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(54) **LIGHTING INCLUDING INTEGRAL COMMUNICATION APPARATUS**

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(51) **Int. Cl.**
F21V 33/00 (2006.01)

(52) **U.S. Cl.**
USPC **362/276**; 362/234; 362/253

(58) **Field of Classification Search**
USPC 362/276, 234, 253, 295, 394, 411, 800, 362/802, 217.01–217.09, 217.1–217.17, 362/218–225
See application file for complete search history.

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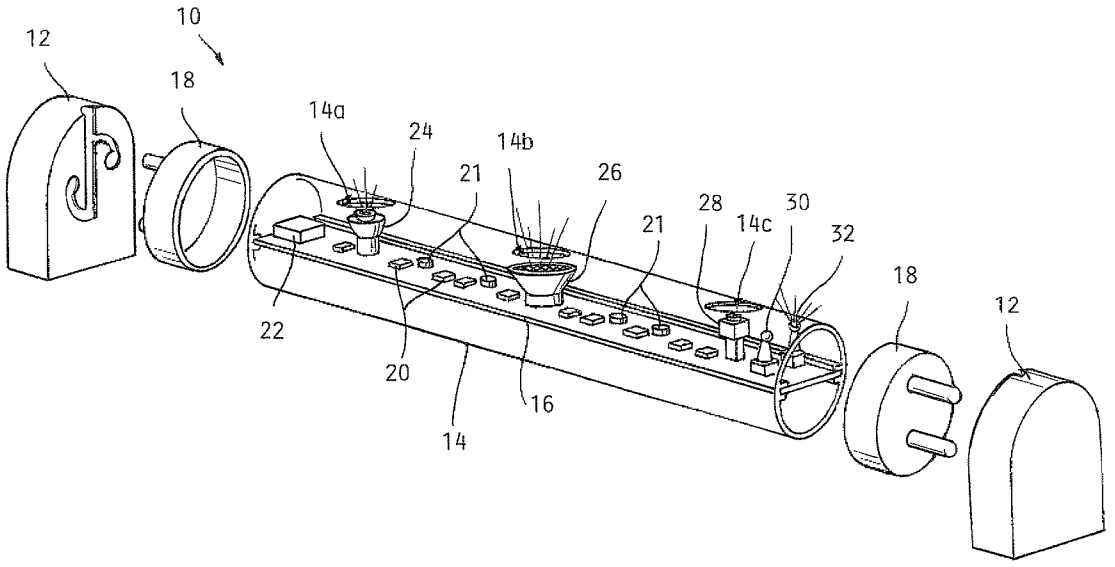
(57) **ABSTRACT**

A lighting and communication system for use in a standardized light fixture is provided. The lighting and communication system includes a light source and a communication apparatus. At least one electrical connector configured for physical and electrical connection to the standardized light fixture is included, and the at least one electrical connector is electrically connected to the light source and the communication apparatus.

