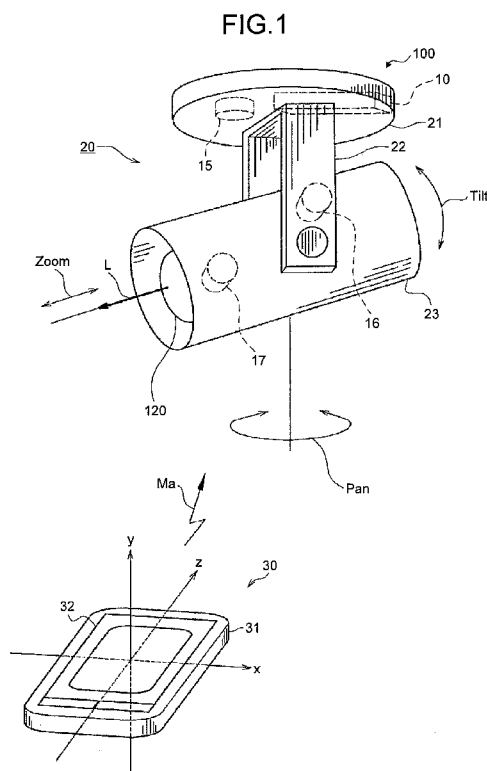




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(54) Title: ADJUSTABLE APPARATUS SYSTEM



(57) Abstract: An adjustable apparatus system (100) includes an apparatus (20) configured to control a part (120) of the apparatus (20), and a remote-control device (30) configured to transmit a control signal to instruct to control the part (120). The remote-control device (30) includes: a detection unit (36) configured to detect movement of a housing (31) of the remote-control device (30); an operating element (336) configured to be operated by an operator; a control unit (34) configured to recognize, as an operation starting point, a position of the housing (31) when the operating element (336) is operated, and to generate the control signal based on a history of the movement of the housing (31) from the operation starting point; and a transmission unit (35) configured to transmit the control signal to the apparatus (20).



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DESCRIPTION

ADJUSTABLE APPARATUS SYSTEM

Field

The present invention relates to an adjustable
5 apparatus system including an apparatus that can drive its
part, and a remote-control device that remotely controls
the apparatus.

Background

Some of the recent light fixtures have a function of
10 rotationally moving an optical axis of the light to a
location where a user wants to illuminate, using a remote
controller. Such light fixtures are called moving lights.
The use of the moving light saves time and effort to move
the light through physical contact with its main body, as
15 with a known light fixture.

The moving light has multiple functions such as
panning, tilting, zooming, dimming, and turning on/off. A
remote controller of the moving light includes multiple
buttons corresponding to these multiple functions. When
20 operating the moving light with the remote controller, an
operator may operate an unintended button unless he/she
checks an operation screen of the remote controller once
prior to the operation. For example, in order to show a
target object more beautifully by the light from the moving
25 light, fine position adjustments are required by panning
and tilting. The operator needs to repeat, in the position
adjustments, the operation of visually checking a location
illuminated by the moving light, checking the operation
screen of the remote controller, and pressing a desired
30 button. This requires the operator's complicated work.
Accordingly, it may become a factor to significantly reduce
operability.

Patent Literature 1 discloses an example of a

technology for remotely controlling an apparatus having multiple functions without placing multiple buttons on a remote-control device. Paragraph 0008 of Patent Literature 1 describes that "according to the remote-control device, the operation instruction signal for instructing the electronic apparatus about an operation is transmitted according to how the housing is moving. Therefore, the user moves the housing to enable the operation of an electronic apparatus." Consequently, as described in paragraph 0027 of the literature, there are the following effects: "the housing 11 of the remote-control device 1 is moved to enable remote control of the television receiver being a control target; accordingly, operations such as finding an operation button corresponding to volume up/down or each channel, and pressing the operation button are not required; therefore, it is possible to significantly reduce the burden of the user who operates the television receiver."

Citation List

20 Patent Literature

Patent Literature 1: Japanese Laid-open Patent

Publication No. 2007-151152

Summary

Technical Problem

25 As described in paragraphs 0011 to 0018 in Patent Literature 1, while the operating element is being pressed, the remote-control device detects the how the housing of the remote-control device is moving by the inclination sensor and the acceleration sensor, and generates an instruction signal associated with the movement with
30 reference to the table for signal generation. In other words, the instruction signal is cyclically generated in accordance with the housing of the remote-control device

has moved.

However, if remote control is performed mainly for the purpose of adjusting the direction and the position such as the illumination direction and the focal length of the moving light, there is a problem that the operability is poor. If, for example, the illumination direction of the moving light (adjustable lighting apparatus) is intended to be changed by the remote-control device of Patent Literature 1, its procedure is as follows.

10 Firstly, the operator inclines the housing in a right rotation direction while pressing an operation button of the remote-control device. Consequently, the remote-control device transmits an instruction signal in accordance with the inclination to the moving light. The moving light starts moving rotationally to the right.

When the operator has recognized that the moving light moved rotationally to a target position, he/she returns the inclination of the housing of the remote-control device to the horizontal position, or stops pressing the operation button. Consequently, the remote-control device stops transmitting the instruction signal. Accordingly, the moving light stops moving rotationally.

In these operations, a time lag occurs between when the operator recognizes the position of the moving light to when stop operating the remote-control device. Moreover, there also occur a time lag between when the remote-control device transmits a signal to when the moving light starts operating, and a time lag between when the remote-control device stops transmitting a signal to when the moving light stops operating. In other words, since time lags always occur, a situation in which the illumination direction of the moving light is moved too much or little with respect to a target direction easily occurs, and it is difficult to

make adjustments to the direction.

Hence, an object of the present invention is to provide an adjustable apparatus system that can easily adjust an apparatus by improving the operability of a remote-control device.

Solution to Problem

According to one aspect of the present invention, there is provided an adjustable apparatus system including: an apparatus configured to control a part of the apparatus; and a remote-control device configured to transmit a control signal to instruct to control the part. The remote-control device may include: a detection unit configured to detect movement of a housing of the remote-control device; an operating element configured to be operated by an operator; a control unit configured to recognize, as an operation starting point, a position of the housing when the operating element is operated, and to generate the control signal based on a history of the movement of the housing from the operation starting point; and a transmission unit configured to transmit the control signal to the apparatus.

According to another aspect of the present invention, there is provided an adjustable apparatus system including: an apparatus configured to control a part of the apparatus; and a remote-control device configured to transmit a control signal to instruct to control the part. The remote-control device may include: a detection unit configured to detect an angle of a housing of the remote-control device; an operating element configured to be operated by an operator; a control unit configured to recognize, as an initial angle, an angle of rotation of the housing when the operating element is operated, and to generate the control signal based on a history of rotation

from the initial angle; and a transmission unit configured to transmit the control signal to the apparatus.

Advantageous Effects of Invention

According to the present invention, it is possible to easily adjust an apparatus by improving the operability of a remote-control device.

Brief Description of Drawings

FIG. 1 is a perspective view illustrating an adjustable apparatus system in an embodiment of the present invention.

FIG. 2 is a block diagram illustrating a remote-control device and a moving light included in the adjustable apparatus system.

FIGS. 3(a) and 3(b) are diagrams illustrating screen transitions of the remote-control device.

FIGS. 4(a) and 4(b) are diagrams illustrating screen transitions of the remote-control device.

FIGS. 5(a) and 4(b) are diagrams illustrating methods for operating the remote-control device.

FIGS. 6(a) and 4(b) are flowcharts illustrating panning, tilting, and zooming operations of the remote-control device.

FIG. 7 is a diagram illustrating the starting point of an operation, rough adjustment motion, and fine adjustment motion.

FIG. 8 is a flowchart illustrating an adjustment process of the remote-control device.

FIG. 9 is a diagram illustrating a screen transition of the remote-control device in a modification.

FIG. 10 are flowcharts illustrating the panning, tilting, and zooming operations of the remote-control device in a modification.

FIG. 11 is a flowchart illustrating the adjustment

process of the remote-control device in a modification.

FIG. 12 is a diagram of the sequence of operations of the adjustable apparatus system in a case where the moving light is visible.

5 FIG. 13 is a diagram of the sequence of operations of the adjustable apparatus system in a case where the moving light is not visible.

Description of Embodiments

10 An embodiment of the present invention is described in detail hereinafter with reference to the drawings.

In the embodiment, a moving light is configured to be able to be operated with a few buttons on an operation screen, using an operation terminal in which a motion sensor is mounted, for example, a smartphone.

15 FIG. 1 is a perspective view illustrating an adjustable apparatus system 100 in the embodiment.

As illustrated in FIG. 1, the adjustable apparatus system 100 is configured to include a moving light 20 and a remote-control device 30 for remotely controlling the moving light 20. The moving light 20 is configured to include a left/right rotation unit 21, an arm 22 fixed to an undersurface of the left/right rotation unit 21, and a hood 23 held by the arm 22. Moreover, the remote-control device 30 is, for example, a smartphone and includes a touchscreen 32 on an upper surface of a housing 31.

25 In the moving light 20, the left/right rotation unit 21 includes a pan motor 15 and an adjustable control unit 10. The left/right rotation unit 21 is connected to a fixing portion of a ceiling and configured to be able to rotate to the left and right by the pan motor 15. Moreover, the left/right rotation unit 21 holds the arm 22 and also can pan the illumination direction of a light fixture 120 to the left and right with the rotation of the pan motor 15.

The hood 23 is held by the arm 22 and is configured to be able to rotate in the up and down direction by a tilt motor 16 attached to the arm 22. The illumination direction of the light fixture 120 can tilt up and down with the rotation of the tilt motor 16.

The hood 23 accommodates the light fixture 120 in it and is configured to be able to adjust the focal length of the light fixture 120 by a focus motor 17 and an unillustrated lens.

The remote-control device 30 generates a communication signal Ma that rotationally moves the light fixture 120 in accordance with a history of movement of the housing 31 at the time when the touchscreen 32 was operated, and transmits the generated communication signal Ma to the adjustable control unit 10 by Bluetooth (registered trademark). In terms of the direction of the movement of the housing 31, the vertically upward direction is the y axis, the rightward direction is the x axis, and the frontward direction is the z axis. The relationship between the attitude of the housing 31 and the x, y, and z axes is described in FIG. 5 described below.

An operator performs an operation of moving the housing 31 in the y-axis direction to rotate the tilt motor 16 in a forward direction. The moving light 20 moves upward with a stop position as the starting point of control. The rotation of the tilt motor 16 is reversed by an operation of moving the housing 31 in the opposite direction on the y axis. The moving light 20 moves downward with a stop position as the starting point of control. Consequently, the illumination direction tilts.

The operator performs an operation of moving the housing 31 in the x-axis direction likewise to rotate the pan motor 15 in a forward direction. The moving light 20

moves to the right with a stop position as the starting point of control. The rotation of the pan motor 15 is reversed by an operation of moving the housing 31 in the opposite direction on the x axis. The moving light 20
5 moves to the left with a stop position as the starting point of control. Consequently, the illumination direction pans.

