and the security system 202. Likewise, as illustrated in Figure 9, when the first electronic switch 414a is in a second position,

the first electronic switch 414a may electrically connect the transformer 424 and the electronic chime 412.

In some embodiments, the locations of the first and second switches 414a and 416a may be reversed, as such, when the first electronic switch 414a is in the second position, the first electronic switch 414a may electrically connect the electronic chime 412 and the security system 202. However, it should be appreciated that even in a reverse configuration, the first and second switches 414a and 416a may effectively achieve the same objective as that illustrated and described with respect to Figures 8 and 9.

With reference to Figure 8, when the second electronic switch 416a is in an open position, the second electronic switch 416a may electrically disconnect the security system 202 and the electronic chime 412. When the second electronic switch 416a is in the open position, the second electronic switch 416a does not allow the first electricity 450a to flow to the electronic chime 412. As shown in Figure 9, when the second electronic switch 416a is in a closed position, the second electronic switch 416a may electrically connect the security system 202 and the electronic chime 412. In this position, the second electronic switch 416a may allow the first electricity 450a to flow to the electronic chime 412. As well, in some embodiments, when the second electronic switch 416a is in the open position, the second electronic switch 416a may electrically disconnect the transformer 424 and the electronic chime 412. Accordingly, when the second electronic switch 416a is in the closed position, the second electronic switch 416a may electrically connect the transformer 424 and the electronic chime 412.

The position of the first and second switches 414a and 416a, may be dependent on the position of the other switch. For example, as shown in Figure 8, when the first electronic switch 414a is in the first position, the second electronic switch 416a may be in the open position. Furthermore, as illustrated in Figure 9, when the first electronic switch 414a is in the second position, the second electronic switch 416a may be in the closed position.

While some embodiments may implement two electronic switches, it should be appreciated that any number of electronic switches less than or greater than two may be implemented. For example, as illustrated in Figures 10-12, the electronic switch assembly 410b may comprise a first electronic switch 414b, a second electronic switch 416b electrically connected to the first electronic switch 414b, and a third electronic switch 418b electrically connected to the first and second electronic switches 414b and 416b.

Similar to the two-switch embodiment, the first, second and third switches 414b, 416b and 418b may move to various positions in response to receiving the first electricity 450b or the second electricity 452b. For example, with reference to Figure 11, in response to the first electricity 450b, the first electronic switch 414b may allow the first electricity 450b to flow through the electronic switch assembly 410b and may not allow the first electricity 450b to flow to the electronic chime 412. As well, the second and third electronic switches 416b and 418b may not allow the first electricity 450b to flow to the electronic chime 412. With reference to Figure 12, in response to the second electricity 452b, the first electronic switch 414b may not allow the second electricity 452b to flow through the electronic switch assembly 410b, and the second and third electronic switches 416b and 418b may allow the second electricity 452b to flow through the electronic chime 412.

Similar to the two-switch example as illustrated in Figures 7-9, the first, second and third switches 414b, 416b and 418b may be configured to implement different operations based on their respective positions. For example, as illustrated in Figure 11, when the first electronic switch 414b is in a closed position, the first electronic switch 414b electrically connects the transformer 424 and the security system 202. Likewise, as illustrated in Figure 12, when the first electronic switch 414b is in an open position, the first electronic switch 414b electrically disconnects the transformer 424 and the security system 202.

With continued reference to Figure 12, when the second electronic switch 416b is in a closed position, the second electronic switch 416b electrically connects the transformer 424 and the electronic chime 412. Now with reference to Figure 11, when the second electronic switch 416b is in an open position, the second electronic switch 416b electrically disconnects the transformer 424 and the electronic chime 412.

As illustrated in Figure 12, when the third electronic switch 418b is in a closed position, the third electronic switch 418b electrically connects the security system 202 and the electronic chime 412. Furthermore, as shown in Figure 11, when the third electronic switch 418b is in an open position, the third electronic switch 418b electrically disconnects the security system 202 and the electronic chime 412.

As well, the position of the first, second and third switches 414b, 416b and 418b, may be dependent on the position of the other switch(es). For example, as shown in Figure 11, when the first electronic switch 414b is in the closed position, the second and third electronic switches

416b and 418b may each be in the open position. Furthermore, as illustrated in Figure 12, when the first electronic switch 414b is in the open position, the second and third electronic switches 416b and 418b each may be in the closed position.

It should be appreciated that the first electronic switch 414a and the second electronic switch 416a may comprise any electrical component configured to route electricity or limit the amount of electricity flow, such as a resistor. For example, in some embodiments, such as the two-switch embodiment illustrated in Figures 7-9, the first electronic switch 414a may comprise a double pole, single throw switch, and the second electronic switch 416a may comprise a single pole, single throw switch. As well, in some embodiments, such as the three-switch embodiment, the first, second and third electronic switches 414b, 416b and 418b may each comprise a single pole, single throw switch.

The electronic switch assembly 410, or the printed circuit board, may be arranged and configured in various sizes and geometries. For example, as illustrated in Figure 13, the electronic switch assembly 410 may comprise a base portion that defines a length that extends along a first direction and a width that extends along a second direction that is opposite the first direction. In some embodiments, the electronic switch assembly 410 may define a rectangular shape, wherein the length is greater than the width. As well, in some embodiments the electronic switch assembly 410 may further include three tabs 510 that may extend from the length along the second direction. As such, electronic switch assembly 410 embodiments viewed from the top down may appear to have a footprint of a capital “E.” However, it should be appreciated that the electronic switch assembly 410 may be arranged and configured to define any shape.

With continued reference to Figure 13, each of the three tabs 510 may include an aperture 512 that extends through each of the three tabs 510 along a third direction that is opposite the first direction and the second direction. Each of the apertures 512 may be configured to receive a threaded fastener. In this manner, the electronic switch assembly 410 may be mechanically coupled to the electronic chime 412 via three threaded fasteners. In other words, each of the threaded fasteners may extend through a respective aperture 512 and mechanically engage the electronic chime 412 to mechanically couple the electronic switch assembly 410 to the electronic chime 412. It should be appreciated that electronic switch assembly 410 may include any number of apertures less than or greater than three and, accordingly, may be mechanically fastened to the

electronic chime 412 via any number of mechanical fasteners, such as threaded fasteners, or the like.

In some embodiments, the doorbell system comprises a housing and the electronic chime 412 and the electronic switch assembly 410 are located inside the housing. As well, the security system 202 may be located outside of the housing, in a remote location relative to the housing. For example the security system 202 may be located adjacent a doorway or an entry or point of a building, such as along an exterior wall adjacent a door. However, it should be appreciated that either or both the security system 202 and the housing may be located inside or outside the building. As well, in some embodiments, the housing is a plastic housing. However, it should be appreciated that the housing may comprise any type of material configured to safely house electronic components inside or outside a building.

As well, several embodiments further include a remote computing device 204. The remote computing device can be configured to send and receive information to and from the security system 202. In several embodiments, the information may include the first threshold. For example, the remote computing device 204 may be used to adjust the level of the first threshold. For example, if the user wishes to adjust the first threshold from 12 volts to 14 volts, the user may do so by using the remote computing device 204. As well, the remote computing device 204 may be used to change the first threshold to voltage, current, power, or the like. In this regard, the switch assembly 410 may include logic circuitry so it can be programmed according to the information as established by the remote computing device 204.

As well, in several embodiments, the information may include a predetermined amount of time that the second electricity is maintained above the first threshold. In other words, the predetermined amount of time may determine the amount of time the electronic chime 412 emits the notification sound 430. For example, if the notification sound 430 is a song, the predetermined amount of time may determine the amount of time that the song plays when a visitor has pressed the button of the security system 202. It should be appreciated that the predetermined amount of time may be any amount of time, such as 3 seconds, 5 seconds, 10 seconds, 30 seconds, 60 seconds, or any other amount of time.

DOORBELL METHOD EMBODIMENTS

Many embodiments utilize the doorbell system embodiments as previously described. For example, several embodiments include a method for using a doorbell system. The doorbell system may include an electronic doorbell, an electronic chime, and a remote computing device. As illustrated in Figure 14, the method may include obtaining the electronic doorbell (or security system 202) that comprises a camera and a button (at step 700). The button may be configurable to enable a visitor to sound an electronic chime 412. The electronic chime 412 may include a speaker configurable to emit a notification sound 430 in response to the visitor pressing the button of the electronic doorbell 202. The method may also include electrically coupling an electronic switch assembly 410 to the electronic chime 412 (at step 702). In several embodiments, the method also may include mechanically coupling the electronic switch assembly 410 to the electronic chime 412.

Furthermore, the method may include electrically coupling the electronic doorbell 202 to the electronic switch assembly 410 (at step 704). As well, some methods may include configuring the electronic switch assembly 410 so that a first electricity 450 that is less than a first threshold passes through the electronic switch assembly 410 without entering the electronic chime 412 (at step 706). In this manner, the first electricity 450 may not cause the electronic chime 412 to emit the notification sound 430. As such, in response to the first electricity being less than the first threshold, the electronic switch assembly 410 may block the first electricity 450 from passing through the electronic chime 412.

Some embodiments may further include configuring the electronic switch assembly 410 so that the electronic switch assembly 410 causes a second electricity 452 that is greater than the first threshold to pass through the electronic chime 412 (at step 708). In this manner, the second electricity 452 may cause the electronic chime 412 to emit the notification sound 430. The electronic switch assembly 410 may be configured to allow the second electricity 452 to pass through the electronic chime 412 in response to the second electricity 452 being greater than the first threshold. It should be appreciated that the first threshold may be an electricity value that is required by the electronic chime 412 in order to emit the notification sound 430.

It should be appreciated that embodiments described in this disclosure are not limited to the first and second electricity 450 and 452. For example, several embodiments may further include a third and a fourth electricity. Some embodiments include configuring an electrical circuit, such as the doorbell system 400, so that the third electricity passes from the transformer

424 to the security system 202, and to the electronic switch assembly 410, and then to the transformer 424 without entering the electronic chime 412 in response to the third electricity being less than first threshold. As well, several embodiments include configuring the electrical circuit so that a fourth electricity passes from the transformer 424 to the security system 202 and to the electronic switch assembly 410 in response to the fourth electricity being greater than the first threshold. In this manner, the fourth electricity may be diverted from the electronic switch assembly 410 into the electronic chime 412, and then back into the electronic switch assembly 410. It should be appreciated that the security system 202 and the electronic switch assembly 410 may be connected in series in the electrical circuit. However, it should also be appreciated that the security system 202 and the electronic switch assembly 410 may be connected in parallel.

The electronic chime 412 may comprise any type of digital device configured to emit a notification sound 430 in response to the visitor pressing the button of the security system 202. For example, the electronic chime 412 may be a digital chime having a first printed circuit board. In several embodiments, the method may further include configuring the first printed circuit board to enable the electronic chime 412 to emit the notification sound 430 from the speaker based on digital music data.

In several embodiments, when the visitor presses the button of the security system 202, the security system 202 may be configured to route all electricity to the electronic chime 412 via the electronic switch assembly 410. To accomplish this, the security system 202 may further comprise a second printed circuit board. In some embodiments, the method may further include routing at least a portion of the first electricity 450 through the second printed circuit board of the security system 202. In response to the visitor pressing the button, the method may further include blocking the second electricity 452 from entering the second printed circuit board of the security system. In order to cause the electronic chime 412 to emit the notification sound 430, the method may include causing the second electricity 452 to be greater than the first threshold in response to the visitor pressing the button of the security system 202.