13 Claims, 4 Drawing Sheets



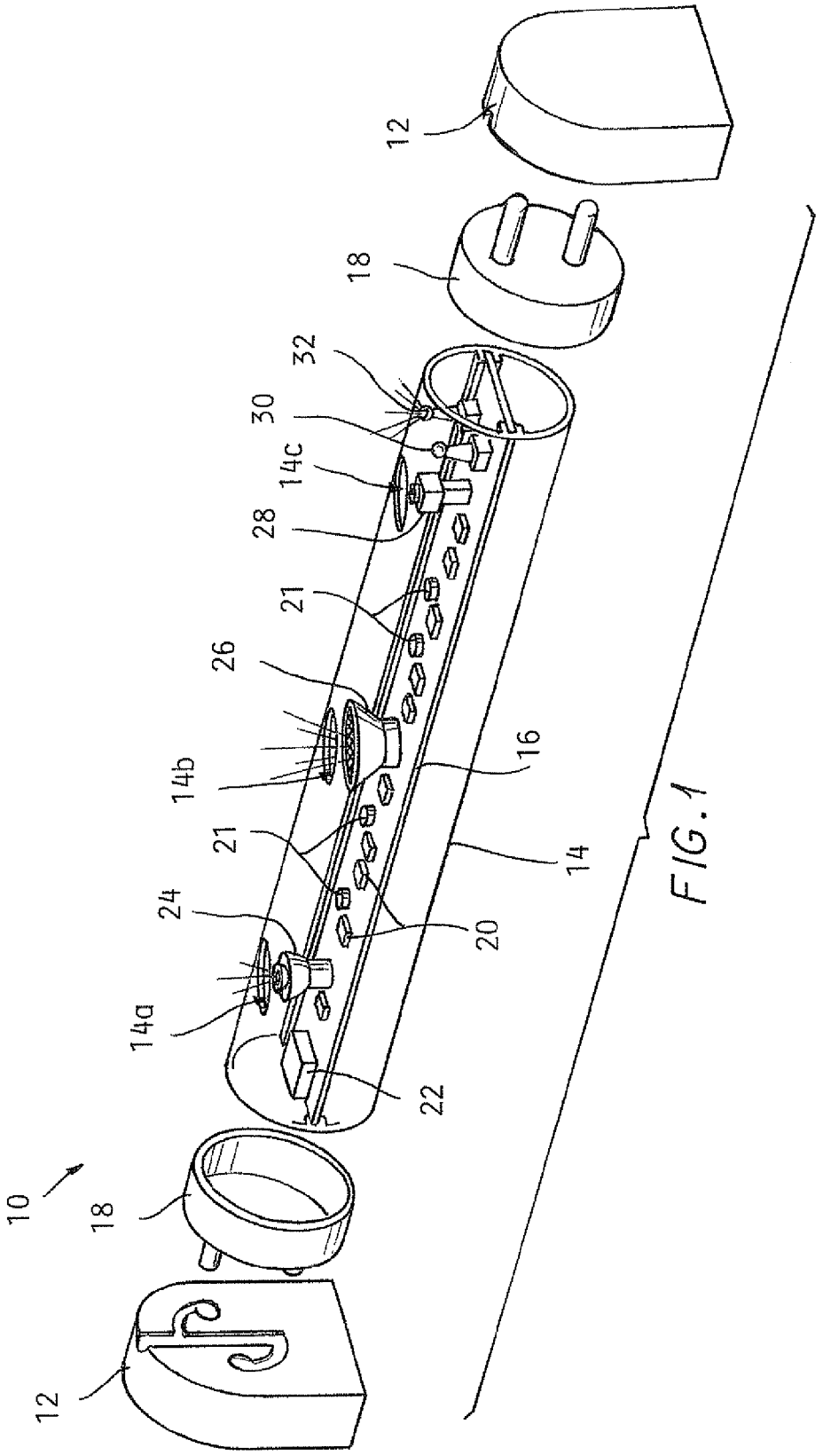


FIG. 1

FIG. 2

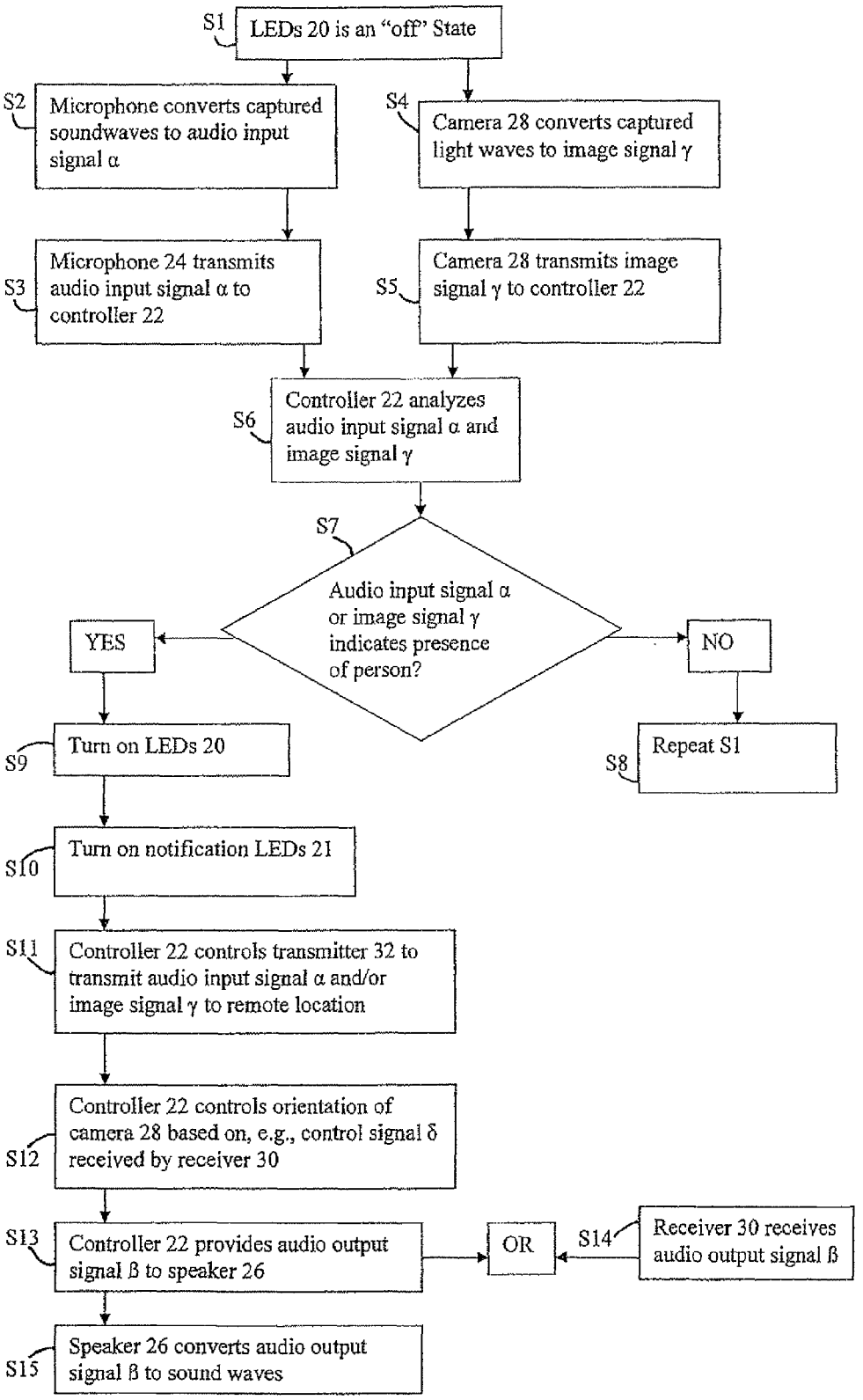
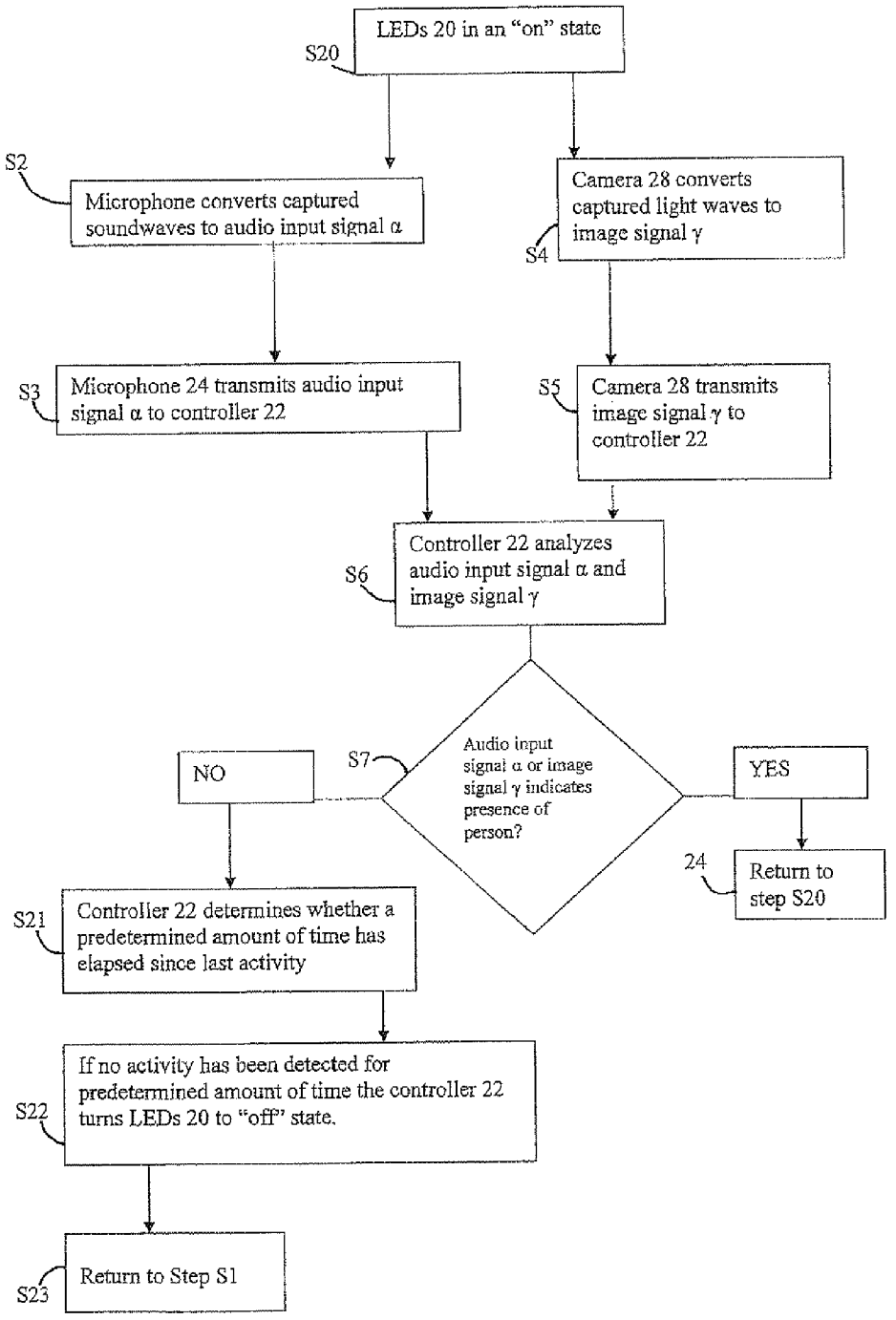