The operator performs an operation of moving the housing 31 in the z-axis direction to rotate the focus
10 motor 17 in a forward direction. The focal length of the moving light 20 moves in a remote direction with a stop position as the starting point of control. The rotation of the focus motor 17 is reversed by an operation of moving the housing 31 in the opposite direction on the z axis.
15 The focal length of the moving light 20 moves in a proximity direction with a stop position as the starting point of control. Consequently, the focal length (Zoom) of the moving light 20 moves.

In other words, a motor corresponding to the
20 direction of a movement is rotated a specified amount by the operation of moving the housing 31 (the remote-control device 30). The illumination direction of the moving light 20 pans or tilts a specified amount of movement, or the focal length (zoom) moves a specified amount of movement.

25 The embodiment describes an example of adjusting (controlling), for example, the pan, tilt, and zoom states of the moving light 20. However, any of the pan, tilt, and zoom states may be adjusted (controlled). For example, pan, tilt, and zoom states may be adjusted (controlled), taking,
30 as a control target apparatus, a monitoring camera or a broadcasting apparatus such as a camera for broadcasting. The states of, for example, the focus and the projection angle with respect to a screen may be adjusted (controlled)

by motors, taking, as a control target apparatus, a projection apparatus represented by a liquid crystal projector or DLP projector (registered trademark).

Furthermore, a direction in which a TV faces may be
5 adjusted to the left or right. The wind direction of an air conditioner or electric fan may be adjusted to the up, down, left, or right, and the vertical position, horizontal position, or angle of an electric window, an electric blind, or an electric curtain may be adjusted.

10 The moving light 20 and the remote-control device 30 of the embodiment communicate bidirectionally with each other. The communication mode is an RF (radio Frequency) communication mode represented by, for example, ZigBee (registered trademark), WiFi (registered trademark), or
15 Bluetooth (registered trademark). The communication modes above are specific examples, and the communication mode is not limited thereto. Moreover, any communication mode is acceptable irrespective of wired or wireless.

FIG. 2 is a block diagram illustrating the remote-
20 control device 30 and the moving light 20 included in the adjustable apparatus system 100.

The remote-control device 30 includes the touchscreen 32, a motion sensor 36, a speaker 37, a two-way wireless communication unit 35, and a control unit 34 that controls
25 each unit of the remote-control device 30.

The control unit 34 (an example of control means) is for controlling each unit of the remote-control device 30, and is realized by, for example, a CPU (Central Processing Unit) executing a control program.

30 The touchscreen 32 is an electronic component that is configured to include a position input device stacked on, for example, a liquid crystal panel and can perform an input operation by pressing the display on the screen.

The motion sensor 36 (an example of detection means) is, for example, an acceleration sensor or gyro sensor (angular acceleration sensor), and is a component for detecting the position of the housing 31 and the movement of the housing 31. An acceleration sensor and a gyro sensor consume a specified amount of electric power while in operation. Accordingly, they are desired to be operated only upon, for example, transition to the operation screen.

The speaker 37 is a component for converting an audio signal into audio.

The two-way wireless communication unit 35 transmits and receives control signals to and from the moving light 20 via a wireless communication path.

The moving light 20 includes the pan motor 15, the tilt motor 16, the focus motor 17, and the adjustable control unit 10 that controls the motors. The adjustable control unit 10 includes a two-way wireless communication unit 12 that receives the communication signal Ma output from the remote-control device 30, a motor control unit 13 that controls the motors, and motor drive circuits 14-1 to 14-3. The adjustable control unit 10 controls the rotation speeds of the pan motor 15, the tilt motor 16, and the focus motor 17 in an adjustable manner. The pan motor 15, the tilt motor 16, and the focus motor 17 are simply described hereinafter as the motors 15 to 17 when they are not especially distinguished.

The two-way wireless communication unit 12 (an example of transmission means) receives the communication signal Ma output from the remote-control device 30, decodes the communication signal Ma, and outputs a receive signal Mb. The two-way wireless communication unit 12 extracts, from the communication signal Ma, an on signal or off signal, direction information (pan, tilt, zoom), and the

direction of the rotation of the motor, and then outputs these signals to the motor control unit 13. When having executing the instruction of the communication signal Ma, the two-way wireless communication unit 12 further

5 transmits an OK signal to the remote-control device 30.

The motor control unit 13 generates an instruction signal S1, S2, or S3 that controls the rotation speed of any of the motors 15 to 17 based on the receive signal Mb. When not being especially distinguished, the instruction
10 signals S1 to S3 are simply described hereinafter as the instruction signal S. The instruction signal S output to the motor drive circuit 14 by the motor control unit 13 includes an instruction for the direction of the rotation of the motor. For example, if the instruction signal S
15 falls below zero, the direction of the rotation of the motor is reversed.

The motor drive circuit 14-1 drives the pan motor 15 at a rotation speed in accordance with the instruction signal S1. The pan motor 15 adjusts the illumination
20 direction of the light fixture 120 to the left and right.

The motor drive circuit 14-2 drives the tilt motor 16 at a rotation speed in accordance with the instruction signal S2. The tilt motor 16 adjusts the illumination direction of the light fixture 120 upward or downward.

25 The motor drive circuit 14-3 drives the focus motor 17 at a rotation speed in accordance with the instruction signal S3. The focus motor 17 adjusts the focal length of the light fixture 120 frontward or backward.

FIGS. 3(a) and 3(b) are diagrams illustrating screen
30 transitions of the remote-control device 30.

FIG. 3(a) is a diagram illustrating an apparatus selection screen. The touchscreen 32 is provided to the front of the housing 31 of the remote-control device 30.

At this point in time, an apparatus button 331, an operation button 332, an apparatus list 333, and a scroll bar 333S of the apparatus list 333 are displayed on the touchscreen 32. At this point in time, the motion sensor 36 (refer to FIG. 2) is disabled.

The apparatus list 333 is a list that displays apparatuses targeted for operation in a selectable manner. The scroll bar 333S indicates a screen display area with respect to the entire apparatus list 333. The operator drags or swipes the apparatus list 333 to scroll the apparatus list 333. The position of the scroll bar 333S moves upward or downward on the screen with the scrolling of the apparatus list 333.

The apparatus button 331 is a button placed in the left half at the bottom of the screen. The operator taps the apparatus button 331 to transit to the apparatus selection screen.

The operation button 332 is a button placed in the right half at the bottom of the screen. The operator taps the operation button 332 to transit to the operation screen via a selection confirmation screen described below and illustrated in FIG. 3(b).

FIG. 3(b) is a diagram illustrating the selection confirmation screen.

At this point in time, on the touchscreen 32, a Yes button 334 and a No button 335 are displayed directly below the words "confirm that light 01 is on," and the apparatus button 331 and the operation button 332 are further displayed. At this point in time, the motion sensor 36 (refer to FIG. 2) is disabled.

The operator taps the Yes button 334 when having confirmed that the light 01 is on, and taps the No button 335 when having not confirmed that the light 01 is on. The

tap on the Yes button 334 causes the remote-control device 30 to transit to an operation screen of FIG. 4(a) described below. The tap on the No button 335 causes the remote-control device 30 to return to the apparatus selection screen of FIG. 3(a).

FIGS. 4(a) and 4(b) are diagrams illustrating screen transitions of the remote-control device 30.

FIG. 4(a) is a diagram illustrating the operation screen.

At this point in time, on the touchscreen 32, an adjustment button 336 (an example of an operating element) described as "light 01 adjustment button" is displayed, and the apparatus button 331 and the operation button 332 are further displayed. At this point in time, the motion sensor 36 (refer to FIG. 2) is enabled.

The operator moves the housing 31 up/down/left/right or back/forth while holding down the adjustment button 336. The operator removes his/her finger from the adjustment button 336 to cause the remote-control device 30 to transmit a control signal that controls the light 01. The light 01 is caused to pan/tilt or zoom.

Furthermore, when the adjustment of the light 01 is complete, the operator taps the apparatus button 331. The tap on the apparatus button 331 causes the remote-control device 30 to transit to the apparatus selection screen via an operation end screen described below.

FIG. 4(b) is a diagram illustrating the operation end screen.

At this point in time, on the touchscreen 32, a Yes button 337 and a No button 338 are displayed directly below the words "do you want to end the operation of light 01 and lock it?", and the apparatus button 331 and the operation button 332 are further displayed. At this point in time,

the motion sensor 36 (refer to FIG. 2) is disabled.

The operator taps the Yes button 337 if ending the operation of the light 01 and locking the light 01, and taps the No button 338 if not ending the operation of the light 01. The tap on the Yes button 337 causes the remote-control device 30 to transit to the apparatus selection screen of FIG. 3(b). The tap on the No button 338 causes the remote-control device 30 to return to the operation screen of FIG. 4(a).

10 FIGS. 5(a) and 5(b) are diagrams illustrating methods for operating the remote-control device 30.

FIG. 5(a) is a diagram illustrating an operation method in a state where the touchscreen 32 (an operation surface) of the remote-control device 30 faces upward.

15 When the operator moves the housing 31 of the remote-control device 30 up or down while holding down the adjustment button 336 and removes his/her finger from the adjustment button 336, the remote-control device 30 detects it as a movement in the y-axis direction and instructs the moving light 20 to tilt 10 degrees.

20 When the operator moves the remote-control device 30 to the left or right while holding down the adjustment button 336, and removes his/her finger from the adjustment button 336, the remote-control device 30 detects it as a movement in the x-axis direction and instructs the moving light 20 to pan 10 degrees.

25 When the operator moves the remote-control device 30 back or forth while holding down the adjustment button 336, and has removes his/her finger from the adjustment button 336, the remote-control device 30 detects it as a movement in the z-axis direction and instructs the moving light 20 to zoom a specified amount.

The control unit 34 integrates outputs of the motion

sensor 36 included in the remote-control device 30 to detect the x, y, and z axes. The y-axis direction is indicated by a negative gravitational acceleration vector. When the remote-control device 30 is held as in FIG. 1, the
5 x-axis direction is indicated by the rightward direction with respect to the housing 31, and the z-axis direction is indicated by the upward direction with respect to the housing 31. When viewed from the operator, the x-axis direction is the rightward direction and the z-axis
10 direction is the frontward direction.

In this manner, after the housing 31 moves up while the adjustment button 336 is being held down, the remote-control device 30 generates a control signal that rotates the light fixture 120 of the moving light 20 upward at a
15 tilt of 10 degrees when the finger is removed from the adjustment button 336. After the housing 31 moves down while the adjustment button 336 is being held down, the remote-control device 30 generates a control signal that rotates the light fixture 120 of the moving light 20
20 downward at a tilt of 10 degrees when the finger is removed from the adjustment button 336.