The doorbell system 400, via the electronic switch assembly 410, also may be configured to block the first electricity 450 from entering the electronic chime 412 when the first electricity 450 is less than the first threshold. Specifically, in several embodiments, the method may include using the electronic switch assembly 410 to block transformer electrical power from entering the electronic chime 412 while the first electricity 450 is less than the first threshold. As well, the

method may include using the electronic switch assembly 410 to divert the transformer electrical power from the electronic switch assembly 410 into the electronic chime 412 while the second electricity 452 is greater than the first threshold.

It should be appreciated that the first threshold may be any type of electricity, such as power, voltage, and/or current. In this regard the first threshold may be described as a first electrical power threshold, a first electrical voltage threshold, and/or a first electrical current threshold.

The doorbell system 400 may also include the remote computing device 204, which can be used to send and receive information to and/or from the security system 202. For example, the information may include a predetermined amount of time that defines the duration of time the electronic chime 412 emits the notification sound 430. In this regard, some embodiments may further include setting the predetermined amount of time via the remote computing device 204 prior to the second electricity 452 exceeding the first threshold. As well, the method may include sending the predetermined amount of time wirelessly from the remote computing device 204 to the security system 202. And once the second electricity 452 is greater than the first threshold, the method may further include maintaining the second electricity 452 above the first threshold for the predetermined amount of time.

In some embodiments, the doorbell system 400 comprises a housing, such as a plastic housing. Accordingly, the method may further include placing the electronic chime 412 and the electronic switch assembly 410 inside the plastic housing. As well, the method may include placing the security system 202 outside the plastic housing and in a remote location relative to the plastic housing. Some methods may further include mounting the plastic housing along an interior surface of the building and mounting the security system 202 along an exterior surface of the building near an entry point of the building. However, it should be appreciated that the plastic housing and/or the security system 202 may be mounted anywhere along an interior or exterior surface of the building.

As illustrated in Figure 15, some embodiments disclose another method for using the doorbell system 400. The method may include obtaining the security system 202 (at step 800). The method may also include mechanically coupling a printed circuit board 410 to the electronic chime 412 and electrically coupling the printed circuit board 410 to the electronic chime 412 (at

step 802). As well, some methods include electrically coupling the security system 202 to the printed circuit board 410 (at step 804).

Several embodiments may include configuring the printed circuit board 410 so that the printed circuit board 410 allows a first electricity 450 to pass through the printed circuit board 410 in response to the first electricity 450 being less than the first threshold (at step 806). As well, the method may include configuring the printed circuit board 410 so that the printed circuit board 410 blocks the first electricity 450 from entering the electronic chime 412 in response to the first electricity 450 being less than the first threshold (at step 808). Accordingly, the first electricity 450 does not cause the electronic chime 412 to emit the notification sound 430.

Several embodiments may further include configuring the printed circuit board 410 so that the printed circuit board 410 causes a second electricity 452 that is greater than the first threshold to enter the electronic chime 412 to cause the electronic chime to emit the notification sound 430. As such, the printed circuit board 410 may cause the second electricity 452 to pass through the electronic chime 412 in response to the second electricity 452 being greater than the first threshold.

Furthermore, the printed circuit board 410 may be described as a first printed circuit board, and the security system 202 may comprise a second printed circuit board. Similar to the method illustrated in Figure 14, the method disclosed in Figure 15 may further include routing at least a portion of the first electricity 450 through the second printed circuit board of the security system 202. As well, this method may further include configuring the second printed circuit board to block the second electricity 452 from entering the second printed circuit board of the security system 202 in response to the visitor pressing the button. Stated differently, these steps may allow all of the transformer electrical power to be blocked from entering the security system 202 and diverted to the electronic chime 412 so that the chime may have enough electrical power to emit the notification sound 430.

Several embodiments include yet another method for using the doorbell system 400. As illustrated in Figure 16, the method includes obtaining the security system 202 (at step 900). Similar to the methods illustrated in Figure 14, many embodiments also include mechanically coupling the printed circuit board 410 to the electronic chime 412 and electrically coupling the printed circuit board 410 to the electronic chime 412 (at step 902). As well, several embodiments include electrically coupling the security system 202 to the printed circuit board 410 (at step

904). With continued reference to Figure 15, in response to the second electricity 452 being greater than the first threshold, many embodiments also include configuring the electronic switch assembly 410 so that the electronic switch assembly 410 causes the second electricity 452 to pass through the electronic chime 412 to cause the electronic chime 412 to emit the notification sound 430 (at step 906).

INTERPRETATION

None of the steps described herein is essential or indispensable. Any of the steps can be adjusted or modified. Other or additional steps can be used. Any portion of any of the steps, processes, structures, and/or devices disclosed or illustrated in one embodiment, flowchart, or example in this specification can be combined or used with or instead of any other portion of any of the steps, processes, structures, and/or devices disclosed or illustrated in a different embodiment, flowchart, or example. The embodiments and examples provided herein are not intended to be discrete and separate from each other.

The section headings and subheadings provided herein are nonlimiting. The section headings and subheadings do not represent or limit the full scope of the embodiments described in the sections to which the headings and subheadings pertain. For example, a section titled "Topic 1" may include embodiments that do not pertain to Topic 1 and embodiments described in other sections may apply to and be combined with embodiments described within the "Topic 1" section.

Some of the devices, systems, embodiments, and processes use computers. Each of the routines, processes, methods, and algorithms described in the preceding sections may be embodied in, and fully or partially automated by, code modules executed by one or more computers, computer processors, or machines configured to execute computer instructions. The code modules may be stored on any type of non-transitory computer-readable storage medium or tangible computer storage device, such as hard drives, solid state memory, flash memory, optical disc, and/or the like. The processes and algorithms may be implemented partially or wholly in application-specific circuitry. The results of the disclosed processes and process steps may be stored, persistently or otherwise, in any type of non-transitory computer storage such as, e.g., volatile or non-volatile storage.

The various features and processes described above may be used independently of one another, or may be combined in various ways. All possible combinations and subcombinations are intended to fall within the scope of this disclosure. In addition, certain method, event, state, or process blocks may be omitted in some implementations. The methods, steps, and processes described herein are also not limited to any particular sequence, and the blocks, steps, or states relating thereto can be performed in other sequences that are appropriate. For example, described tasks or events may be performed in an order other than the order specifically disclosed. Multiple steps may be combined in a single block or state. The example tasks or events may be performed in serial, in parallel, or in some other manner. Tasks or events may be added to or removed from the disclosed example embodiments. The example systems and components described herein may be configured differently than described. For example, elements may be added to, removed from, or rearranged compared to the disclosed example embodiments.

Conditional language used herein, such as, among others, "can," "could," "might," "may," "e.g.," and the like, unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or steps. Thus, such conditional language is not generally intended to imply that features, elements and/or steps are in any way required for one or more embodiments or that one or more embodiments necessarily include logic for deciding, with or without author input or prompting, whether these features, elements and/or steps are included or are to be performed in any particular embodiment. The terms "comprising," "including," "having," and the like are synonymous and are used inclusively, in an open-ended fashion, and do not exclude additional elements, features, acts, operations and so forth. Also, the term "or" is used in its inclusive sense (and not in its exclusive sense) so that when used, for example, to connect a list of elements, the term "or" means one, some, or all of the elements in the list. Conjunctive language such as the phrase "at least one of X, Y, and Z," unless specifically stated otherwise, is otherwise understood with the context as used in general to convey that an item, term, etc. may be either X, Y, or Z. Thus, such conjunctive language is not generally intended to imply that certain embodiments require at least one of X, at least one of Y, and at least one of Z to each be present.

The term "and/or" means that "and" applies to some embodiments and "or" applies to some embodiments. Thus, A, B, and/or C can be replaced with A, B, and C written in one

sentence and A, B, or C written in another sentence. A, B, and/or C means that some embodiments can include A and B, some embodiments can include A and C, some embodiments can include B and C, some embodiments can only include A, some embodiments can include only B, some embodiments can include only C, and some embodiments can include A, B, and C. The term "and/or" is used to avoid unnecessary redundancy.

While certain example embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions disclosed herein. Thus, nothing in the foregoing description is intended to imply that any particular feature, characteristic, step, module, or block is necessary or indispensable. Indeed, the novel methods and systems described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions, and changes in the form of the methods and systems described herein may be made without departing from the spirit of the inventions disclosed herein.

THE FOLLOWING IS CLAIMED:

1. A doorbell system comprising:
a doorbell comprising a camera and a button;
a switch assembly electrically coupled to the doorbell and a power supply; and
a chime.

2. The doorbell system of Claim 1, wherein the chime is electrically coupled in parallel with a first switch of the switch assembly, wherein in response to a first electricity that is less than a first threshold the first switch is configured to allow at least a portion of the first electricity to flow through the switch assembly, and in response to a second electricity that is greater than the first threshold, the first switch is configured to not allow the second electricity to flow through the switch assembly and is configured to enable the second electricity to flow through the chime.

3. The doorbell system of Claim 2, wherein the first switch comprises a single-pole, single-throw switch.

4. The doorbell system of Claim 2, wherein when the first switch is in a closed position, the first switch electrically couples the power supply and the doorbell.

5. The doorbell system of Claim 2, wherein the doorbell is configured such that pressing the button of the doorbell causes the second electricity to be greater than the first threshold.

6. The doorbell system of Claim 2, wherein the doorbell system is configured to maintain the second electricity above the first threshold for a predetermined amount of time in response to a press of the button.

7. The doorbell system of Claim 1, wherein the chime is electrically coupled in parallel with a first switch of the switch assembly, the button of the doorbell is configurable to enable a visitor to sound the chime, and

the first switch is configured to have a first state and a second state, wherein the first state occurs in response to a first electricity that is less than a first threshold, and the second state occurs in response to a second electricity that is greater than the first threshold, wherein in the first state the first switch is configured prevent at least a portion of the first electricity from passing through the chime to prevent the chime from emitting a notification sound, and in the second state the switch assembly is configured to allow the second electricity to pass through the chime such that the chime emits the notification sound.

8. The doorbell system of Claim 7, wherein the doorbell is configured such that pressing the button of the doorbell causes the second electricity to be greater than the first threshold to cause the second state.

9. The doorbell system of Claim 7, wherein in the first state, the switch assembly is configured to allow the portion of the first electricity to pass through the switch assembly.

10. The doorbell system of Claim 7, wherein in the first state, the first switch is configured to allow the portion of the first electricity to pass through the first switch.

11. The doorbell system of Claim 10, wherein the switch assembly is mechanically coupled to the chime.

12. The doorbell system of Claim 10, wherein the chime comprises a plastic housing, the switch assembly is located inside the plastic housing, and the doorbell is located outside of the plastic housing and in a remote location relative to the plastic housing.

13. The doorbell system of Claim 7, wherein the doorbell system is configured to maintain the second electricity above the first threshold for a predetermined amount of time in response to a press of the button.