S1
LEDs 20 is an "off" State
S2
Microphone converts captured soundwaves to audio input signal α
S4
Camera 28 converts captured light waves to image signal γ
S3
Microphone 24 transmits audio input signal α to controller 22
S5
Camera 28 transmits image signal γ to controller 22
S6
Controller 22 analyzes audio input signal α and image signal γ
S7
Audio input signal α or image signal γ indicates presence of person?
YES
NO
S9
Turn on LEDs 20
S8
Repeat S1
S10
Turn on notification LEDs 21
S11
Controller 22 controls transmitter 32 to transmit audio input signal α and/or image signal γ to remote location
S12
Controller 22 controls orientation of camera 28 based on, e.g., control signal δ received by receiver 30
S13
Controller 22 provides audio output signal ß to speaker 26
OR
S14
Receiver 30 receives audio output signal ß
S15
Speaker 26 converts audio output signal ß to sound waves

Fig. 3


S20
LEDs 20 in an "on" state
S2
Microphone converts captured soundwaves to audio input signal α
S4
Camera 28 converts captured light waves to image signal γ
S3
Microphone 24 transmits audio input signal α to controller 22
S5
Camera 28 transmits image signal γ to controller 22
S6
Controller 22 analyzes audio input signal α and image signal γ
S7
Audio input signal α or image signal γ indicates presence of person?
NO
YES
24
Return to step S20
S21
Controller 22 determines whether a predetermined amount of time has elapsed since last activity
S22
If no activity has been detected for predetermined amount of time the controller 22 turns LEDs 20 to "off" state.
S23
Return to Step S1