After the housing 31 moves to the left while the adjustment button 336 is being held down, the remote-control device 30 generates a control signal that rotates
25 the light fixture 120 of the moving light 20 to the left at a pan of 10 degrees when the finger is removed from the adjustment button 336. After the housing 31 moves to the right while the adjustment button 336 is being held down, the remote-control device 30 generates a control signal
30 that rotates the light fixture 120 of the moving light 20 to the right at a pan of 10 degrees when the finger is removed from the adjustment button 336. Furthermore, after the housing 31 moves to the front while the adjustment

button 336 is being held down, the remote-control device 30 generates a control signal that zooms up the light fixture 120 of the moving light 20 by a specified amount when the finger is removed from the adjustment button 336. After
5 the housing 31 moves down while the adjustment button 336 is being held down, the remote-control device 30 generates a control signal that zooms down the light fixture 120 of the moving light 20 by a specified amount when the finger is removed from the adjustment button 336.

10 In this manner, the remote-control device 30 is simplified focusing only on the adjustment button 336. The operator can remotely control the rotational movement and the zoom movement of the moving light 20 with a simple operation of moving the housing 31 while feeling for and
15 holding down the adjustment button 336. Furthermore, the direction of the movement of the housing 31 corresponds to the direction of the rotational movement of the moving light 20. Accordingly, the operator can cause the moving light 20 to make a rotational movement and a zooming
20 movement with the intuitive operation of the remote-control device 30. Consequently, the operator is not required the work of looking at a location illuminated by the moving light 20 and then the operation screen of the remote-control device 30 again and again.

25 The adjustment button 336 is operated in combination with the detection value of the motion sensor 36. Accordingly, the remote-control device 30 of the embodiment can control a plurality of operation items.

FIG. 5(b) is a diagram illustrating an operation
30 method in a state where the touchscreen 32 (the operation surface) of the remote-control device 30 faces rightward.

The operator can perform the panning, tilting, and zooming operations even in the state where the touchscreen

32 of the remote-control device 30 faces rightward as in the state where the touchscreen 32 faces upward. The remote-control device 30 recognizes the inclination of the housing 31 by the motion sensor 36 and in that state,
5 recognizes that the housing 31 has moved in the horizontal direction, right or left, or the vertical direction, up or down. The operator can perform a horizontal movement operation and a vertical movement operation irrespective of the attitude of the remote-control device 30.

10 The operator can further perform the panning, tilting, and zooming operations even in a state where the touchscreen 32 of the remote-control device 30 is inclined obliquely as in the state where the touchscreen 32 faces rightward. This is because the control unit 34 removes a
15 gravitational acceleration vector and an acceleration vector from the motion sensor 36 and performs an operation.

Even if the operator moves the remote-control device 30 up/down/left/right/back/forth quickly or slowly, the travel speed of the moving light 20 is set to a specified
20 value. Having reached the pan/tilt rotation limit angle or the zoom limit range, the moving light 20 accepts only the opposite movement direction.

FIGS. 6(a) and 6(b) are flowcharts illustrating the panning, tilting, and zooming operations of the remote-
25 control device 30.

Fig. 6(a) is a flowchart illustrating a rough adjustment operation.

The operator makes pan, tilt, and zoom rough adjustments to the moving light 20 only with the adjustment
30 button 336 as follows. A description is given here taking, as an example, the panning operation where the operator rotationally moves the illumination direction of the moving light 20 10 degrees to the right.

Firstly, the operator presses the adjustment button 336 of the remote-control device 30 (Step S10), moves the remote-control device 30 to the right while holding down the adjustment button 336 (Step S11), and removes his/her
5 finger from the adjustment button 336 (Step S12).

In Step S11, the operator may move the remote-control device 30 in any of directions, up, down, right, down, back, and forth while holding the adjustment button 336. Consequently, the operator can instruct the moving light 20
10 to rotationally move in accordance with the movement direction.

FIG. 6(b) is a flowchart illustrating a fine adjustment operation.

The operator makes pan, tilt, and zoom fine
15 adjustments to the moving light 20 only with the adjustment button 336 as follows. A description is given here taking, as an example, the panning operation where the operator rotationally moves the illumination direction of the moving light 20 one degree to the right.

20 Firstly, the operator presses the adjustment button 336 of the remote-control device 30 (Step S20), moves the remote-control device 30 to the right while holding down the adjustment button 336 (Step S21), returns the remote-control device 30 to an operation starting point (Step S22),
25 and removes his/her finger from the adjustment button 336 (Step S23). The operation starting point refers here to a position at the time when the operator presses the adjustment button 336 of the remote-control device 30 in Step S20. Consequently, the operator can make rough and
30 fine adjustments with the single adjustment button 336.

In Step S21, the operator may move the remote-control device 30 in any of the directions, up, down, right, left, back, and forth while holding down the adjustment button

336. Consequently, the operator can instruct the moving light 20 to rotationally move in accordance with the movement direction.

FIG. 7 is a diagram illustrating the starting point of an operation, rough adjustment motion, and fine adjustment motion. FIG. 7 illustrates a cross section of $z = 0$ with the starting point of an operation of the remote-control device 30 at the center.

Spaces 41U, 41R, 41D, and 41L indicate spaces away a distance L1 (a first specified value) or more from the starting point of the operation. A space 40 indicates a space in proximity to the starting point of the operation and within a distance L2 (a second specified value).

Rough adjustment motion 50 is motion at the time when panning the moving light 20 to the right to make a rough adjustment. The operator moves the remote-control device 30 to the space 41R while pressing and holding down the adjustment button 336 of the remote-control device 30, and then removes his/her finger from the adjustment button 336. Consequently, the remote-control device 30 generates and transmits a control signal that causes the moving light 20 to move the illumination direction 10 degrees (a first specified amount of movement).

Moreover, fine adjustment motion 51 is motion at the time when panning the moving light 20 to the right to make a fine adjustment. The operator moves the remote-control device 30 to the space 41R while pressing and holding down the adjustment button 336 of the remote-control device 30, and then returns the remote-control device 30 again to the space 40 in proximity to the operation starting point, and removes his/her finger from the adjustment button 336. Consequently, the remote-control device 30 generates and transmits a control signal that causes the moving light 20

to move the illumination direction one degree (a second specified amount of movement).

The moving light 20 performs any of tilting, panning, and zooming. These operations are not performed at the same time. Hence, the remote-control device 30 detects a movement direction vector and a gravitational direction vector, sets angle thresholds of the movement direction vector and the gravitational direction vector to ± 45 degrees, and determines whether its own movement direction is up/down or left/right. Dead bands 42DL and 42UR and dead bands 42UL and 42DR exist with the angle threshold of ± 45 degrees at the center.

The dead band 42DL is located between the spaces 41D and 41L. A downward tilt and a leftward pan are clearly distinguished to prevent misoperation. The dead band 42DR is located between the spaces 41D and 41R. A downward tilt and a rightward pan are clearly distinguished to prevent misoperation.

The dead band 42UL is located between the spaces 41U and 41L. An upward tilt and a leftward pan are clearly distinguished to prevent misoperation. The dead band 42UR is located between the spaces 41U and 41R. An upward tilt and a rightward pan are clearly distinguished to prevent misoperation.

The cross section of $z = 0$ is illustrated here. However, the same can be applied to a cross section of $x = 0$ and a cross section of $y = 0$. The tilt space and the zoom space are partitioned at the angle threshold of ± 45 degrees. A dead band is provided with the angle threshold of ± 45 degrees at the center. Moreover, the pan space and the zoom space are also partitioned at the angle threshold of ± 45 degrees. A dead band is provided with the angle

threshold of ± 45 degrees at the center.

FIG. 8 is a flowchart illustrating an adjustment process of the remote-control device 30.

When the operation screen (refer to FIG. 4(a)) is
5 being displayed on the touchscreen 32, the control unit 34
of the remote-control device 30 starts the adjustment
process illustrated in FIG. 8.

When the operator has pressed the adjustment button
336 (Step S30 $\rightarrow$ Yes), the control unit 34 recognizes the
10 position of the time of the housing 31 as the operation
starting point (Step S31). The control unit 34 detects the
amount of movement of the housing 31 by the motion sensor
36 (Step S32). While the adjustment button 336 is being
held down, the amount of movement of the housing 31 is
15 repeatedly detected (Step S33 $\rightarrow$ No).

When the press of the adjustment button 336 is
stopped (Step S33 $\rightarrow$ Yes), the control unit 34 determines
the history of movement obtained while the adjustment
button 336 was being held down (Step S34). The control
20 unit 34 generates a control signal based on the operation
starting point, and a relative position detected by the
motion sensor 36 and a history of the distance while the
adjustment button 336 was being held down.

In Step S34, the control unit 34 generates a rough
25 adjustment signal for an operation in accordance with the
movement direction in a case where the history of movement
is applicable to the rough adjustment motion (Step S35),
and generates a fine adjustment signal for an operation in
accordance with the movement direction in a case where the
30 history of movement is applicable to the fine adjustment
motion (Step S36). The process of FIG. 8 is ended. The
control unit 34 ends the process of FIG. 8 in a case of,

for example, a movement to a dead band.

The case where the history of movement is applicable to the rough adjustment motion in the determination in Step S34 means the case where the press of the adjustment button 336 is stopped after the distance between the relative position and the operation starting point becomes larger than the distance L1. At this point in time, the control unit 34 generates a moving signal that causes the moving light 20 to rotationally move the light fixture 120 10 degrees. The control unit 34 further generates a moving signal that causes the moving light 20 to rotationally move the light fixture 120 10 degrees whenever the movement distance reaches the distance L1.

The case where the history of movement is applicable to the fine adjustment motion in the determination in Step S34 means the case where the press of the adjustment button 336 is stopped after the distance between the relative position and the operation starting point becomes smaller than the distance L2 during the passage of a specified time since the distance became larger than the distance L1. At this point in time, the control unit 34 generates a moving signal that causes the moving light 20 to rotationally move the light fixture 120 one degree.

In the embodiment, it is possible to make an adjustment in accordance with the intention of the operator in a short time with a location where the adjustment button 336 is pressed as the operation starting point. A series of operations is repeated which moves the remote-control device 30 while holding down the adjustment button 336, and removes the finger from the adjustment button 336. Accordingly, it is possible to adjust the moving light 20 to a target position in a short time.

Moreover, in the embodiment, when the finger is

removed from the adjustment button 336, the history of movement during a period of time while the adjustment button 336 was being held down is determined to be applicable to which motion. Accordingly, an accurate
5 adjustment can be made without misoperation as compared to a case where motion is determined without the adjustment button. Moreover, when the finger is removed from the adjustment button 336, a control signal is generated. Accordingly, at what timing an adjustment is made is clear
10 and also there is no risk of misoperation.

FIG. 9 is a diagram illustrating the operation screen of the remote-control device 30 in a modification.