14. The doorbell system of Claim 7, further comprising a remote computing device configured to receive a predetermined amount of time from a user, wherein the predetermined amount of time defines an amount of time that the second electricity is maintained above the first threshold.

15. The doorbell system of Claim 7, wherein the first switch comprises a single-pole, single-throw switch.

16. The doorbell system of Claim 1, wherein the switch assembly comprises a first switch configured to have a first state and a second state, wherein the first state occurs in response to a first electricity that is less than a first threshold, and the second state occurs in response to a second electricity that is greater than the first threshold,

wherein in the first state the first switch is in a closed position such that a first electrical current flows through the first switch between the doorbell and the power supply such that the chime does not emit a notification sound during the first state,

wherein in the second state the first switch is in an open position such that the first switch blocks a second electrical current from flowing through the first switch between the doorbell and the power supply.

17. The doorbell system of Claim 16, wherein the chime is electrically coupled in parallel with the first switch.

18. The doorbell system of Claim 16, wherein the first switch is mechanically coupled to the chime, is located remotely relative to the doorbell, and is electrically coupled to the doorbell such that the doorbell controls whether the first switch is in the first state or the second state.

19. The doorbell system of Claim 16, wherein the chime is configured to emit the notification sound in response to the second state.

20. The doorbell system of Claim 16, wherein the first switch comprises a single-pole, single-throw switch.

21. The doorbell system of Claim 16, wherein the doorbell is configured such that pressing the button of the doorbell causes the second electricity to be greater than the first threshold to cause the second state.

22. The doorbell system of Claim 16, wherein the doorbell system is configured to maintain the second electricity above the first threshold for a predetermined amount of time.

23. A system configured to electrically couple a doorbell and a power supply, the system comprising:

a chime; and

a switch assembly electrically and mechanically coupled to the chime.

24. The system of Claim 23, wherein the chime is electrically coupled in parallel with a first switch of the switch assembly,

in response to a first electricity that is less than a first threshold the first switch is configured to allow at least a portion of the first electricity to flow through the switch assembly, and

in response to a second electricity that is greater than the first threshold the first switch is configured to not allow the second electricity to flow through the switch assembly and is configured to enable the second electricity to flow through the chime.

25. The system of Claim 24, wherein the first switch comprises a single-pole, single-throw switch.

26. The system of Claim 24, further comprising the doorbell, wherein the doorbell is configured such that pressing a button of the doorbell closes a second switch of the doorbell to cause the second electricity to be greater than the first threshold.

27. The system of Claim 23, wherein the chime is electrically coupled in parallel with a first switch of the switch assembly, and

the first switch is configured to have a first state and a second state, wherein the first state occurs in response to a first electricity that is less than a first threshold, and the second state occurs in response to a second electricity that is greater than the first threshold, wherein in the first state the first switch prevents at least a portion of the first electricity from passing through the chime to prevent the chime from emitting a notification sound.

28. The system of Claim 27, wherein in the second state the switch assembly allows the second electricity to pass through the chime to enable the chime to emit the notification sound.

29. The system of Claim 23, wherein the switch assembly comprises a first switch configured to have a first state and a second state, wherein the first state occurs in response to a first electricity that is less than a first threshold, and the second state occurs in response to a second electricity that is greater than the first threshold,

wherein in the first state the first switch is in a closed position such that the first switch is configured to enable a first electrical current to flow through the first switch between the doorbell and the power supply such that the chime does not emit a notification sound during the first state,

wherein in the second state the first switch is in an open position such that the first switch is configured to block a second electrical current from flowing through the first switch between the doorbell and the power supply.

30. The system of Claim 29, wherein the first switch is located remotely relative to the doorbell and is electrically coupled to the doorbell such that the doorbell controls whether the first switch is in the first state or the second state.

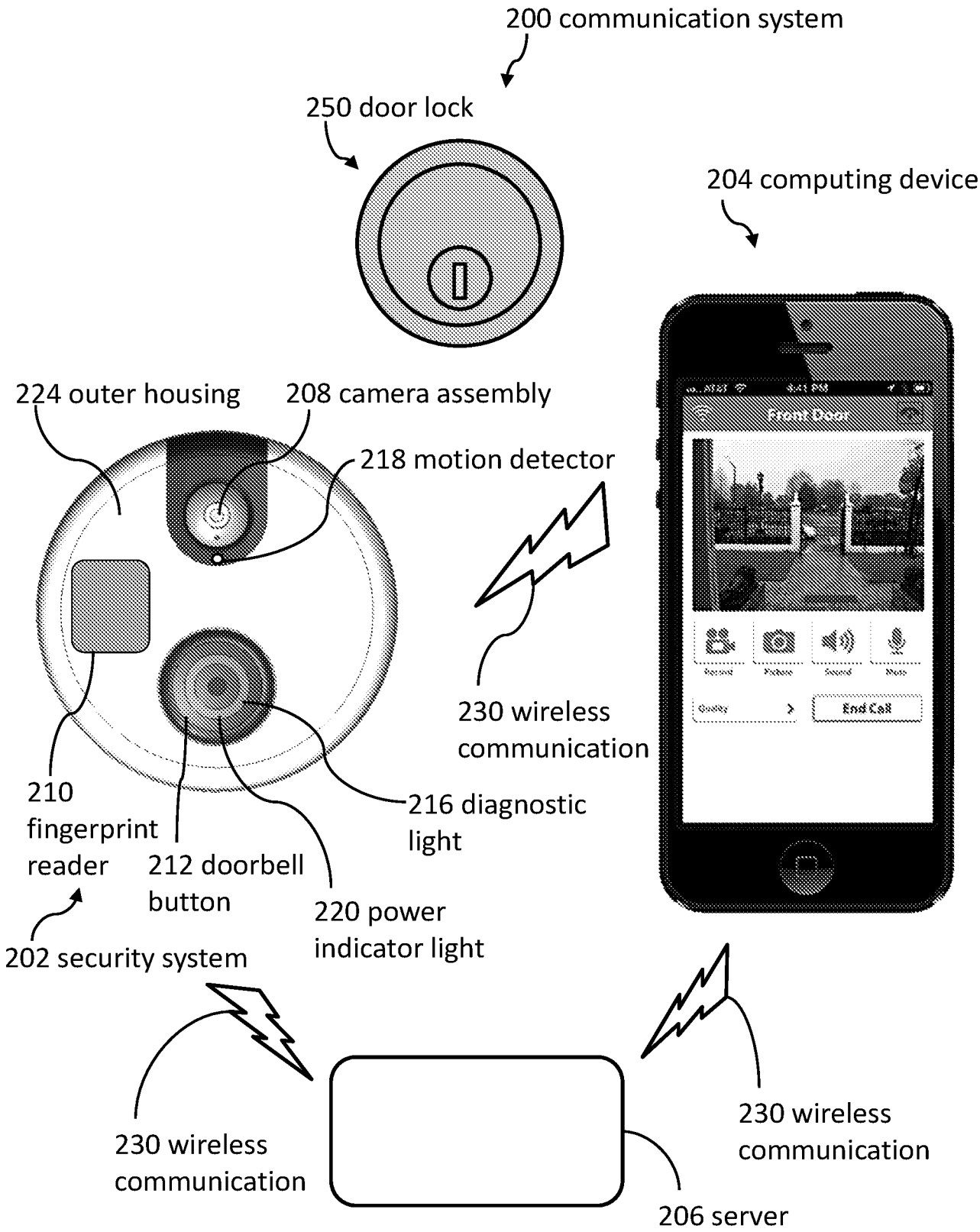
200 communication system
250 door lock
204 computing device
224 outer housing
208 camera assembly
218 motion detector
230 wireless communication
210 fingerprint reader
212 doorbell button
216 diagnostic light
220 power indicator light
202 security system
230 wireless communication
230 wireless communication
206 server
Front Door
End Call

Figure 1

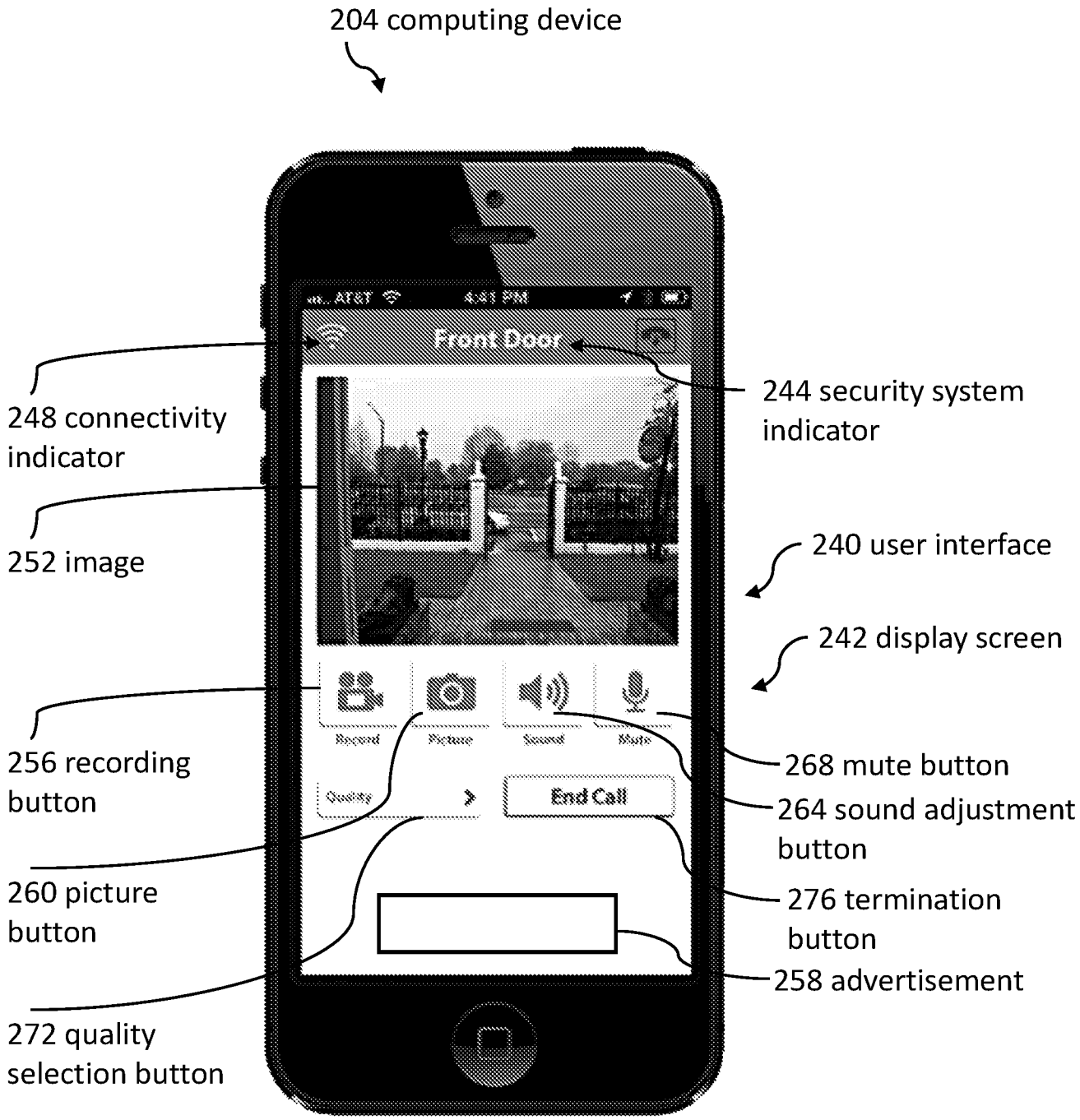
204 computing device
248 connectivity indicator
252 image
256 recording button
260 picture button
272 quality selection button
244 security system indicator
240 user interface
242 display screen
268 mute button
264 sound adjustment button
276 termination button
258 advertisement
Front Door
End Call