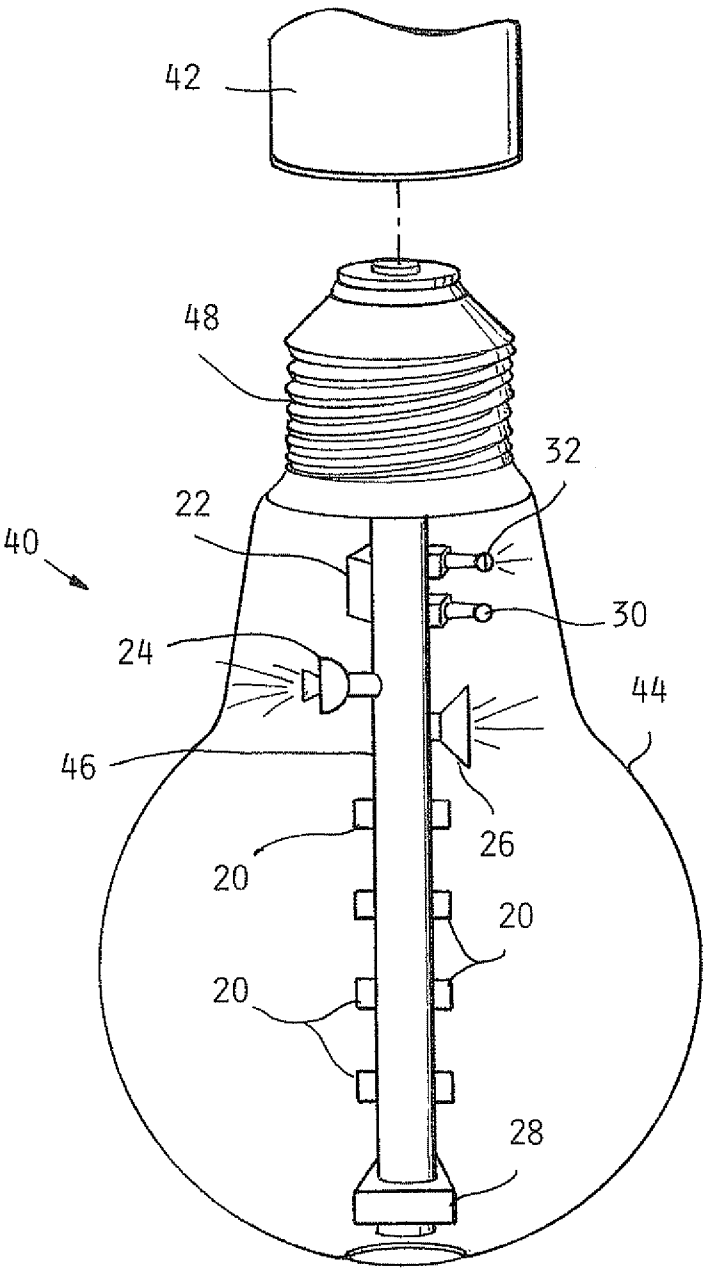


FIG. 4

LIGHTING INCLUDING INTEGRAL COMMUNICATION APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 12/985,049, filed Jan. 5, 2011, which is a continuation of U.S. patent application Ser. No. 12/257,691, filed Oct. 24, 2008, both of which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

The present invention relates to building communication systems, and more particularly to integrating building communication system components with building lighting.

BACKGROUND

Many buildings have lighting systems. For example, many commercial buildings include fluorescent lighting fixtures for use with fluorescent tubes, though other types of lighting systems using other types of lights (e.g., incandescent lights) may also be used. Fixtures are typically hard-wired to a power source, such as an electric utility line. The lighting system may produce a generally constant flux of light so long as a switch controlling the lighting system is in an "on" position. Typically, the sole function of lighting systems is providing light.

Many buildings also have one or more sound systems. For example, an alarm sound system may be part of an alarm system for notifying building occupants of an emergency. While alarm sound systems may include emergency lighting, the emergency lighting is typically active only during the emergency to supplement the notice of the emergency provided by the alarm sound. The emergency lighting included with some sound systems, such as a strobe light, is typically not designed to provide normal lighting for a building. Another type of sound system includes speakers for making announcements. Such speakers typically do not include lighting. Sound systems, including both the alarm sound system and announcement speakers, typically are separate from and operate independently of lighting systems.

Many buildings also have one or more cameras for security purposes. Most cameras are separate from and operate independently of both lighting systems and sound systems.

BRIEF SUMMARY

Embodiments of the present invention provide a lighting and communication system for use in a standardized light fixture. In one example,

Embodiments of a lighting and communication system for use in a standardized fluorescent fixture are disclosed herein. In one such embodiment, the lighting and communication system includes a light source, a communication apparatus and a housing at least partially enclosing the light source and the communication apparatus. The system also includes at least one end cap configured for physical and electrical connection to the standardized light fixture. The at least one end cap is electrically connected to the light source and the communication apparatus and includes a pair of pin-carrying connectors. The housing and the pair of pin-carrying connectors at least partially define a single package sized for use in the standardized fluorescent fixture.

In another embodiment, the light the lighting and communication system includes at least one LED, a communication apparatus configured to generate a signal useable by a controller to control a brightness of the at least one LED and a pair of pin-carrying connectors for physical and electrical connection to the fluorescent fixture. The connectors are electrically connected to the at least one LED and the communication apparatus.

Embodiments of a lighting and communication system for use in a standardized light fixture are disclosed herein. The lighting and communication system includes a light source, a communication apparatus, a controller operative to control a brightness of the light source in response to an input signal received from the communication apparatus and a housing at least partially enclosing the light source and the communication apparatus. The system also includes at least one connector configured for physical connection to the standardized light fixture. The housing and the connector at least partially define a single package sized for use in the standardized light fixture.

These and other embodiments will be described in additional detail hereafter.