"Light 01" is displayed at the top of the touchscreen 32 of the remote-control device 30 of the modification. A
15 rough adjustment button 336a and a fine adjustment button 336b are displayed below "light 01." The apparatus button 331 and the operation button 332 are further displayed.

The operator moves the housing 31 up/down/left/right or back/forth while holding down the rough adjustment
20 button 336a, and removes his/her finger from the rough adjustment button 336a. Accordingly, a rough adjustment can be made to the position of the light 01.

Furthermore, the operator moves the housing 31 up/down/left/right or back/forth while holding down the
25 fine adjustment button 336b, and removes his/her finger from the fine adjustment button 336b. Accordingly, a fine adjustment can be made to the position of the light 01.

FIGS. 10(a) and 10(b) are flowcharts illustrating the panning, tilting, and zooming operations of the remote-
30 control device 30 in a modification.

FIG. 10(a) is a flowchart illustrating the rough adjustment operation of the remote-control device 30 of the modification.

The operator makes pan, tilt, and zoom rough adjustments to the moving light 20 with the rough adjustment button 336a as follows. A description is given here taking, as an example, the panning operation where the operator rotationally moves the illumination direction of the moving light 20 10 degrees to the right.

Firstly, the operator presses the rough adjustment button 336a of the remote-control device 30 (Step S40), moves the remote-control device 30 in the rightward horizontal direction while holding down the rough adjustment button 336a (Step S41), and removes his/her finger from the rough adjustment button 336a (Step S42).

In Step S41, the operator may move the remote-control device 30 in any of the directions, up, down, left, right, back, and forth while holding down the rough adjustment button 336a.

FIG. 10(b) is a flowchart illustrating the fine adjustment operation of the remote-control device 30 of the modification.

The operator makes pan, tilt, and zoom fine adjustments to the moving light 20 with the fine adjustment button 336b as follows. A description is given here taking, as an example, the panning operation where the operator rotationally moves the illumination direction of the moving light 20 one degree to the right.

Firstly, the operator presses the fine adjustment button 336b of the remote-control device 30 (Step S50), moves the remote-control device 30 in the rightward horizontal direction while holding down the fine adjustment button 336b (Step S51), and removes his/her finger from the fine adjustment button 336b (Step S52).

In Step S51, the operator may move the remote-control device 30 in any of the directions, up, down, left, right,

back, and forth while holding down the fine adjustment button 336b. Consequently, the operator can instruct the moving light 20 to make a rotational movement and a zoom movement in accordance with the movement direction.

5 The remote-control device 30 of the modification is provided with the rough adjustment button 336a and the fine adjustment button 336b. Accordingly, it is possible to notify the operator that rough and fine adjustments can be made. Furthermore, the motions of the rough and fine
10 adjustments are set to be the same. Accordingly, it is easy to learn the operation method.

FIG. 11 is a flowchart illustrating the adjustment process of the remote-control device 30 in a modification.

The remote-control device 30 of the modification
15 starts the adjustment process illustrated in FIG. 11 when the operation screen (refer to FIG. 9) is being displayed on the touchscreen 32.

The control unit 34 of the remote-control device 30 waits until any button is pressed (Step S60 → No). When
20 the rough adjustment button 336a is pressed (Step S60 → Rough adjustment), the control unit 34 proceeds to a rough adjustment process illustrated in Steps S61 to S65. When the fine adjustment button 336b is pressed (Step S60 → Fine adjustment), the control unit 34 proceeds to a fine
25 adjustment process illustrated in Steps S70 to S74.

Rough Adjustment Process

The control unit 34 recognizes, as the operation starting point, the position of the housing 31 at the time when the rough adjustment button 336a was pressed (Step
30 S61). The control unit 34 detects the amount of movement of the housing 31 by the motion sensor 36 (Step S62), and repeats this while the rough adjustment button 336a is

being held down (Step S63 → No).

When the press of the rough adjustment button 336a is stopped (Step S63 → Yes), the control unit 34 determines the history of movement at the time when the rough
5 adjustment buttons 336a was held down (Step S64).

In Step S64, the control unit 34 generates a rough adjustment signal for an operation in accordance with the movement direction in a case where the history of movement is applicable to the rough adjustment motion (Step S65) to
10 end the process of FIG. 11. The control unit 34 ends the process of FIG. 11 in a case of, for example, a movement to a dead band.

The case where the history of movement is applicable to the rough adjustment motion means the case where the
15 press of the rough adjustment button 336a is stopped after the distance between the relative position and the operation starting point becomes larger than the distance L1. At this point in time, the control unit 34 generates a
moving signal that causes the moving light 20 to
20 rotationally move the light fixture 120 10 degrees. The control unit 34 further generates a moving signal that causes the moving light 20 to rotationally move the light fixture 120 10 degrees whenever the movement distance reaches the distance L1.

25 Fine Adjustment Process

The control unit 34 recognizes, as the operation starting point, the position of the housing 31 at the time when the fine adjustment button 336b was pressed (Step S70). The control unit 34 detects the amount of movement of the
30 housing 31 by the motion sensor 36 (Step S71), and repeats this while the fine adjustment button 336b is being held down (Step S72 → No).

When the press of the fine adjustment button 336b is stopped (Step S72 → Yes), the control unit 34 determines the history of movement at the time when the fine adjustment button 336b was held down (Step S73).

5 In Step S73, the control unit 34 generates a fine adjustment signal for an operation in accordance with the movement direction in a case where the history of movement is applicable to the fine adjustment motion (Step S74) to end the process of FIG. 11. The control unit 34 ends the
10 process of FIG. 11 in a case of, for example, a movement to a dead band.

The case where the history of movement is applicable to the fine adjustment motion means the case where the press of the fine adjustment button 336b is stopped after
15 the distance between the relative position and the operation starting point becomes larger than the distance L1 as in the rough adjustment motion. At this point in time, the control unit 34 generates a moving signal that causes the moving light 20 to rotationally move the light
20 fixture 120 one degree.

Consideration is given here to a case where one moving light 20 is selected from a plurality of moving lights 20 to be operated. At this point, it is desired to be able to confirm that a desired moving light has been
25 successfully selected before its actual operation. Especially if part of moving lights is installed at a position that is not visible from the operator, it is necessary to avoid a chance of operating it mistakenly.

FIG. 12 is a diagram of a sequence example of
30 operations of the adjustable apparatus system 100 in a case where a desired moving light 20 is selected from a plurality of moving lights 20.

A moving light 20-1 selected on the apparatus

selection screen (refer to FIG. 3(a)) is located at a position where the operator can view, and is in an off state at the beginning. The operator uses the remote-control device 30 to operate the moving light 20-1. In the
5 drawings, the moving light 20-1 may be described as "moving light #1." Moreover, the moving light 20-1 is described as "light 01" on the screen of the remote-control device 30.

Firstly, the operator causes the remote-control device 30 to display the apparatus selection screen (refer
10 to FIG. 3(a)), and taps and selects the light 01. Consequently, the remote-control device 30 transmits a request signal to the moving light #1 (20-1) (sequence Q10), and further displays the selection confirmation screen (refer to FIG. 3(b)).

15 When having received the request signal, the moving light 20-1 lights up after blinking a specified number of times (sequence Q11), and transmits an enable signal of the moving light #1 to the remote-control device 30 (sequence Q12).

20 When having confirmed that the selected light 01 is on, the operator taps the Yes button 334 in accordance with the words "confirm that light 01 is on" on the selection confirmation screen (sequence Q13). Consequently, the remote-control device 30 transmits an unlock signal to the
25 moving light #1 (20-1) (sequence Q14), and further displays the operation screen (refer to FIG. 9).

When having received the unlock signal, the moving light 20-1 unlocks itself (sequence Q15), and transmits an OK signal to the remote-control device 30 (sequence Q16).
30 Consequently, the moving light 20-1 accepts the subsequent moving signals.

The operator holds down the fine adjustment button 336b on the operation screen (refer to FIG. 9) and moves

the housing 31 down (sequence Q17). Consequently, the remote-control device 30 transmits a moving signal of a downward tilt of one degree to the moving light #1 (20-1) (sequence Q18).

5 When having received the moving signal, the moving light 20-1 executes a downward tilt of an angle of one degree (sequence Q19). When the tilt is complete, the moving light 20-1 transmits an OK signal to the remote-control device 30 (Sequence Q20). Consequently, the
10 remote-control device 30 issues a confirmation sound.

 The operator taps the apparatus button 331 on the operation screen (refer to FIG. 9) to instruct a transition to the operation end screen, and also instructs the moving light 20-1 to lock (sequence Q21). Consequently, the
15 remote-control device 30 displays the operation end screen (refer to FIG. 4(b)). At this point in time, the operator taps (presses) the Yes button 337 (sequence Q22). The remote-control device 30 transmits a lock signal to the moving light #1 (20-1) (sequence Q23).

20 When having received the lock signal, the moving light 20-1 locks itself (sequence Q24), and transmits an OK signal to the remote-control device 30 (sequence Q25). Consequently, the moving light 20-1 will not accept the subsequent moving signals.

25 FIG. 13 is a diagram of the sequence of operations of the adjustable apparatus system 100 in a case where not a desired moving light but a moving light at a position that is not visible by the operator is mistakenly selected from the plurality of moving lights 20 on the apparatus
30 selection screen (refer to FIG. 3(a)).

 A moving light 20-2 is located in, for example, an adjacent room that is not visible by the operator, and is in the off state at the beginning. The operator uses the

remote-control device 30 to operate the moving light 20-2. In the drawings, the moving light 20-2 may be described as "moving light #2." Moreover, the moving light 20-2 is described as "light 02" on the screen of the remote-control
5 device 30.

Firstly, the operator causes the remote-control device 30 to display the apparatus selection screen (FIG. 3(a)) and taps and selects the light 02. Consequently, the remote-control device 30 transmits a request signal to the
10 moving light #2 (20-2) (sequence Q30), and further displays the selection confirmation screen (refer to FIG. 3(b)). At this point in time, "confirm that light 02 is on" is presented on the selection confirmation screen.

When having received the request signal, the moving
15 light 20-2 lights up after blinking a specified number of times (sequence Q31), and transmits an enable signal of the moving light #2 to the remote-control device 30 (sequence Q32).

The operator could not confirm that the selected
20 light 02 is on and accordingly, taps the No button 335 in accordance with the words "confirm that light 02 is on" on the selection confirmation screen (sequence Q33). Consequently, the remote-control device 30 transmits a lock signal to the moving light #2 (20-2) (sequence Q34), and
25 further returns to the apparatus selection screen (refer to FIG. 3(a)).

When having received the lock signal, the moving light 20-2 locks itself (sequence Q35), and transmits an OK signal to the remote-control device 30 (sequence Q36).
30 Consequently, the moving light 20-2 will not accept the subsequent moving signals.