Figure 2

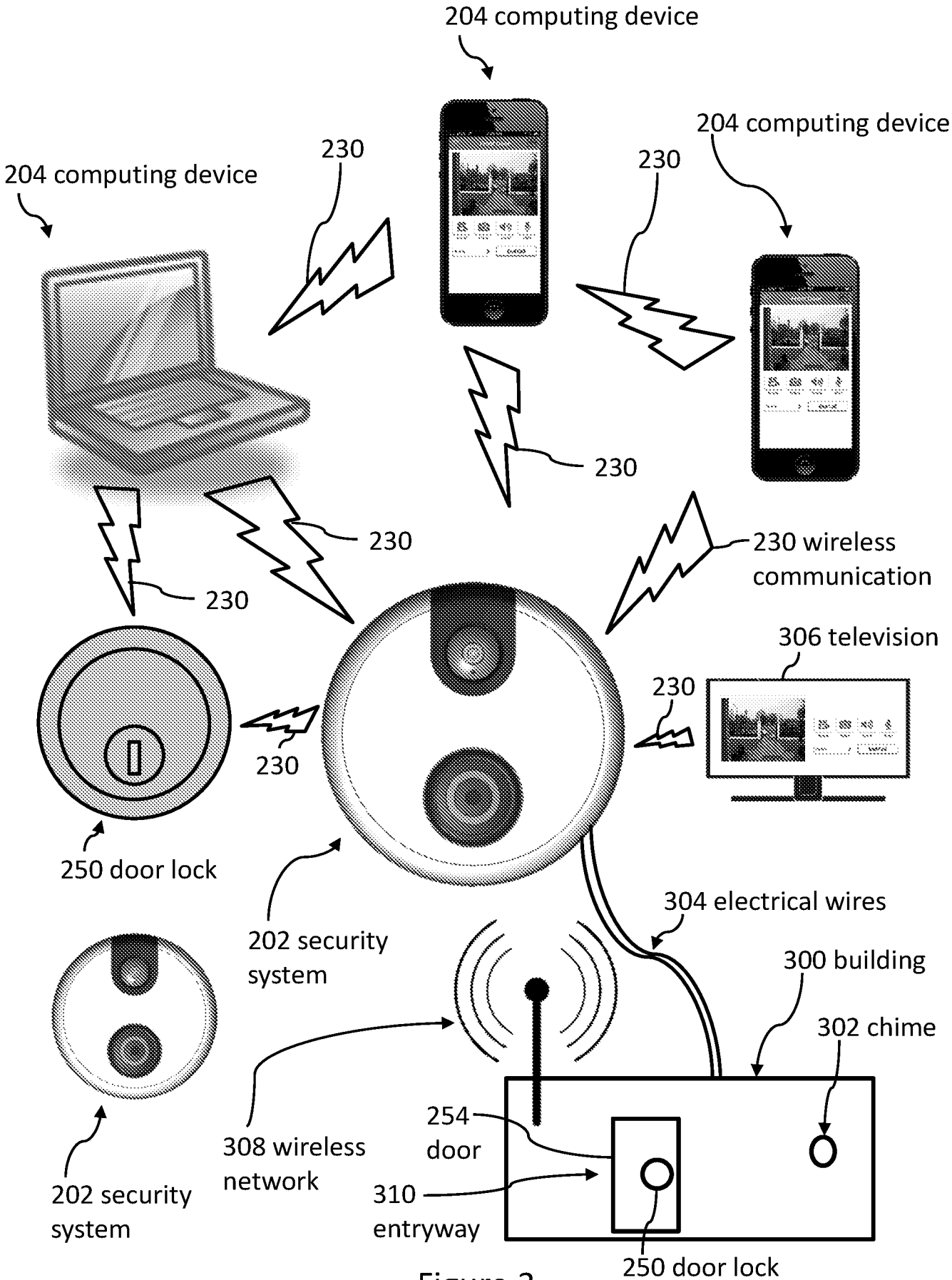
204 computing device
204 computing device
204 computing device
230
230
230
230
230
230
230 wireless communication
306 television
230
250 door lock
202 security system
304 electrical wires
300 building
302 chime
308 wireless network
254 door
310 entryway
202 security system
250 door lock

Figure 3

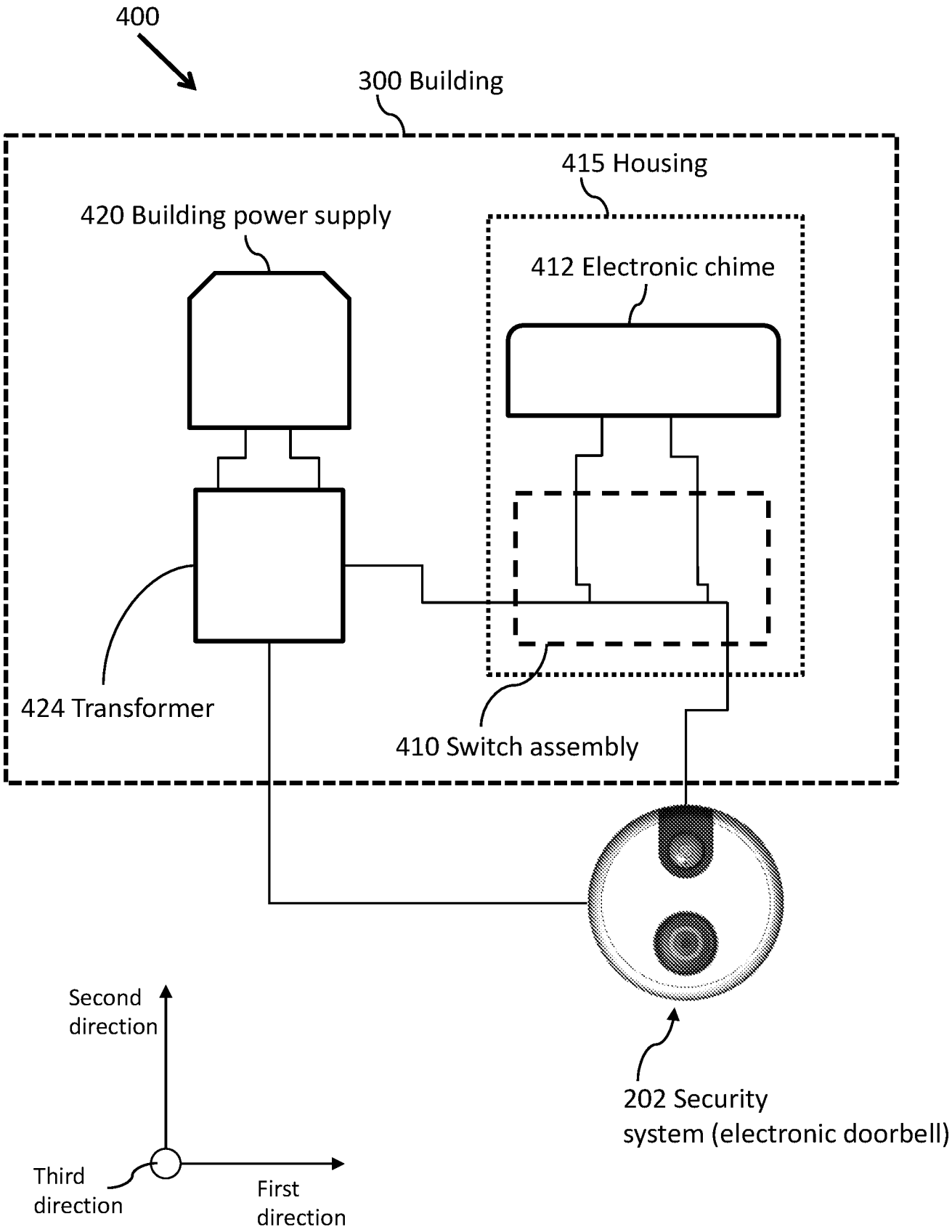
400
300 Building
415 Housing
420 Building power supply
412 Electronic chime
424 Transformer
410 Switch assembly
202 Security system (electronic doorbell)
Second direction
Third direction
First direction

Figure 4

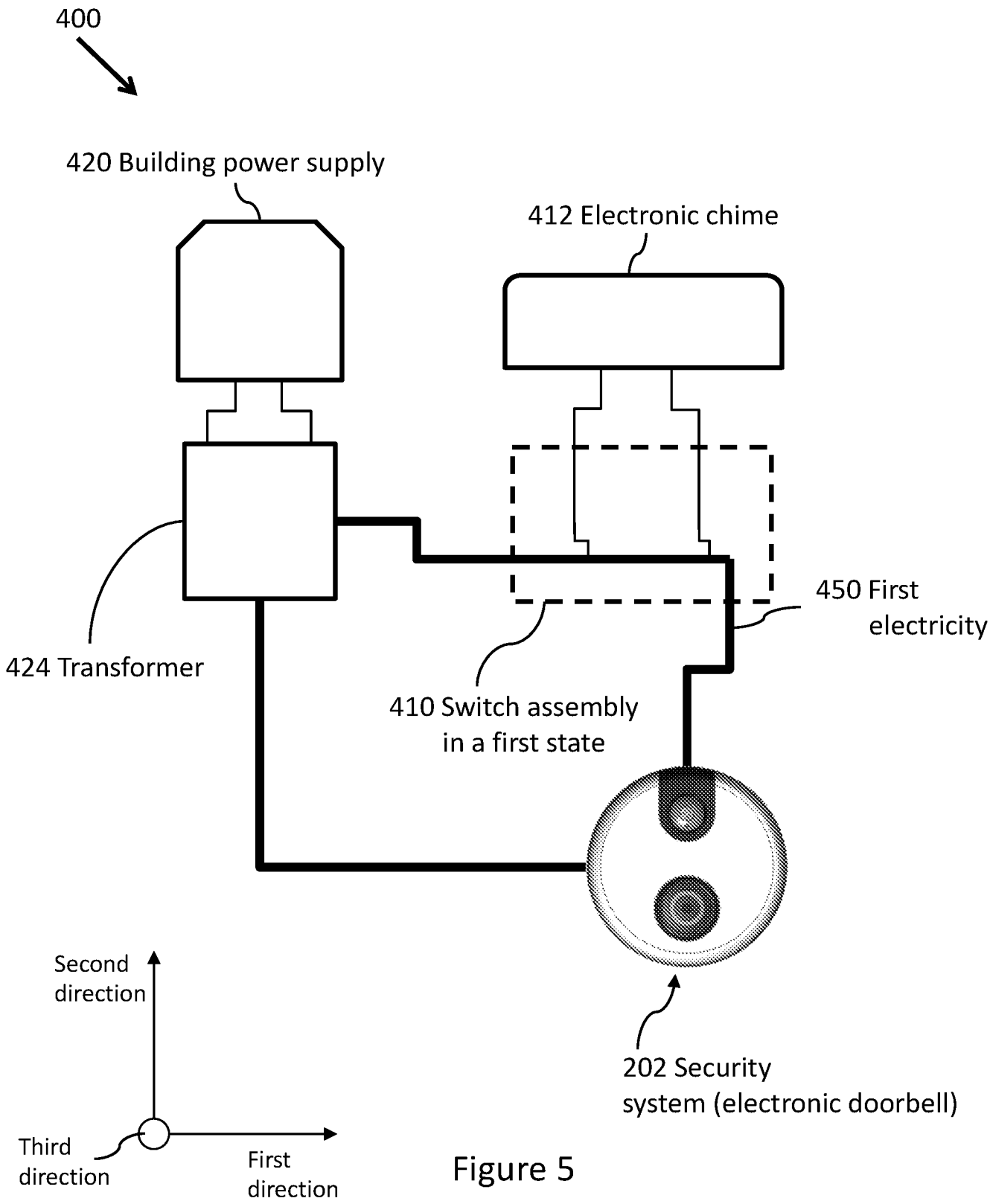
400
420 Building power supply
412 Electronic chime
450 First electricity
424 Transformer
410 Switch assembly in a first state
202 Security system (electronic doorbell)
Second direction
Third direction
First direction