BRIEF DESCRIPTION OF THE DRAWINGS

The description herein makes reference to the accompanying drawings wherein like reference numerals refer to like parts throughout the several views, and wherein:

FIG. **1** is a perspective view of an example of a light and communication system;

FIG. **2** is a flowchart showing an example of the light and communication system of FIG. **1** in operation;

FIG. **3** is a flowchart showing another example of the light and communication system of FIG. **1** in operation; and

FIG. **4** is a perspective view of another example of a light and communication system.

DETAILED DESCRIPTION

Examples of light and communication systems according to the invention are discussed with reference to FIGS. **1-4**. FIG. **1** illustrates a light and communication system **10** for use in a standard fixture **12**, such as a fixture designed to accept T5, T8, T10, or T12 tubes. As such, the system **10** can have the shape of a standard tube, i.e., the shape of a T5, T8, T10, or T12 tube, or otherwise be shaped for compatibility with the standard fixture **12**. Alternatively, another example of a light and communication system can have an alternative shape from the illustrated system **10** for use in fixtures that accept other types of standard sized lights, such as the shape of an incandescent bulb as shown in FIG. **4** or standard sized halogen lamps. However, all examples of light and communication systems need not be compatible with the fixture **12** or another type of standard fixture. That is, yet another example of a light and communication system can be powered by a battery or connected to a power source by means such as hard-wiring the system to a power source.

As shown in FIG. **1**, the light and communication system **10** includes a housing **14**, a circuit board **16**, a pair of end caps **18**, LEDs **20**, a controller **22**, an audio device including a microphone **24** and a speaker **26**, a camera **28**, a receiver **30**, and a transmitter **32**. The housing **14** as shown in FIG. **1** is a light transmitting cylindrical tube. The housing **14** can be made from polycarbonate, acrylic, glass or another light transmitting material (i.e., the housing **14** can be transparent or translucent). For example, a translucent housing **14** can be made from a composite, such as polycarbonate with particles

of a light refracting material interspersed in the polycarbonate. While the illustrated housing **14** is cylindrical, a housing having a square, triangular, polygonal, or other cross sectional shape can alternatively be used. Similarly, while the illustrated housing **14** is linear, a housing having an alternative shape, e.g., a U-shape or a circular shape can alternatively be used. Additionally, the housing **14** need not be a single piece as shown in FIG. **1**. Instead, another example of a housing can be formed by attaching multiple individual parts, not all of which need be light transmitting. For example, such a housing can include an opaque lower portion and a lens or other transparent cover attached to the lower portion to cover the LEDs **20**. The housing **14** can be manufactured to include light diffusing or refracting properties, such as by surface roughening or applying a diffusing film to the housing **14**. For compatibility with the fixture **12** as discussed above, the housing **14** can have a length such that the light **10** is approximately 48" long, and the housing **14** can have a 0.625", 1.0", or 1.5" diameter. The housing **14** can define first, second, and third apertures **14***a*, **14***b*, and **14***c* as discussed below.

The circuit board **16** as illustrated in FIG. **1** is an elongate printed circuit board. Multiple circuit board sections can be joined by bridge connectors to create the circuit board **16**. The circuit board **16** as shown in FIG. **1** is slidably engaged with the housing **14**, though the circuit board **16** can alternatively be clipped, adhered, snap- or friction-fit, screwed or otherwise connected to the housing **14**. For example, the circuit board **16** can be mounted on a heat sink that is attached to the housing **14**. Also, other types of circuit boards may be used, such as a metal core circuit board. Or, instead of a circuit board **16**, other types of electrical connections (e.g., wires) can be used to electrically connect the LEDs **20** to a power source.

The light and communication system **10** can include two bi-pin end caps **18** (i.e., each end cap **18** can carry two pins), one at each longitudinal end of the housing **14**, for physically and electrically connecting the system **10** to the fixture **12**. The end caps **18** can be the sole physical connection between the light and communication system **10** and the fixture **12**. The end caps **18** can be electrically connected to the circuit board **16** to provide power to the LEDs **20** and other components (e.g., the microphone **24**, speaker **26**, and camera **28**). Each end cap **18** can include two pins, though two of the total four pins can be "dummy pins" that do not provide an electrical connection. Alternatively, other types of electrical connectors can be used, such as an end cap carrying a single pin. Also, while the end caps **18** are shown as including cup-shaped bodies, apparatuses having a different configuration can alternatively be used (e.g., plugs lodged in ends of the housing **14** can carry pins or other electrical connectors). One or both of the end caps **18** can additionally include electric components, such as a rectifier and filter.

The LEDs **20** can be surface-mount devices of a type available from Nichia, though other types of LEDs can alternatively be used. For example, although surface-mounted LEDs **20** are shown, one or more organic LEDs can be used in place of or in addition thereto. The LEDs **20** can be mounted to the circuit board **16** by solder, a snap-fit connection, or other means. The LEDs **20** can produce white light. However, LEDs that produce blue light, ultra-violet light or other wavelengths of light can be used in place of white light emitting LEDs **20**. Additionally, notification LEDs **21** can be included. Notification LEDs **21** can be identical to LEDs **20**, except notification LEDs **21** can produce a different color of light than LEDs **20** (e.g., if the LEDs **20** produce white light as described above, notification LEDs **21** can produce red light).

The number of LEDs **20** can be a function of the desired amount of light produced by the light and communication system **10** and the power of the LEDs **20**. For a 48" light, such as the illustrated light and communication system **10**, the number of LEDs **20** can vary from about five to four hundred such that the system **10** outputs approximately 500 to 3,000 lumens. However, a different number of LEDs **20** can alternatively be used, and the system **10** can output a different amount of lumens. The LEDs **20** can be evenly spaced along the circuit board **16**, and the spacing of the LEDs **20** can be determined based on, for example, the light distribution of each LED **20** and the number of LEDs **20**.