In the embodiment and modifications, one moving light 20 is selected from a plurality of moving lights 20. When

being visible, the selection target is unlocked and remotely controlled. Consequently, it is possible to prevent misoperation of a moving light 20 (adjustable lighting apparatus) installed at a position that is not visible from the operator. Moreover, the confirmation sound is issued when an OK signal has been received from the moving light 20. Accordingly, it is possible to prevent misoperation.

Other Modifications

The present invention is not limited to the above embodiment, and can be modified within the scope that does not depart from the gist of the present invention. The following (a) to (h) are examples:

(a) A motor included in a control target apparatus is not especially limited and may be of an arbitrary type.

Furthermore, the number of motors is neither limited.

(b) The number of control target apparatuses is not limited to more than one, and may be one.

(c) The movement motion of the remote-control device 30 of the present invention is not limited to a parallel movement and may be a rotational movement. For example, the remote-control device 30 is required to recognize, as an initial angle, the rotation angle of the housing 31 at the time when the adjustment button 336 is pressed, detect a history of rotation from the initial angle by a gyro sensor, and generate a moving signal of a pan/tilt/zoom based on the history of rotation. Furthermore, the movement motion may be the rotational motion of the housing 31, a combination of the direction and the rotational motion of the housing 31, or a combination of the rotational motion and the parallel movement motion of the housing 31.

(d) The remote-control device 30 is not limited to a smartphone and may be a dedicated remote-control device.

Moreover, the touchscreen 32 is not essential either and may be simply a mechanical switch.

(e) In terms of signals between the remote-control device 30 and the control target apparatus, the enable signal, the lock signal, the unlock signal, the OK signal, and the like are not essential. Between the remote-control device 30 and the control target apparatus is not limited to two-way communication, and the moving signal may be transmitted in one-way communication such as infrared communication and visible light communication.

(f) The timing when the control unit 34 enables the motion sensor 36 is not limited to when transiting to the operation screen and may be a timing when pressing the adjustment button. Consequently, the amount of electric power consumed by the motion sensor 36 can be further reduced.

(g) The operation of the adjustment button is not limited to holding it down. For example, it may be configured in such a manner as to recognize an operation starting point with a tap and detect the movement of the housing, and then determine the history of movement from the operation starting point with a double tap, and generate a control signal.

(h) When the housing 31 moves in the up and down direction, the left and right direction, or the front and back direction, the remote-control device 30 is simply required to generate a control signal that causes the control target apparatus to move its part by a specified amount of movement in a predetermined direction.

30 Reference Signs List

- 10 ADJUSTABLE CONTROL UNIT
- 12 TWO-WAY WIRELESS COMMUNICATION UNIT
- 13 MOTOR CONTROL UNIT

- 14 MOTOR DRIVE CIRCUIT
- 15 to 17 MOTOR
- 20 MOVING LIGHT (EXAMPLE OF APPARATUS)
- 21 LEFT/RIGHT ROTATION UNIT
- 5 22 ARM
- 23 HOOD
- 30 REMOTE-CONTROL DEVICE
- 31 HOUSING
- 32 TOUCHSCREEN
- 10 333 APPARATUS LIST
- 336 ADJUSTMENT BUTTON (EXAMPLE OF OPERATING ELEMENT)
- 336a ROUGH ADJUSTMENT BUTTON (EXAMPLE OF OPERATING ELEMENT)
- 336b FINE ADJUSTMENT BUTTON (EXAMPLE OF OPERATING ELEMENT)
- 15 34 CONTROL UNIT (EXAMPLE OF CONTROL MEANS)
- 35 TWO-WAY WIRELESS COMMUNICATION UNIT (EXAMPLE OF TRANSMISSION MEANS)
- 36 MOTION SENSOR (EXAMPLE OF DETECTION MEANS)
- 37 SPEAKER
- 20 42UR, 42UL, 42DR, 42DL DEAD BAND
- 50 ROUGH ADJUSTMENT MOTION
- 51 FINE ADJUSTMENT MOTION
- 100 ADJUSTABLE APPARATUS SYSTEM
- 120 LIGHT FIXTURE (EXAMPLE OF PART)

CLAIMS

1. An adjustable apparatus system comprising:
an apparatus configured to control a part of the apparatus; and
5 a remote-control device configured to transmit a control signal to instruct to control the part, the remote-control device including:
a detection unit configured to detect movement of a housing of the remote-control device;
10 an operating element configured to be operated by an operator;
a control unit configured to recognize, as an operation starting point, a position of the housing when the operating element is operated, and to generate the
15 control signal based on a history of the movement of the housing from the operation starting point; and
a transmission unit configured to transmit the control signal to the apparatus.
- 20 2. The adjustable apparatus system according to claim 1, wherein the apparatus is configured to move while setting a stop position of the part as a starting point of control.
3. The adjustable apparatus system according to claim 1
25 or 2, wherein upon the housing having moved in an up and down direction, in a left and right direction, or in a front and back direction, the control unit is configured to generate the control signal for causing the apparatus to move the part a specified amount of movement in a
30 predetermined direction.
4. The adjustable apparatus system according to any one of claims 1 to 3, wherein the control unit is configured

to:

generate the control signal based on the operation starting point and a distance between a relative position of the housing detected by the detection unit while the operating element is being operated and the operation starting point; and

upon completion of the operation of the operating element after the distance becomes larger than a first specified value, generate the control signal for causing the apparatus to move the part a specified amount of movement.

5. The adjustable apparatus system according to claim 4, wherein upon completion of the operation of the operating element in a state where the distance is larger than the first specified value, the control unit is configured to generate the control signal for causing the apparatus to move the part a first specified amount of movement.

6. The adjustable apparatus system according to claim 5, wherein when the distance becomes smaller than a second specified value, which is smaller than the first specified value, during the passage of a specified period of time since the distance becomes larger than the first specified value, and then the operation of the operating element is completed, the control unit is configured to generate the control signal for causing the apparatus to move the part a second specified amount of movement.

7. The adjustable apparatus system according to claim 6, wherein the second specified amount of movement is smaller than the first specified amount of movement.

8. The adjustable apparatus system according to any one of claims 1 to 5, wherein the operating element includes: an operating element for making a rough adjustment; and an operating element for making a fine adjustment, and

5 wherein, when an operation is performed by the operating element for making a rough adjustment, the operating element is configured to generate the control signal for causing the apparatus to move the part a specified amount of movement, and

10 when an operation is performed by the operating element for making a fine adjustment, the operating element is configured to generate the control signal for causing the apparatus to move the part a smaller amount of movement than the specified amount of movement.

15

9. The adjustable apparatus system according to any one of claims 1 to 8, wherein the control unit is configured to:

20 determine an up and down direction and a left and right direction based on a specified angle threshold;

determine the up and down direction and a front and back direction based on the specified angle threshold; or

determine the left and right direction and the front and back direction based on the specified angle threshold.

25

10. The adjustable apparatus system according to claim 9, wherein the specified angle threshold is ± 45 degrees with respect to a direction of a determination target.

30 11. The adjustable apparatus system according to claim 9, wherein a dead band area exists around the specified angle threshold.

12. An adjustable apparatus system comprising:

an apparatus configured to control a part of the apparatus; and

5 a remote-control device configured to transmit a control signal to instruct to control the part, the remote-control device including:

a detection unit configured to detect an angle of a housing of the remote-control device;

10 an operating element configured to be operated by an operator;

a control unit configured to recognize, as an initial angle, an angle of rotation of the housing when the operating element is operated, and to generate the control signal based on a history of rotation from the initial
15 angle; and

a transmission unit configured to transmit the control signal to the apparatus.

13. The adjustable apparatus system according to any one
20 of claims 1 to 12, wherein

the remote-control device is configured to transmit a request signal to the apparatus designated by the operator, and

25 upon having received the request signal, the apparatus is configured to blink and also transmit an enable signal to the remote-control device.

14. The adjustable apparatus system according to claim 13, wherein

30 upon start of the operation of the designated apparatus, the remote-control device is configured to transmit an unlock signal to the apparatus, and

upon end of the operation of the designated apparatus,

the remote-control device is configured to transmit a lock signal to the apparatus.

15. The adjustable apparatus system according to claim 13
5 or 14, wherein the remote-control device is configured to issue a confirmation sound upon having received the enable signal.

16. The adjustable apparatus system according to any one
10 of claims 13 to 15, wherein the remote-control device is configured to issue a confirmation sound upon completion of the movement of the part of the apparatus.