Figure 5

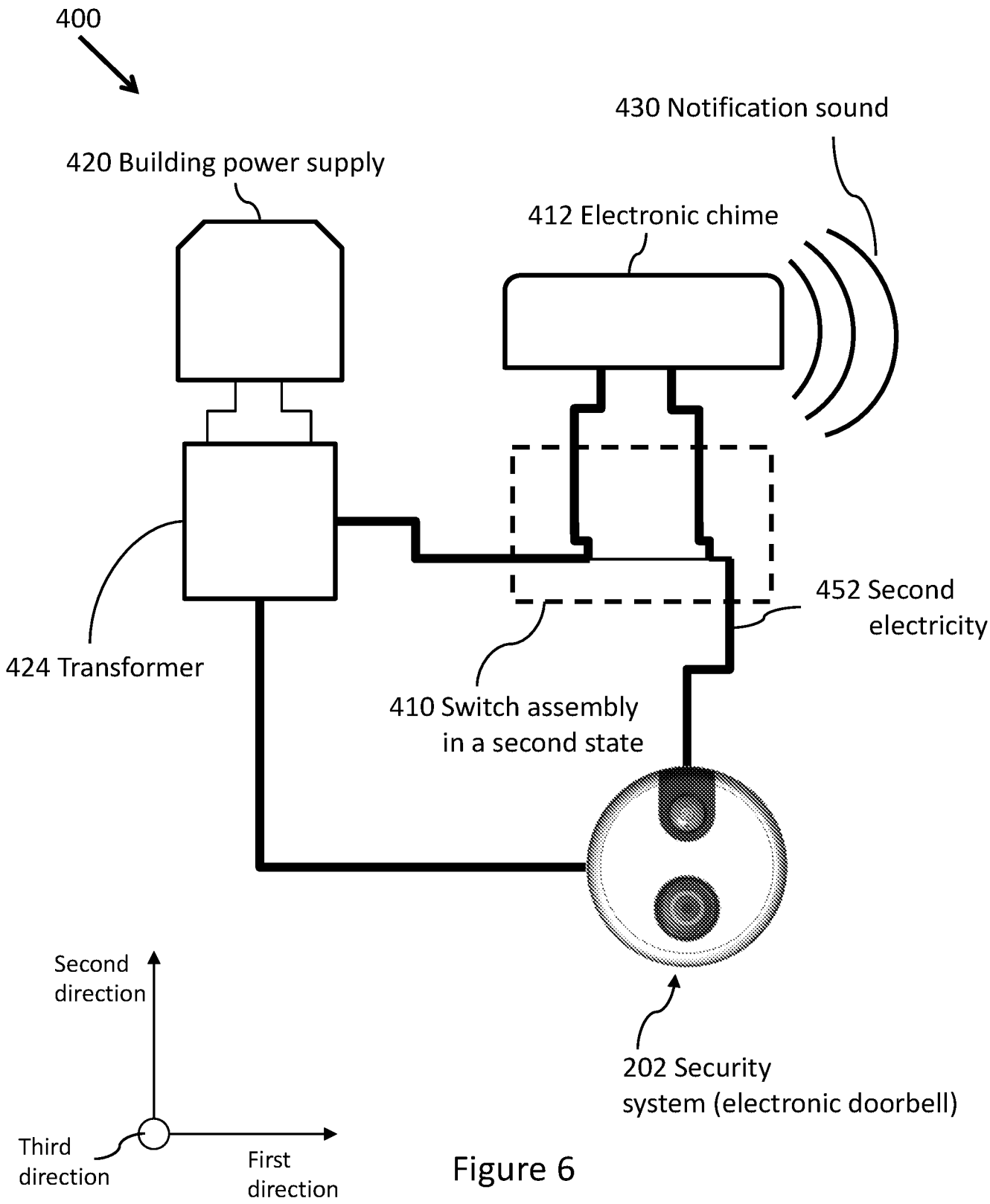
400
430 Notification sound
420 Building power supply
412 Electronic chime
452 Second electricity
424 Transformer
410 Switch assembly in a second state
Second direction
Third direction
First direction
202 Security system (electronic doorbell)

Figure 6

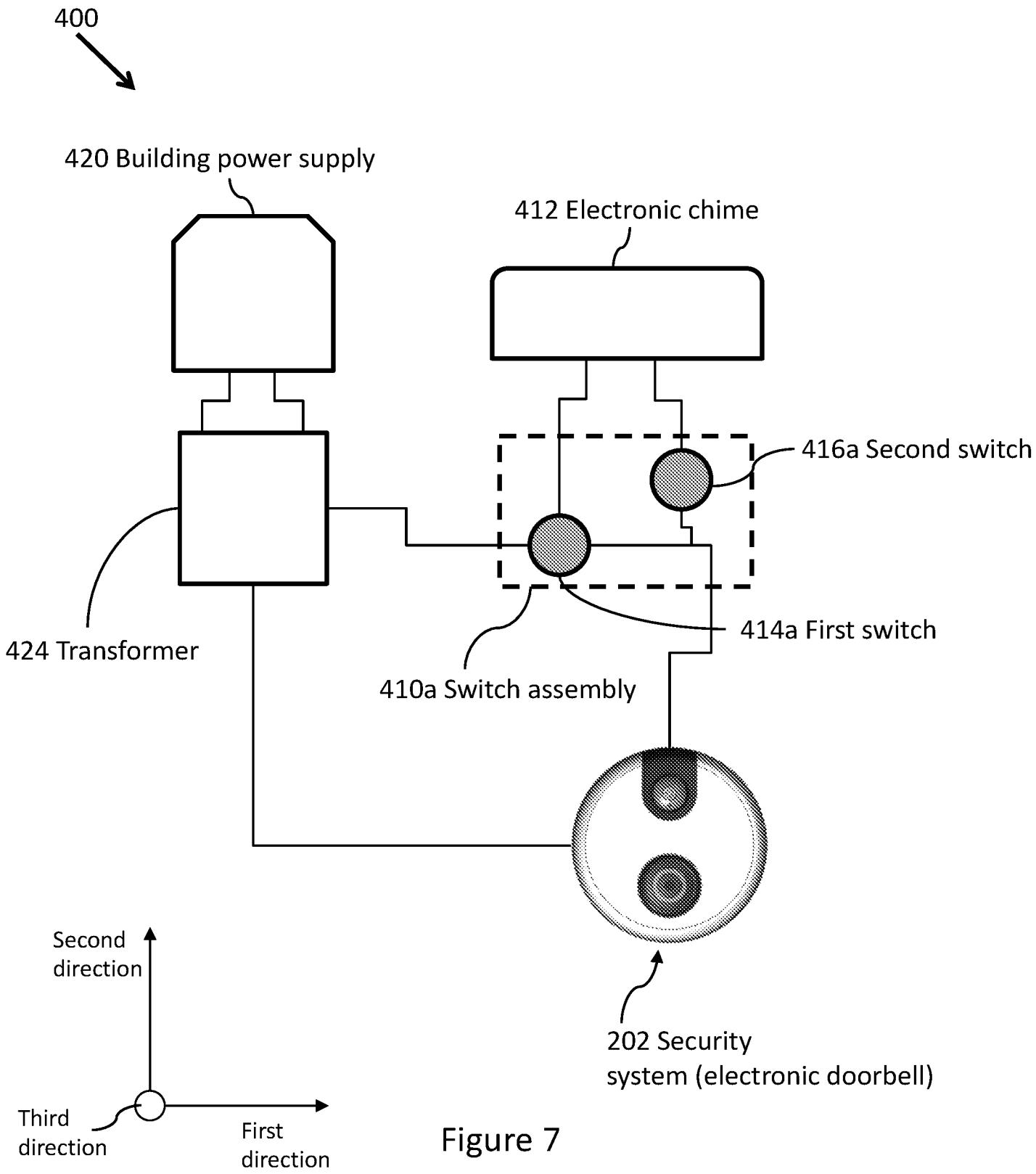
400
420 Building power supply
412 Electronic chime
416a Second switch
424 Transformer
414a First switch
410a Switch assembly
202 Security system (electronic doorbell)
Second direction
Third direction
First direction