The controller **22** can be digital and include a CPU and a memory, such as RAM or another type of memory, though a controller including analog circuits can be used. The controller **22** can be mounted on the circuit board **16** to receive power from one or both of the end caps **18**, though the controller **22** can be coupled to a different power source such as a battery. The controller **22** can also be in communication with the LEDs **20** and **21**, the microphone **24**, the speaker **26**, the camera **28**, the receiver **30**, and the transmitter **32**. The memory can store a program for determining an operating mode of at least some components of the system **10**, such as the LEDs **20**, the microphone **24**, the speaker **26**, and the camera **28**. Additionally, the memory can store sound files for transmission to the speaker **26**, and the memory can include empty space for storing sound files corresponding to sounds captured by the microphone **24**. The functionality of the controller **22** is discussed below in greater detail in reference to FIGS. **2** and **3**.

The audio device can include the microphone **24** and the speaker **26** as mentioned above. The microphone **24** can be positioned to capture sound waves produced outside the housing **14**. For example, the housing **14** can define the first aperture **14***a*, and the microphone **24** can be positioned adjacent the first aperture **14***a* such that sound waves produced outside the housing **14** can reach the microphone **24** to avoid sound waves having to pass through the housing **14** to reach the microphone **24**. While not illustrated, the microphone **24** can substantially fill the aperture **14***a*, and a seal can be included between the microphone **24** and aperture **14***a* to protect the circuit board **16** and other components inside the housing **14**. As another example, the microphone **24** can be mounted to an exterior of the housing **14**. The microphone **24** can be in communication with the controller **22** and/or the transmitter **32**. The microphone **24** can be mounted on the circuit board **16** for receiving power passing from the fixture **12** to the circuit board **16** via at least one of the end caps **18** and for communicating the audio input signal to the controller **22** and/or the transmitter **32**. Alternatively, the microphone **24** can be powered by another power source (e.g., a battery). The microphone **24** can produce an audio input signal α corresponding to captured sound waves, and the microphone **24** can communicate the audio input signal α to the controller **22** and the transmitter **32**.

The speaker **26** can be positioned to produce sound waves that travel outside the housing **14**. For example, the housing **14** can define the second aperture **14***b*, and the speaker **26** can be positioned adjacent to the second aperture **14***b* such that sound waves produced by the speaker **26** can pass unobstructed (e.g., without having to pass through the housing **14**) to an area outside the housing **14**. While not illustrated, the speaker **26** can substantially fill the aperture **14***b*, and a seal can be included between the speaker **26** and aperture **14***b* to protect the circuit board **16** and other components inside the housing **14**. Alternatively, the speaker **26** can be mounted at an alternative location, such as on an exterior of the housing

14. The speaker 26 can be mounted on the circuit board 16 for receiving power passing from the fixture 12 to the circuit board 16 via at least one of the end caps 18, though the speaker 26 can alternatively be powered by another power source (e.g., a battery), and for communication with the controller 22 and/or the receiver 30. The speaker 26 can transform an audio output signal β communicated from the controller 22 or receiver 30 into audible sound waves. Additionally, more than one speaker 26 can be included.

The camera 28 can be positioned to capture video or still images of an area outside the housing 14. For example, the housing 14 can define the third aperture 14*c*, and a lens of the camera 28 can be positioned adjacent the third aperture 14*c* such that light waves can pass unobstructed from outside the housing 14 to the lens of the camera 28. While not illustrated, the camera 28 can substantially fill the aperture 14*c*, and a seal can be included between the camera 28 and aperture 14*c* to protect the circuit board 16 and other components inside the housing 14. As another example, the camera 28 can be mounted on an exterior of the housing 14, or the camera 28 can be mounted to face a transparent portion of the housing 14 through which the camera 28 can capture images. The camera 28 can be electrically coupled to the circuit board 16 to receive power from the end caps 18 and for communication with the controller 22 and/or the transmitter 30. Alternatively, the camera 28 can be powered by another source (e.g., a battery), and the camera 28 can communicate with the controller 22 and/or transmitter 30 wirelessly or via a hard-wire not integral with the circuit board 16. The camera 28 can also include additional equipment. For example, the camera 28 can be mounted on a motorized pivot for movement tracking of an object moving relative to the system 10, or the camera 28 can be mounted on an adjustable pivot such that the camera 28 can be oriented to capture images of a certain area of a room when installed in the fixture 12. The camera 28 can output an image signal γ corresponding to either still images or video to the controller 22 and/or transmitter 32.

The receiver 30 can be in communication with a remote source, such as a security center, for receiving the audio output signal β. The receiver 30 can be in wireless communication with the remote source using a standard wireless protocol such as IEEE 802.11, a protocol for radio communication, Bluetooth, a cellular standard (e.g., 3G), or another wireless protocol. Alternatively, the receiver 30 can be hard-wired in communication with the remote source using a telephone line, an Ethernet line, an electrical line, or another physical coupling. The receiver 30 can be mounted on the circuit board 16 for receiving power from the end caps 18 and for communication with the controller 22 and/or the speaker 26. Alternatively, the receiver 30 can be powered by a different source (e.g., a battery) and be coupled to the controller 22 and/or speaker 26 wirelessly or through a hard wire not integral with the circuit board 16. The receiver 30 can receive also receive a control signal δ including instructions for controlling the LEDs 20, the notification LEDs 21, the speaker 26, and/or the camera 28.