FIG.1

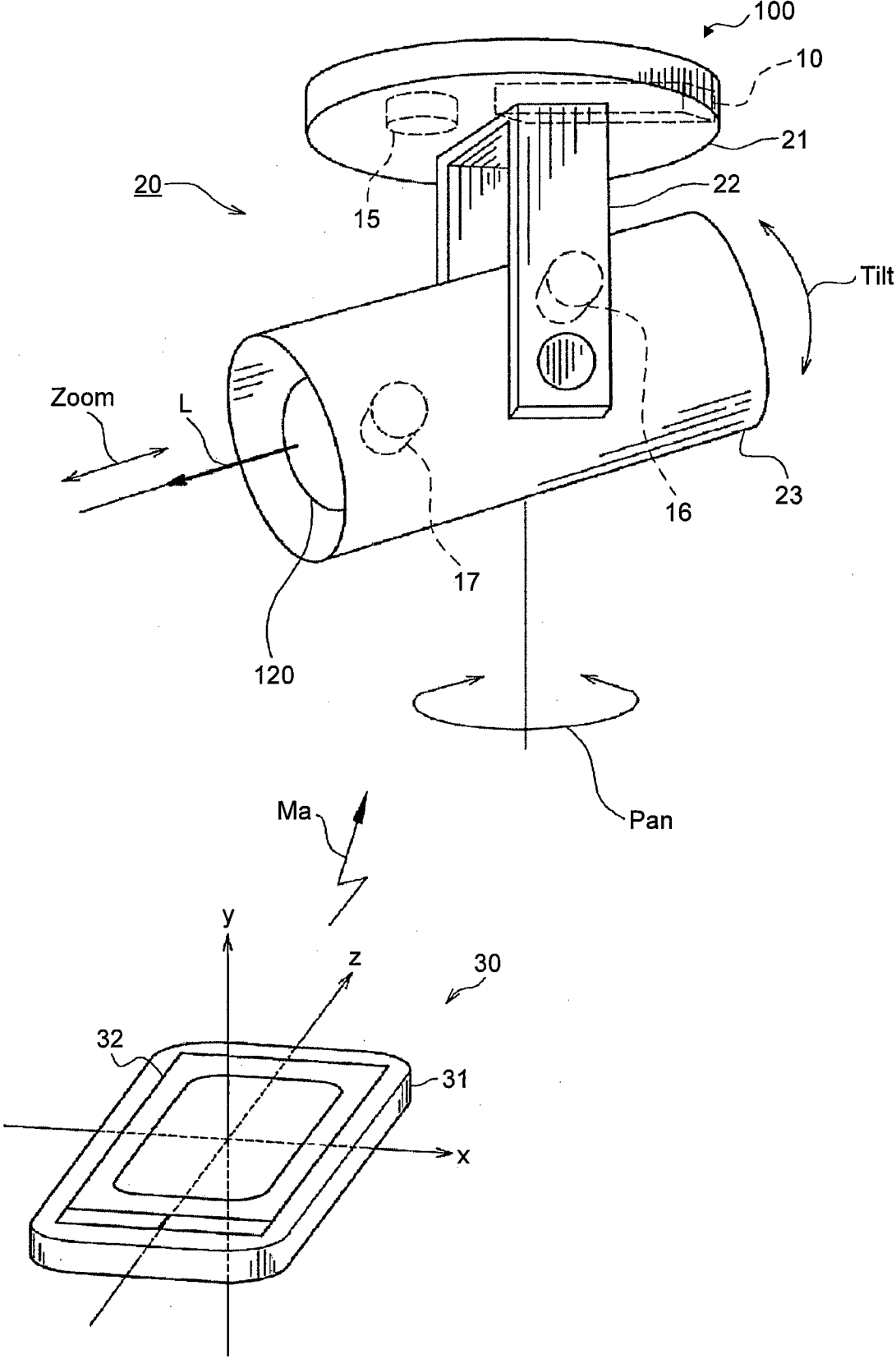


FIG.2

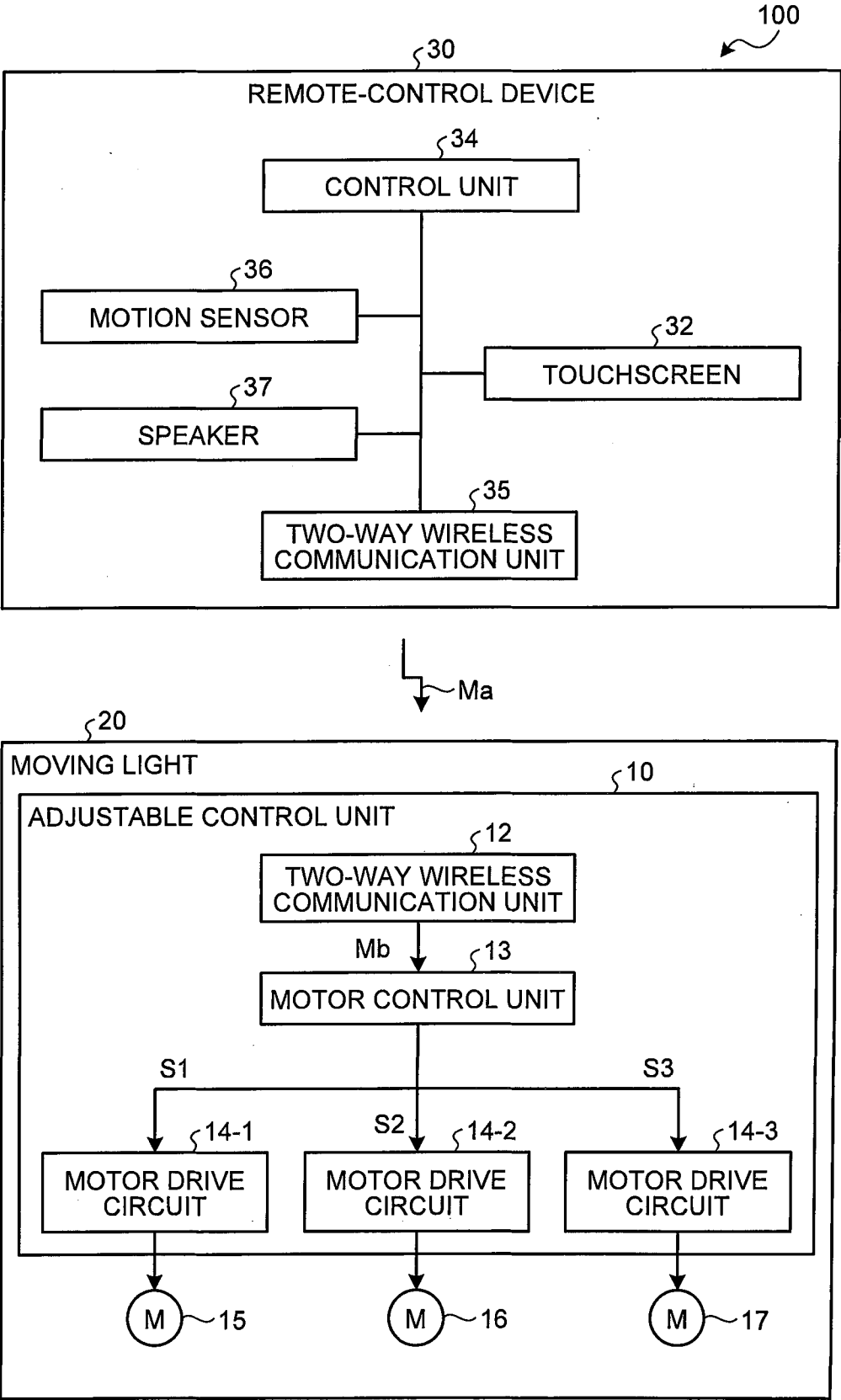


FIG.3

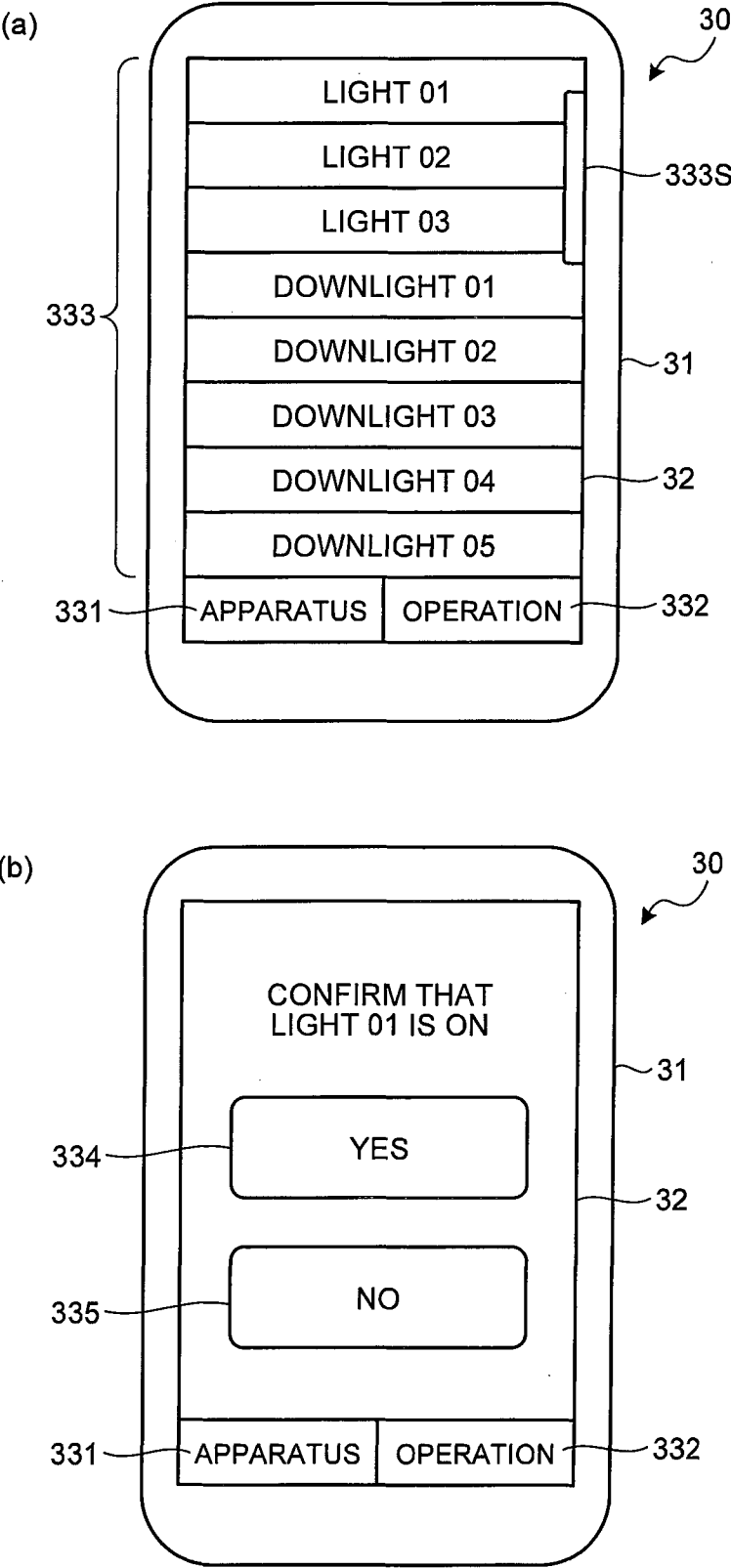
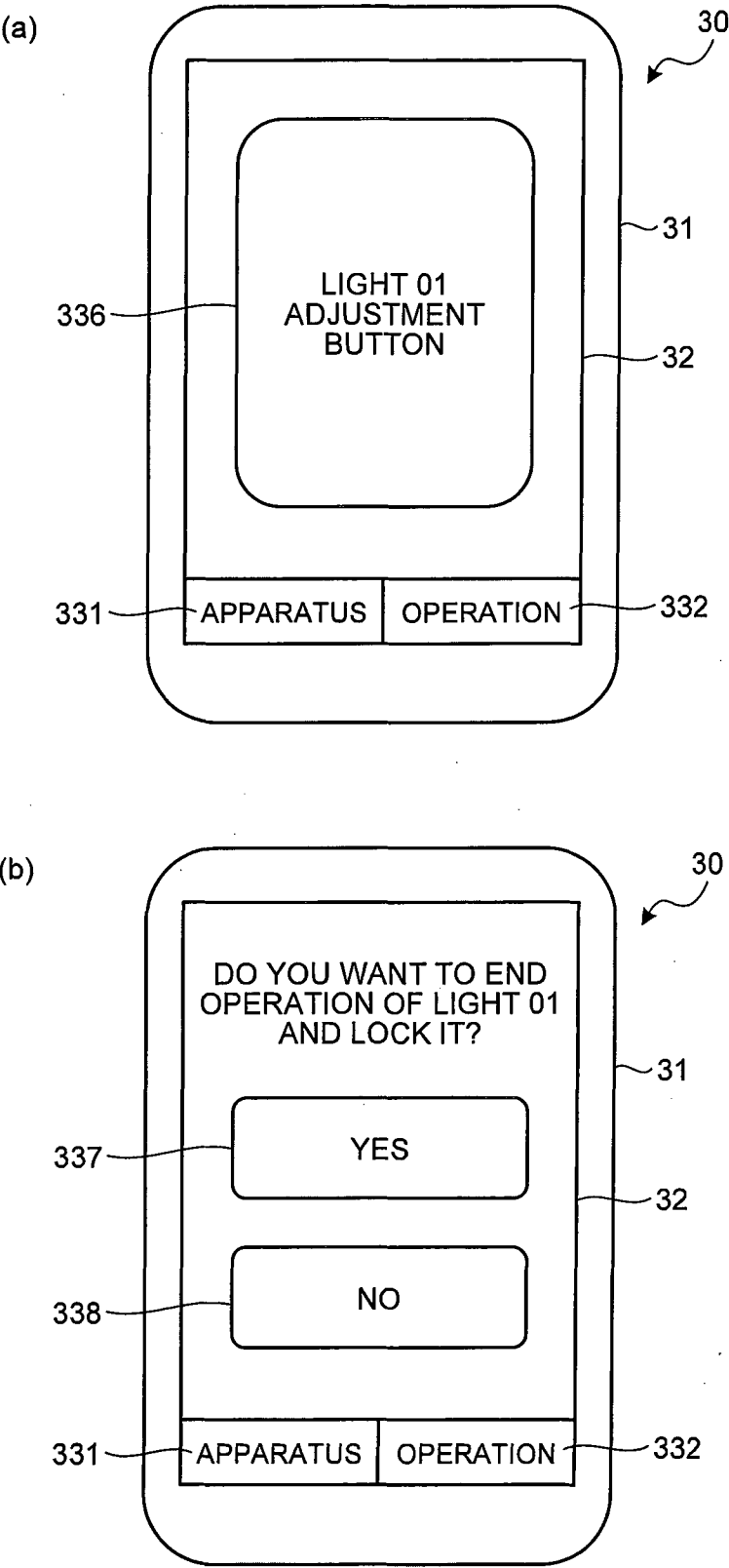
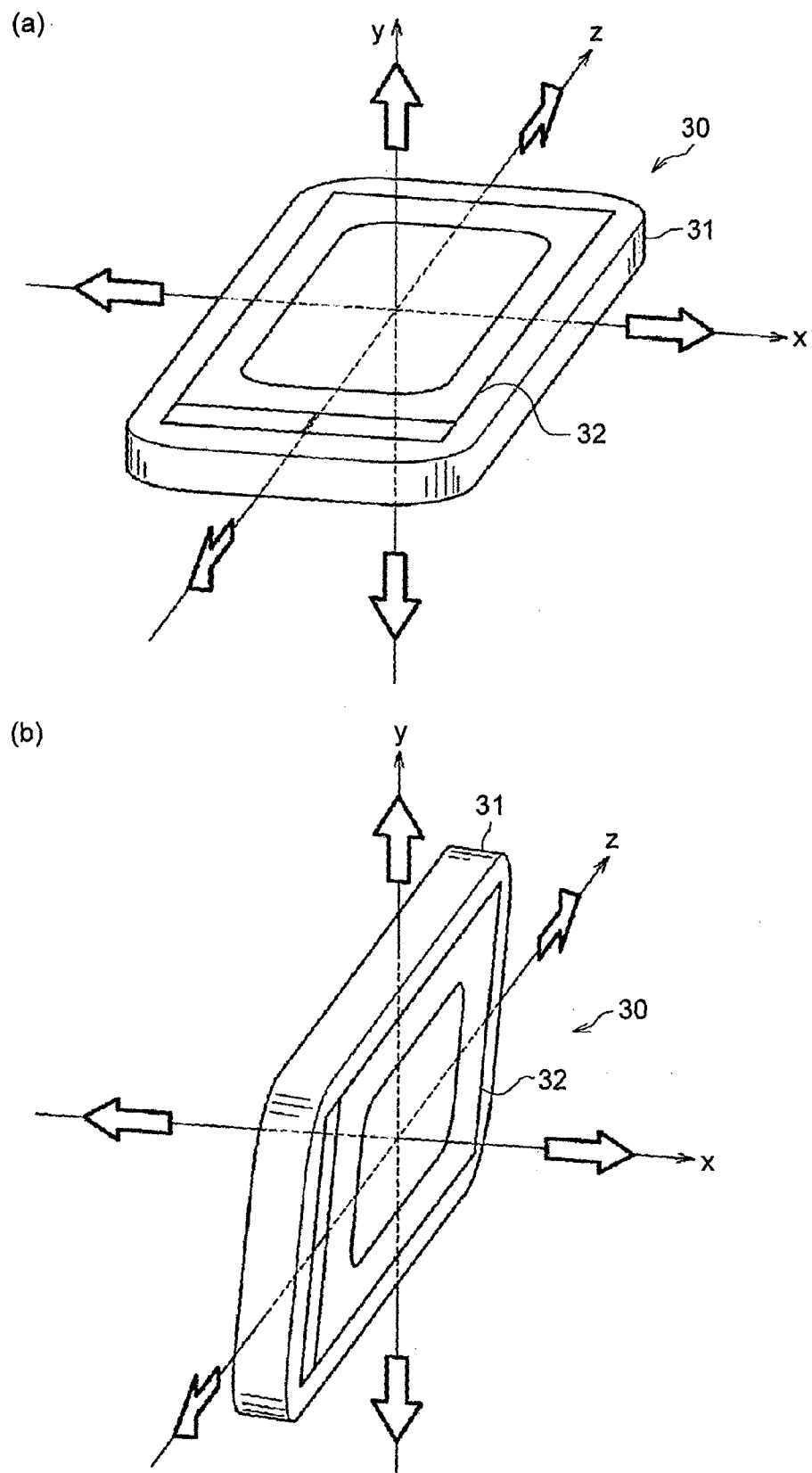