Figure 7

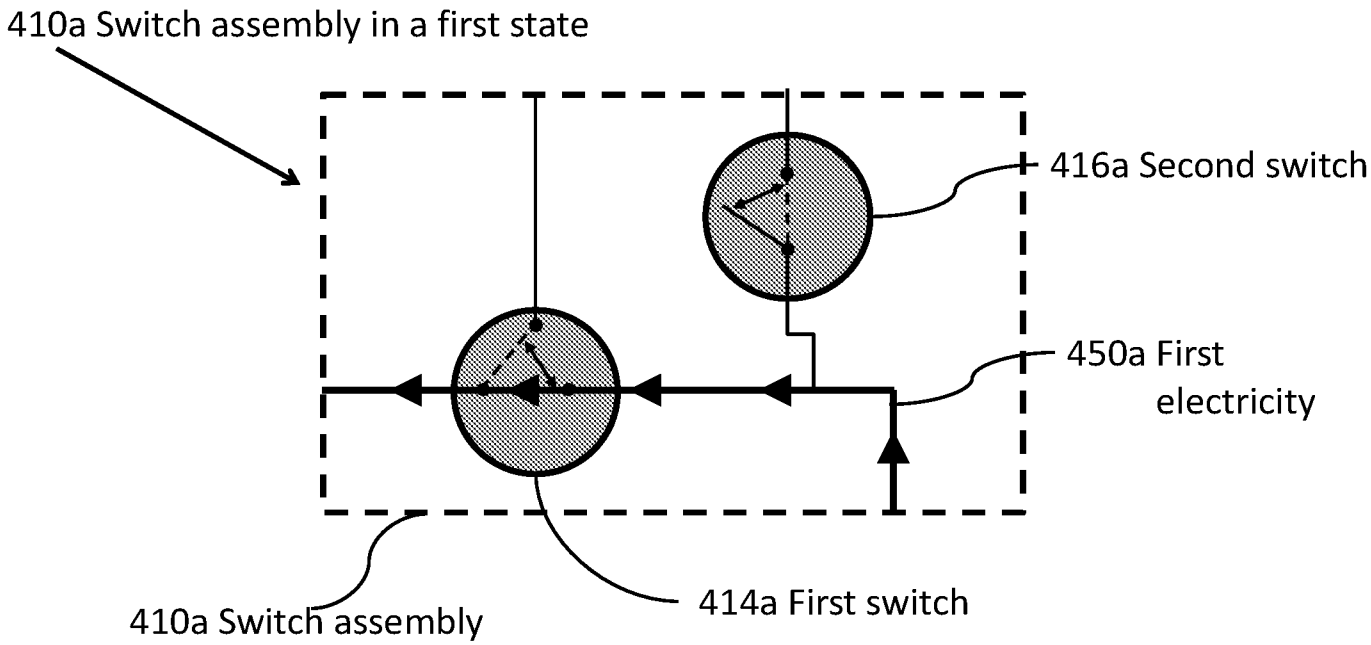

Figure 8

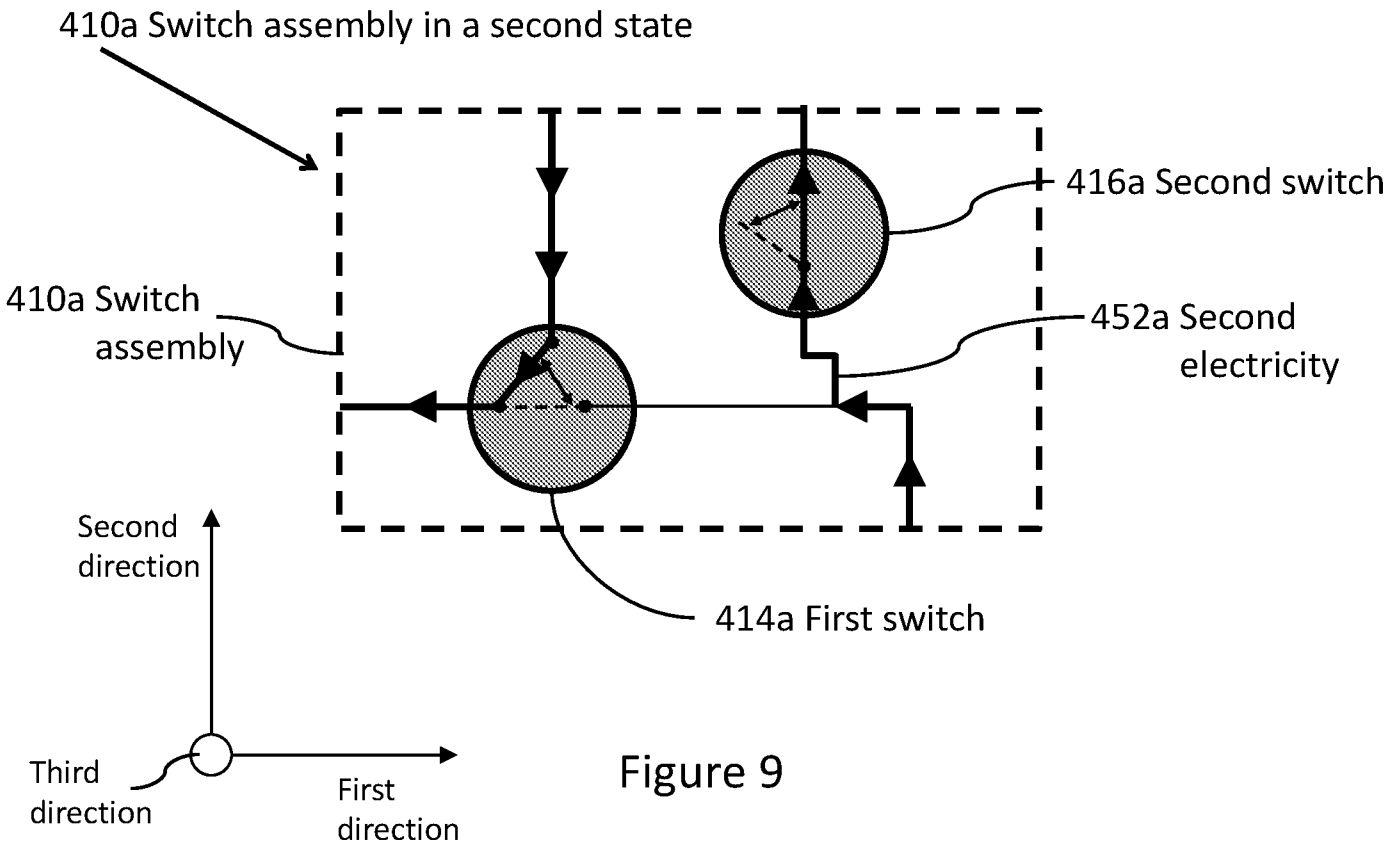

Figure 9

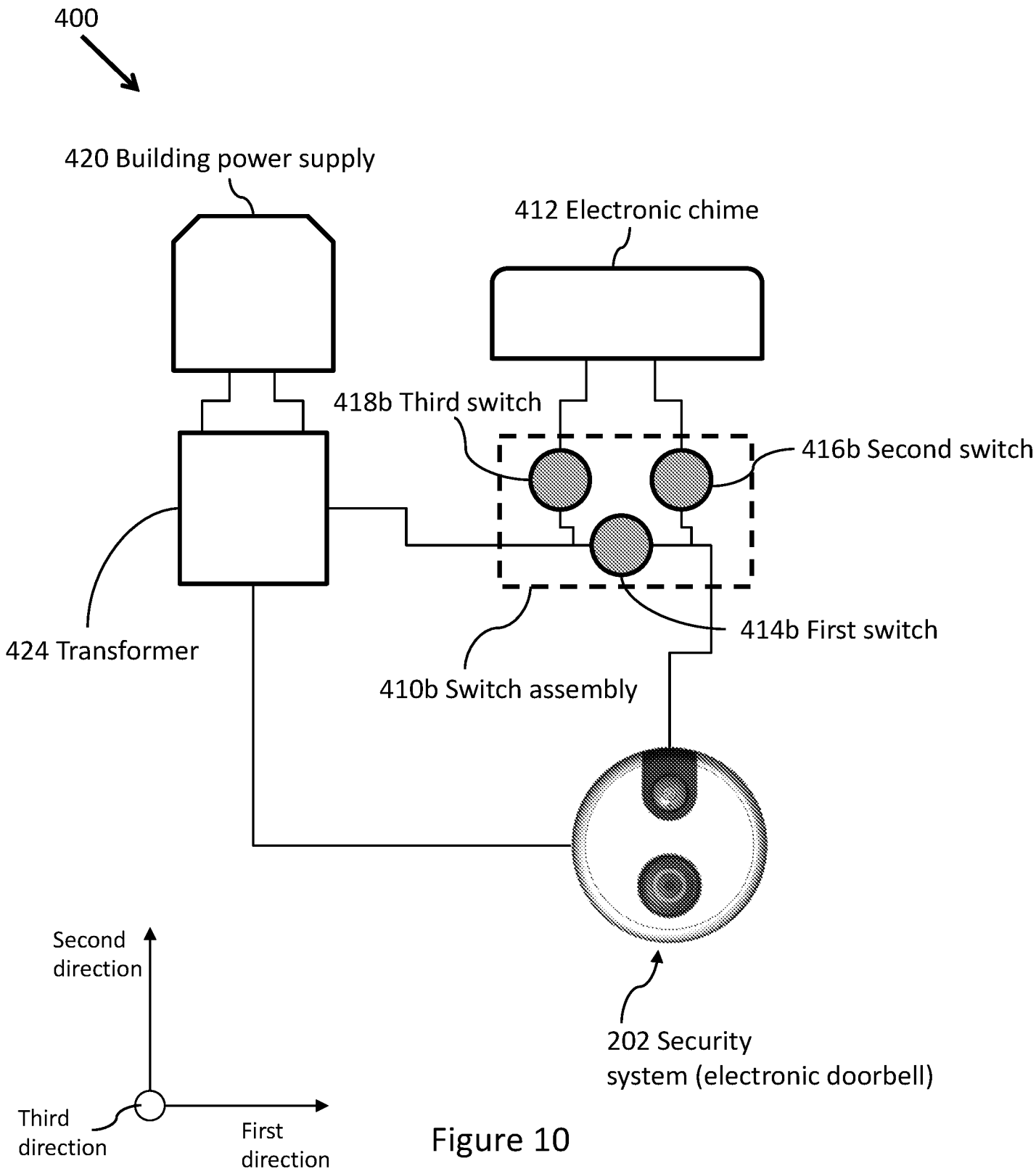
400
420 Building power supply
412 Electronic chime
418b Third switch
416b Second switch
424 Transformer
414b First switch
410b Switch assembly
202 Security system (electronic doorbell)
Second direction
Third direction
First direction