The transmitter 32 can also be in communication with the remote source for transmitting at least one of the audio input signal α and the image signal γ to the remote source. The transmitter 32 can be in wireless communication with the remote source using one of the wireless protocols mentioned above, or the transmitter 32 can be hard-wired to the remote source. The transmitter 32 can be mounted on the circuit board 16 for receiving power from the end caps 32 and for communication with the controller 22, the microphone 24, and/or the camera 28. Alternatively, the transmitter 30 can be powered by a different source (e.g., a battery) and can be coupled to the controller 22, audio device, and/or camera 28 wirelessly or through a hard wire not integral with the circuit board 16.

The system 10 can perform several functions when installed in the fixture 12. For example, as shown in FIG. 2, in step S1 the LEDs 20 are in an "off" state. That is, the controller 22 is not providing power to the LEDs 20. In step S2, the microphone 24 can capture sound waves and convert the sound waves to generate the audio input signal α. In step S3, the microphone 24 can transmit the audio input signal α to the controller 22. Similarly, in steps S4 and S5, respectively, the camera 28 can capture light waves and convert the light waves to generate the image signal γ and transmit the image signal γ to the controller 22. Alternatively, only one set of steps S2 and S3 or steps S4 and S5 can be performed. Additionally or alternatively, the microphone 24 and camera 28 can transmit the audio input signal α and the image signal γ, respectively, to the transmitter 32. Also, while the process of FIG. 2 is described as occurring while the LEDs 20 are in an "off" state, a similar process can be performed when the LEDs 20 are in an "on" state as is described below with reference to FIG. 3.

In step S6, the controller 22 analyzes the audio input signal α and the image signal γ. For example, the controller 22 can analyze the audio input signal α to determine whether a sound over a predetermined volume is produced, whether a spike in sound to a predetermined level greater than a level of normal background noise is produced, whether a series of sounds at similar frequency to footsteps are produced, whether a sound corresponding to human speech is produced, or whether some other sound indicative of the presence of a person is produced. Similarly, the controller 22 can analyze the image signal γ by performing a facial recognition analysis, comparing successive images of video to detect a moving object, or performing another analysis. In step S7, the controller 22 determines whether a person is present based on the analysis of step S6. Alternatively, the controller 22 can analyze the audio input signal α and the image signal γ for the presence of something other than a person, such as a fire if the camera 28 is an infrared camera. Also, instead of or in addition to steps S6 and S7, the transmitter 32 can transmit the audio input signal α and the image signal γ to the remote location, and personnel at the remote location can select an appropriate course of action and transmit the control signal δ to the receiver 30.

In step S8, the controller 22 determines that no person is present, in which case the LEDs 20 remain in the "off" state and the process can be repeated continuously or after a predetermined time. Step S9, however, can be performed if the controller 22 determines that a person is present. In this case, any of steps S9 through S15 can be performed, though in another example fewer than all of steps S9 and S15 can be performed.

In step S9, the controller 22 turns on the LEDs 20. The controller 22 can turn the LEDs 20 on to operate in a normal mode in which the LEDs 20 produce a generally constant flux of light, or the controller 22 can operate the LEDs 20 in an alarm mode in which the LEDs 20 flash or produce some other pattern of light. Similarly, in step S10, the controller 20 can turn on the notification LEDs 21, thereby producing a red light that can provide a warning or other message to a viewer.

Additionally, in step S11, the controller 22 can instruct the transmitter 32 to transmit the audio input signal α and the image signal γ to the remote location. Thus, personnel at the remote location can take appropriate action, such as transmitting the control signal δ to the receiver 30, or the audio input signal α and the image signal γ can be recorded for later viewing. Step S12 shows an example of personnel at the remote location transmitting the control signal δ to the con-

troller **22** via the receiver **30**. As shown, the control signal δ can include an instruction for the controller **22** to change the orientation of the camera **28** (e.g., by controlling a motor coupled to a pivot on which the camera **28** is mounted).

In step S**13**, the controller **22** can provide the audio output signal β from its memory to the speaker **26**. The audio output signal β can correspond to an alarm sound, a pre-recorded warning (e.g., "Exit the building."), or some other sound. In step S**15**, the speaker **26** can convert the audio output signal β into sound waves. Instead of having the speaker **26** produce the audio output signal β as stored on the memory portion of the controller **22**, step S**14** shows an additional example of a response of personnel at the remote location in which the personnel transmit the audio output signal β to the receiver **30**. In this case, the audio output signal β can be, for example, a message spoken by personnel at the remote location. This audio output signal β can also be converted to sound waves by the speaker **26** in step S**15**.

Another function of the light and communication system **10** is shown in FIG. **3**. In step S**20**, the LEDs **20** are in an "on" state. Steps S**2** through S**6** can be then be performed as described with reference to FIG. **2**. However, while steps S**2** through S**7** are continuing to be performed continuously or at intervals, the controller **22** in step S**21** determines whether a predetermined amount of time (e.g., five minutes) have passed since activity indicating the presence of a person was last detected in step S**7**. As shown in step S**22**, if no person has been detected for the predetermined amount of time, the controller **22** can turn off the LEDs **20**. After turning the LEDs **20** off, the controller **22** can return to step S**1** as shown in FIG. **2**.