FIG.4



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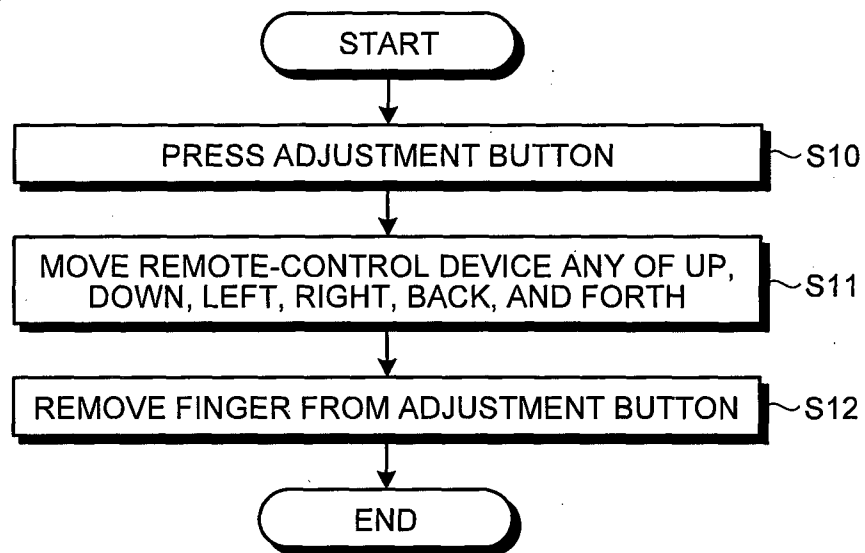
FIG.5



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FIG.6

(a)



(b)