Figure 10

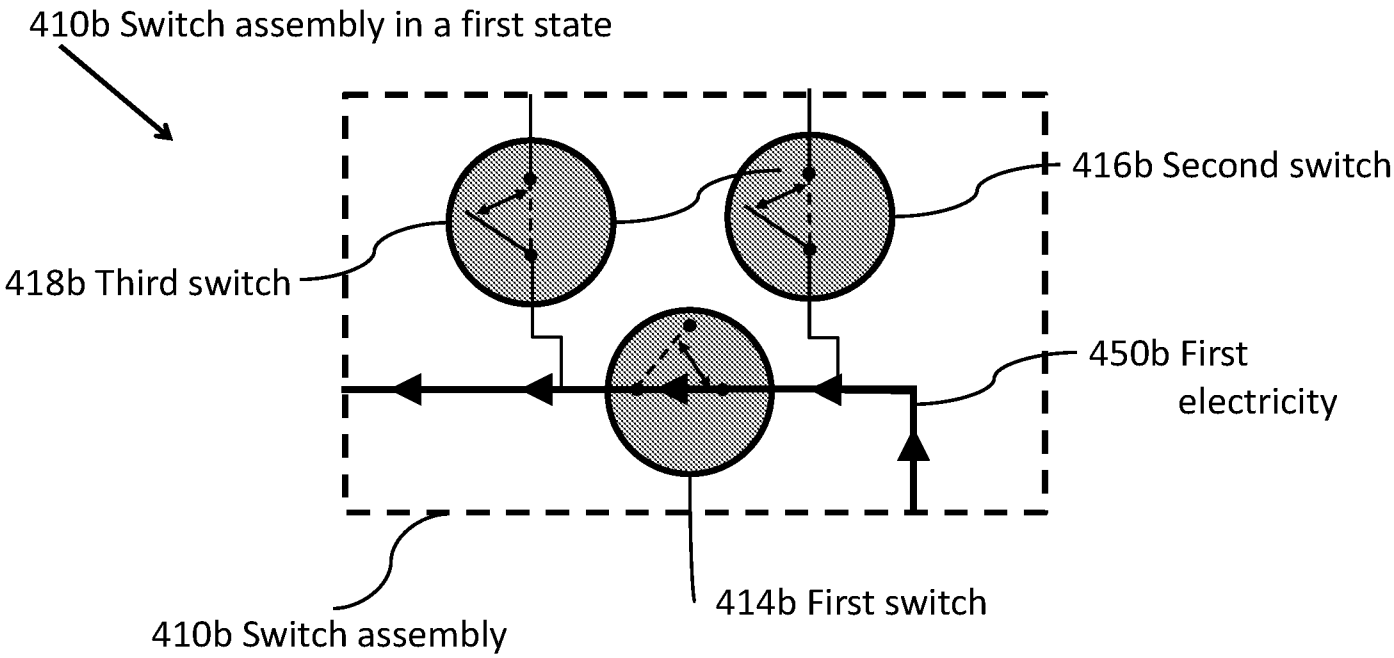

Figure 11

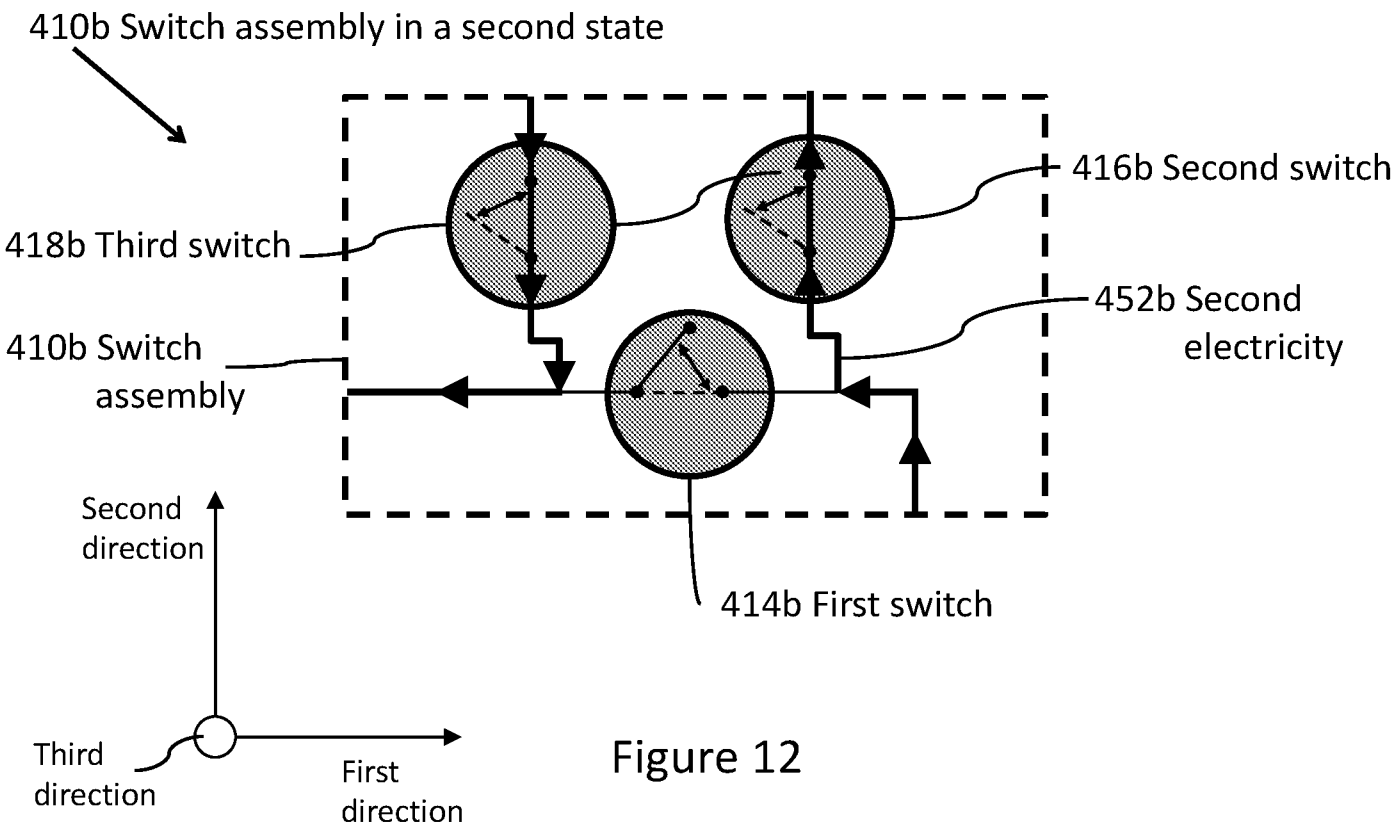

Figure 12

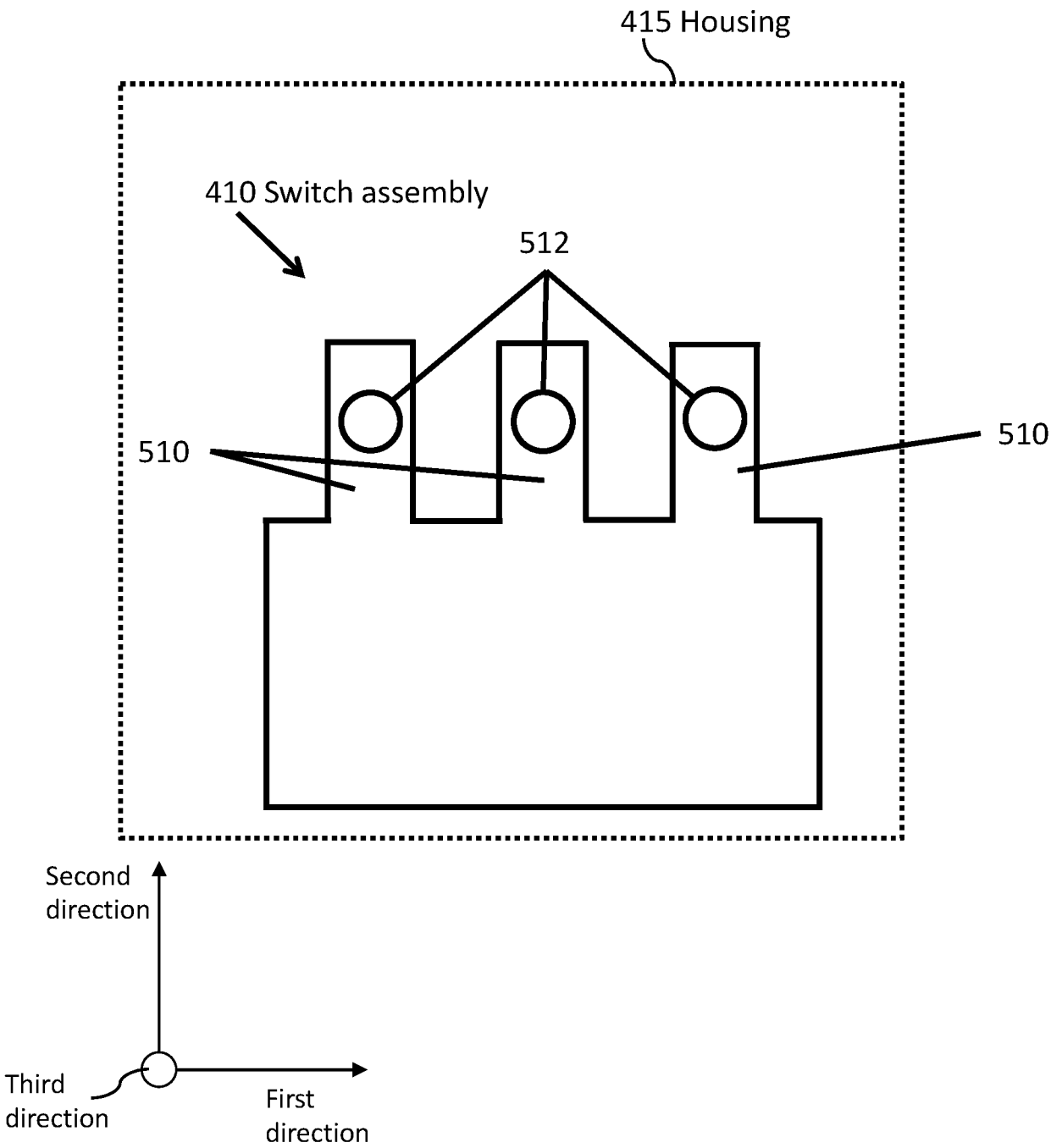
415 Housing
410 Switch assembly
512
510
510
Second direction
Third direction
First direction

Figure 13

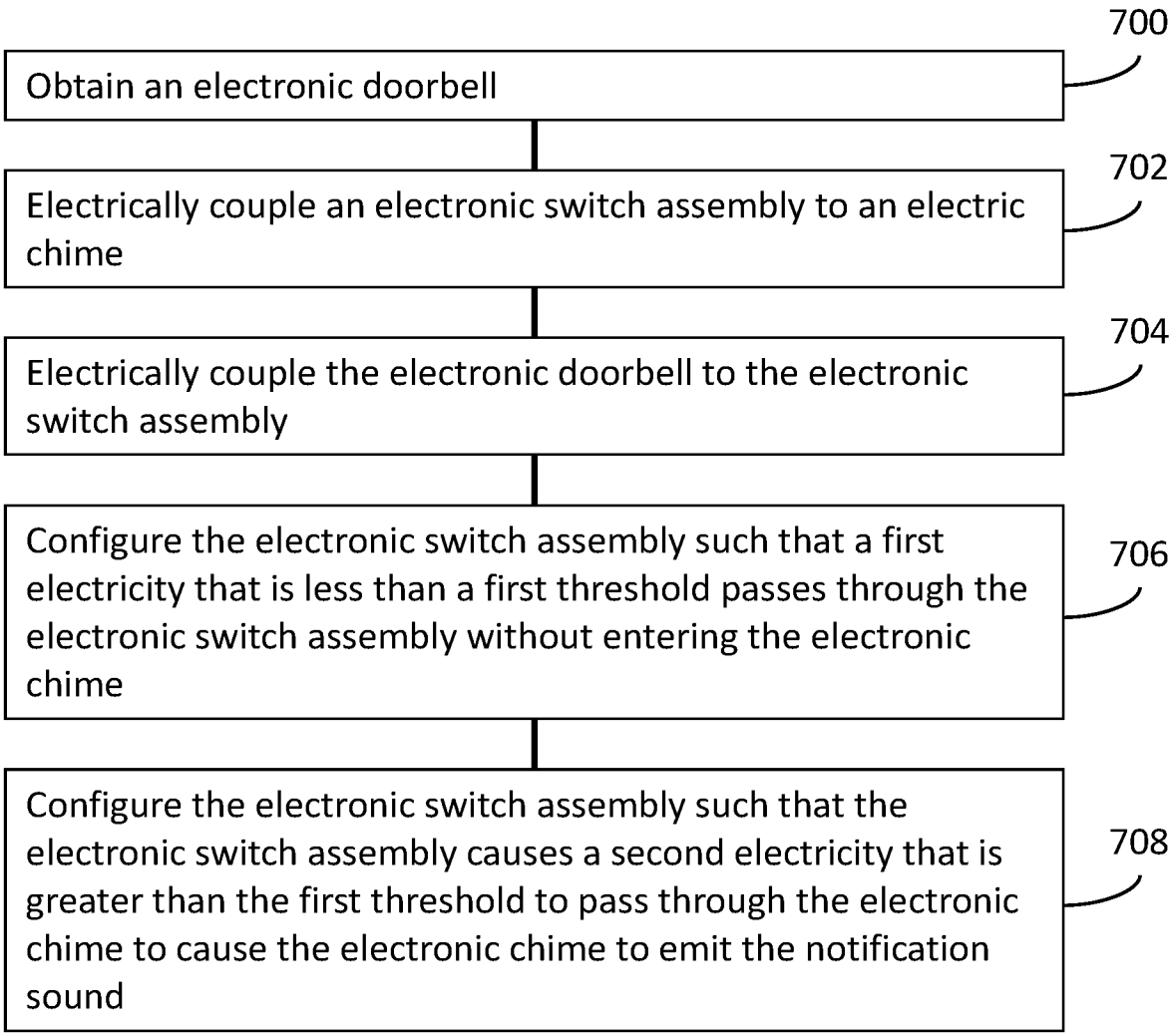
700
Obtain an electronic doorbell
702
Electrically couple an electronic switch assembly to an electric chime
704
Electrically couple the electronic doorbell to the electronic switch assembly
706
Configure the electronic switch assembly such that a first electricity that is less than a first threshold passes through the electronic switch assembly without entering the electronic chime
708
Configure the electronic switch assembly such that the electronic switch assembly causes a second electricity that is greater than the first threshold to pass through the electronic chime to cause the electronic chime to emit the notification sound