Additionally, the light and communication system **10** can perform other functions. For example, when a building is in an unoccupied state (e.g., at night or over a vacation period), the controller **22** can provide power to the LEDs **20** at times to give the appearance of activity in the building. Providing power to the LEDs **20** when the building in an unoccupied state can give the appearance of activity in the building to deter trespassers from entering the building. As another example, while the example discussed above in reference to FIG. **2** describes the camera **28** as providing the image signal γ to the remote location upon the detection of the presence of a person, the camera **28** can alternatively provide the image signal γ at a certain time interval (e.g., every fifteen seconds) for analysis by security personnel or to be stored for review in the event a break-in or other incident occurs. As yet another example, the controller **22** can turn on the camera **28**, record images captured by the camera, or cause the images captures by the camera **28** to be sent to the remote location based on the audio input signal α (e.g., when the audio input signal α indicates the presence of a person).

The light and communication system **10** offers many advantages. The system **10** can be installed in the standard fixture **12** with no additional wiring, as the entire system **10** can be contained in a single package defined by the housing **14** and end caps **18**, allowing for easy and inexpensive implementation of a communication system in a building. The system **10** can be installed in a "smart" building for communication with other components. For example, the receiver **30** can receive the control signal δ from a door ajar sensor separate from the system **10** with instructions to turn on the LEDs **20**. Alternatively, the system **10** can be installed in a conventional building to transform the building into a "smart" building.

While the system **10** is shown and described as including the microphone **24**, the speaker **26**, the camera **28**, the receiver **30**, and the transmitter **32**, another example of the light and communication system can include fewer components (e.g., another example of the system may not include the receiver **30**). Also, while the controller **22**, audio device, camera **28**, receiver **30**, and transmitter **32** are described as separate components, one or more of the components can be integral (e.g., single component can function as both the receiver **30** and transmitter **32**).

FIG. **4** shows another example of a light and communication system **40** for installation in a standard incandescent socket **42** as mentioned above. A bulb shaped housing **44** can enclose a circuit board **46** in electrical communication with a standard screw base **48**, such as an E26 Edison threaded screw base. LEDs **20**, the controller **22**, the microphone **24**, the speaker **26**, the camera **28**, the receiver **30**, and the transmitter **32** can be mounted on the circuit board **46**. The camera **28** can be mounted near a tip of the bulb for a wide viewing angle, or multiple cameras **28** can be used.

The above-described embodiments have been described in order to allow easy understanding of the invention and do not limit the invention. On the contrary, the invention is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under the law.

What is claimed is:

1. A lighting and communication system for use in a standardized fluorescent fixture, the lighting and communication system comprising:

a light source adapter to produce a generally constant flux of light to at least partially satisfy a general lighting requirement in an area surrounding the system:

a communication apparatus configured to generate one or more signals indicative of a presence of a person in the area;

a housing at least partially enclosing the light source and the communication apparatus;

at least one end cap including a pair of pin-carrying connectors configured at least for physical connection to the fixture, wherein the housing and the pair of pin-carrying connectors at least partially define a single package sized for use in the fixture; and

a controller operative to control the light source in response to the one or more signals to produce a generally constant flux of light.

2. The lighting and communication system of claim **1**, wherein the light source includes at least one LED.

3. The lighting and communication system of claim **1**, wherein the communication apparatus is at least one of an audio device or a camera.

4. The lighting and communication system of claim **3**, wherein the audio device includes a speaker, and further comprising:

a receiver configured to receive an audio signal; and

wherein the speaker is operable to output sound in response to the audio signal.

5. The lighting and communication system of claim **3**, wherein the communication apparatus includes a memory operative to store a recording; and

wherein the audio device is operative to produce a sound corresponding to the recording.

6. The lighting and communication system of claim **1**, wherein the light source includes multiple LEDs arranged along a length of the housing.

7. An LED-based light including a lighting and communication system for use in a fluorescent fixture, the LED-based light comprising:

a light source including at least one LED and adapted to produce a generally constant flux of light to at least partially satisfy a general lighting requirement in an area surrounding the LED-based light;

a communication apparatus configured to generate a signal useable by a controller to control a brightness of the at least one LED, wherein the communication apparatus is at least one of an audio device or a camera configured to generate one or more signals indicative of a presence of a person in the area;

a pair of pin-carrying connectors for physical and electrical connection to the fluorescent fixture, the connectors electrically connected to the at least one LED and the communication apparatus; and

a controller operative to control the light source in response to the one or more signals to produce a generally constant flux of light.

8. The LED-based light of claim **7**, further comprising:

a receiver configured to receive an audio signal;

wherein the audio device includes a speaker operable to output sound in response to the audio signal.

9. The LED-based light of claim **7**, further comprising:

a housing including a light transmitting portion;

wherein the at least one LED is oriented to produce light through the light transmitting portion; and

wherein the housing and the pair of pin-carrying connectors define a single package at least partially enclosing the at least one LED and the communication apparatus.

10. The lighting and communication system of claim **1**, wherein at least one of the pair of pin-carrying connectors is further configured for electrical connection to the fixture; and

wherein the at least one of the pair of pin-carrying connectors is electrically connected to the light source and the communication apparatus.

11. The lighting and communication system of claim **1**, wherein the housing includes a light transmitting portion; and

wherein the plurality of LEDs is oriented to produce light through the light transmitting portion.

12. The lighting and communication system of claim **1**, further comprising:

a battery electrically connected to at least one of the light source and the communication apparatus.

13. The lighting and communication system of claim **1**, wherein the communications apparatus comprises:

a camera and an audio device including a microphone; and

a transmitter to transmit at least one of audio captured by the microphone and an image captured by the camera.

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