Figure 14

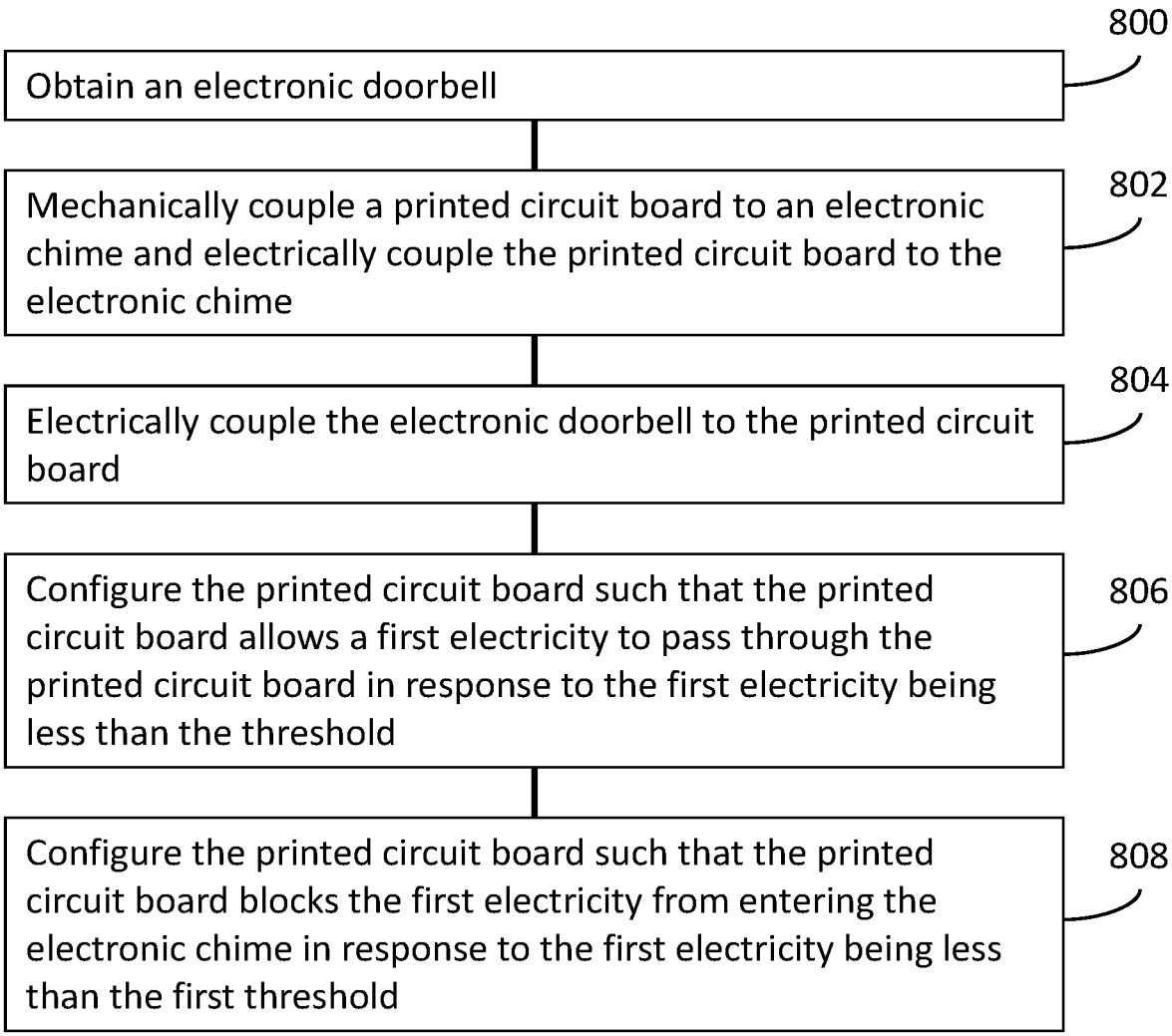
800
Obtain an electronic doorbell
802
Mechanically couple a printed circuit board to an electronic chime and electrically couple the printed circuit board to the electronic chime
804
Electrically couple the electronic doorbell to the printed circuit board
806
Configure the printed circuit board such that the printed circuit board allows a first electricity to pass through the printed circuit board in response to the first electricity being less than the threshold
808
Configure the printed circuit board such that the printed circuit board blocks the first electricity from entering the electronic chime in response to the first electricity being less than the first threshold

Figure 15

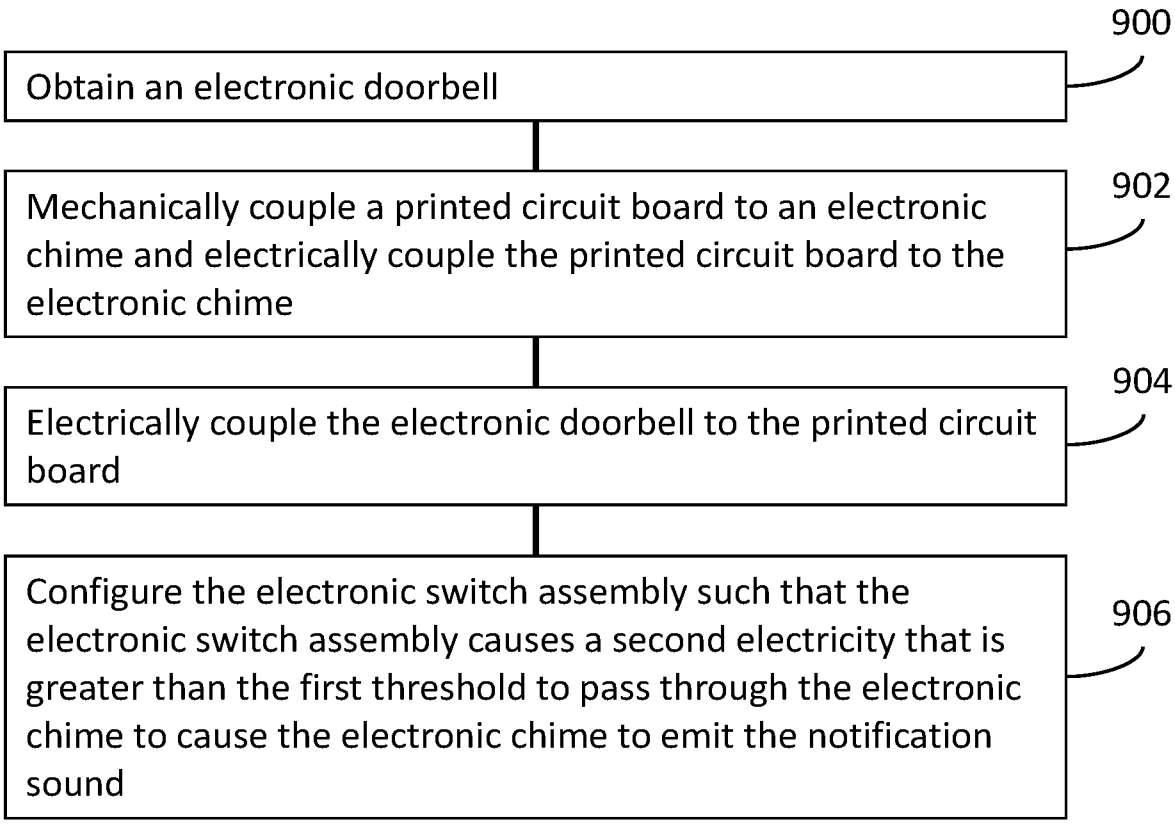
900
Obtain an electronic doorbell
902
Mechanically couple a printed circuit board to an electronic chime and electrically couple the printed circuit board to the electronic chime
904
Electrically couple the electronic doorbell to the printed circuit board
906
Configure the electronic switch assembly such that the electronic switch assembly causes a second electricity that is greater than the first threshold to pass through the electronic chime to cause the electronic chime to emit the notification sound

Figure 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2019/028906

A. CLASSIFICATION OF SUBJECT MATTER

IPC: G08B 3/10, 1/08; H04M 19/04; G10K 1/064
CPC: G08B 3/10, 1/08; H04M 19/04; G10K 1/064, 1/0645

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)

CPC: CPC: G08B 3/10, 1/08; H04M 19/04; G10K 1/064, 1/0645/IPC: G08B 3/10, 1/08;H04M 19/04;G10K 1/064

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)

US-PGPUB, USPAT, USOCR: doorbell, ab, ti, switch, same, camera, second, near, and, circuit, Music, Dutton, light, off, press, chime, switches, plurality, third, multiple, or, LED, push, Seton, Joseph, SCALISI, KASMIR, controller, bell, single, pole, throw, power, supply, amplifier, parallel, speaker, electricity, threshold, skybell, scalini, assembly, state, sound, comparator, touch, current, sense, remote, Frank, timer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	US 2007/0052531 A1 (MATHEWS ET AL.) 08 March 2007 (08.03.2007),	
X	See entire documents,	1
Y	See entire documents.	7, 8, 15-17, 19-21, and 27-29
	US 2014/0070922 A1 (DAVIS) 13 March 2014 (13.03.2014),	
X	See entire documents,	23
Y	See entire documents.	27-30
	US 2007/0146122 A1 (RATNER) 28 June 2007 (28.06.2007),	
Y	See entire documents.	7, 8, 15-17, 19-21, and 27-30

☐ Further documents are listed in the continuation of Box C. ☐ 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
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"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	Date of mailing of the international search report
03 July 2019 (03.07.2019)	10 JUL 2019
Name and mailing address of the ISA/US **COMMISSIONER FOR PATENTS MAIL STOP PCT, ATTN: ISA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, UNITED STATES OF AMERICA** Facsimile No. **(571)273-8300**	Authorized officer **HARRY C. KIM** Telephone No. **571-272-4300**