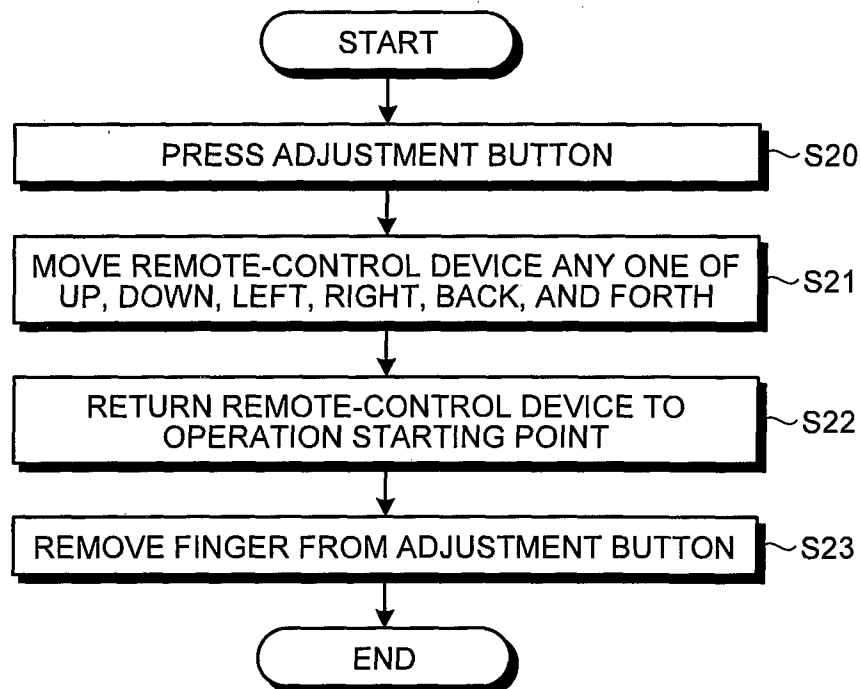


FIG.7

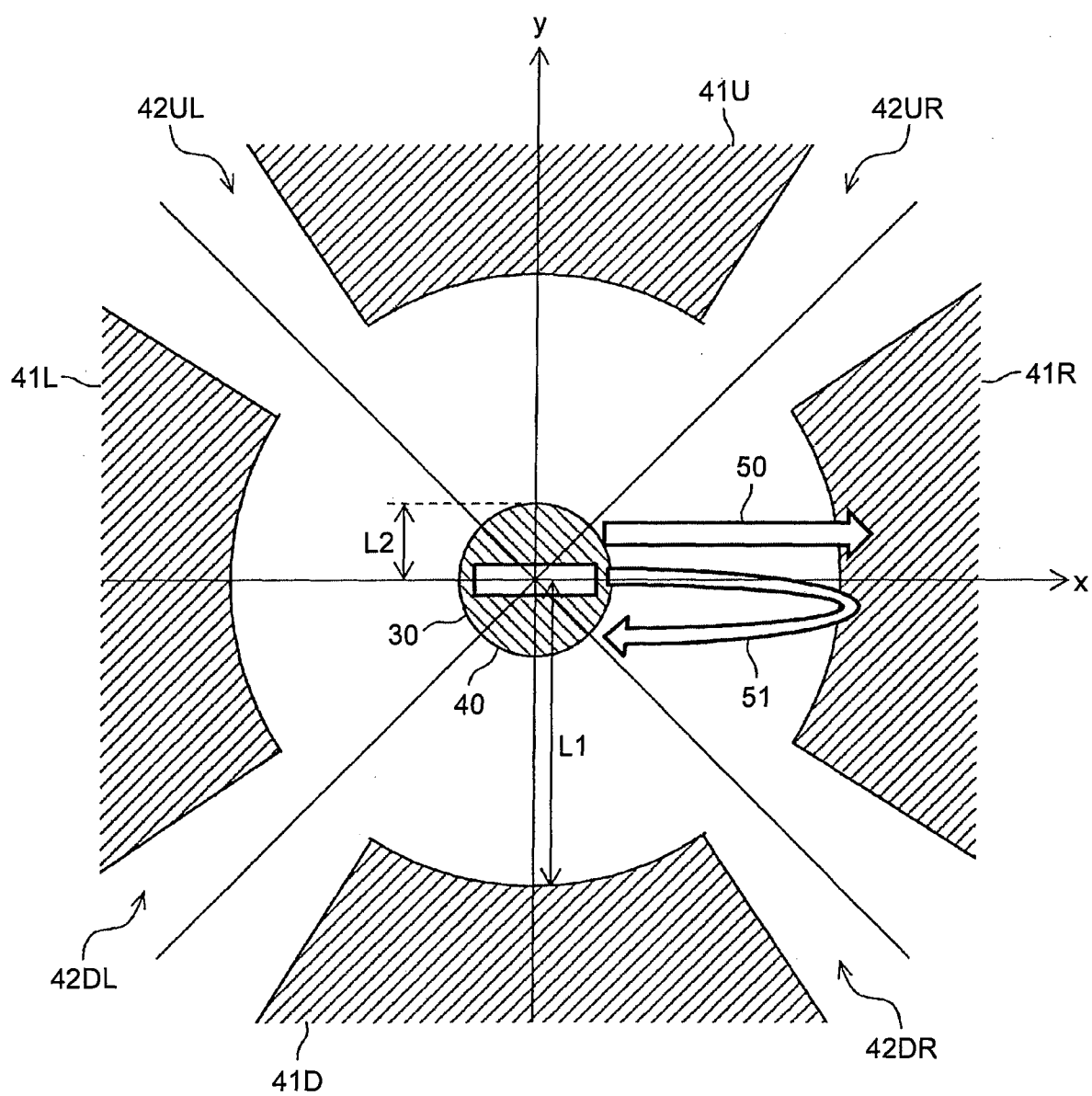


FIG.8

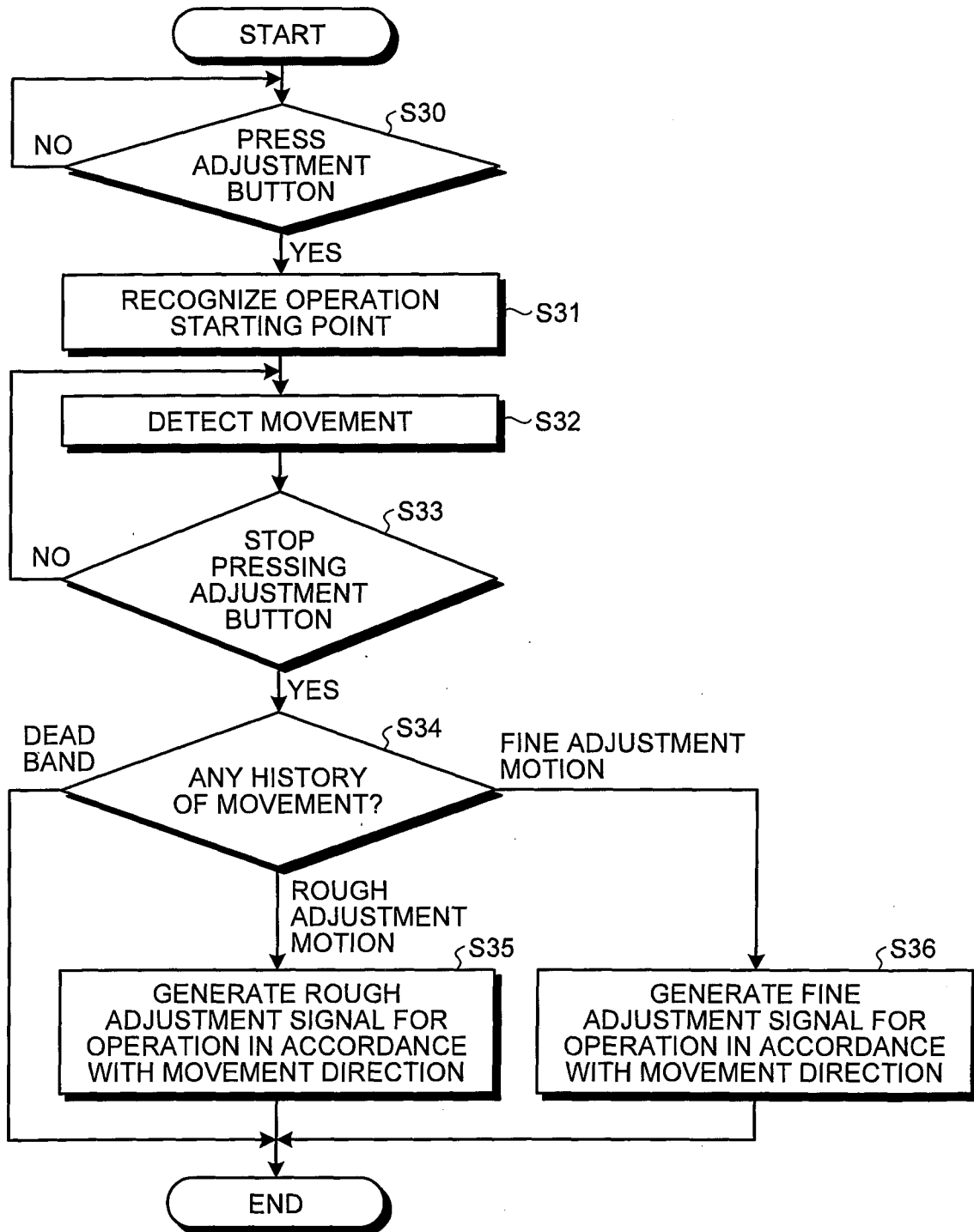
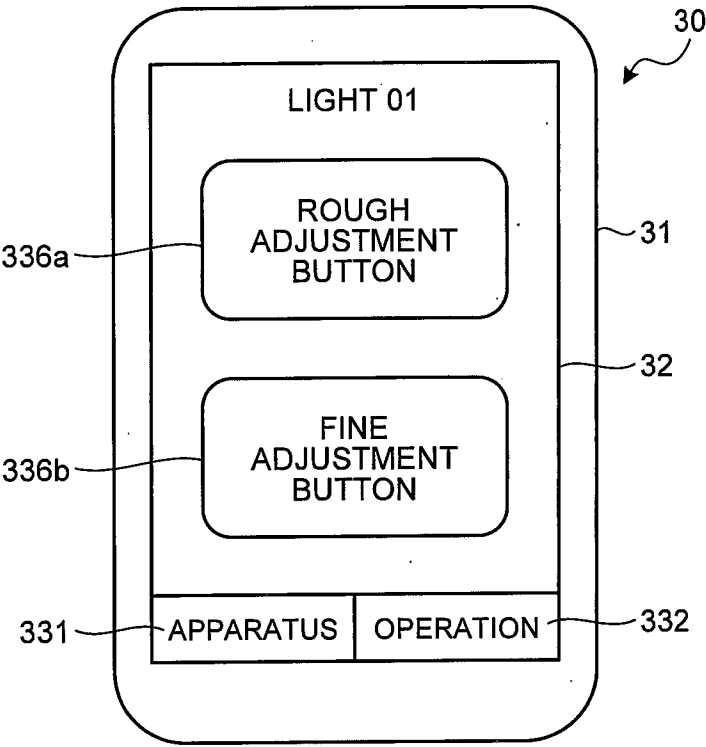


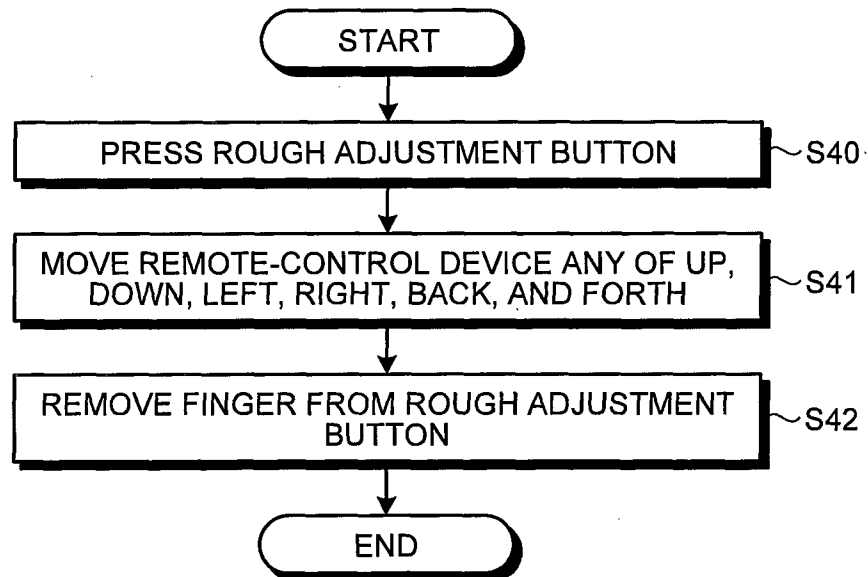
FIG.9



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FIG.10

(a)



(b)

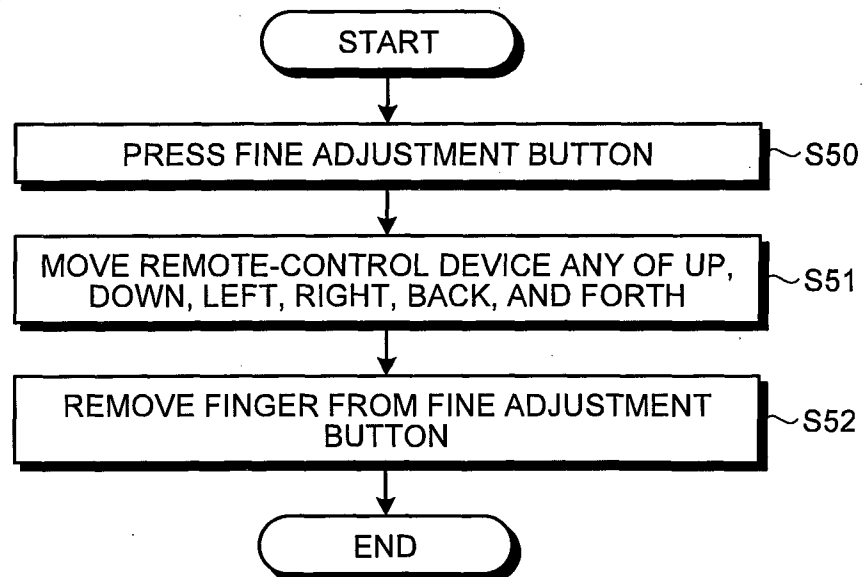
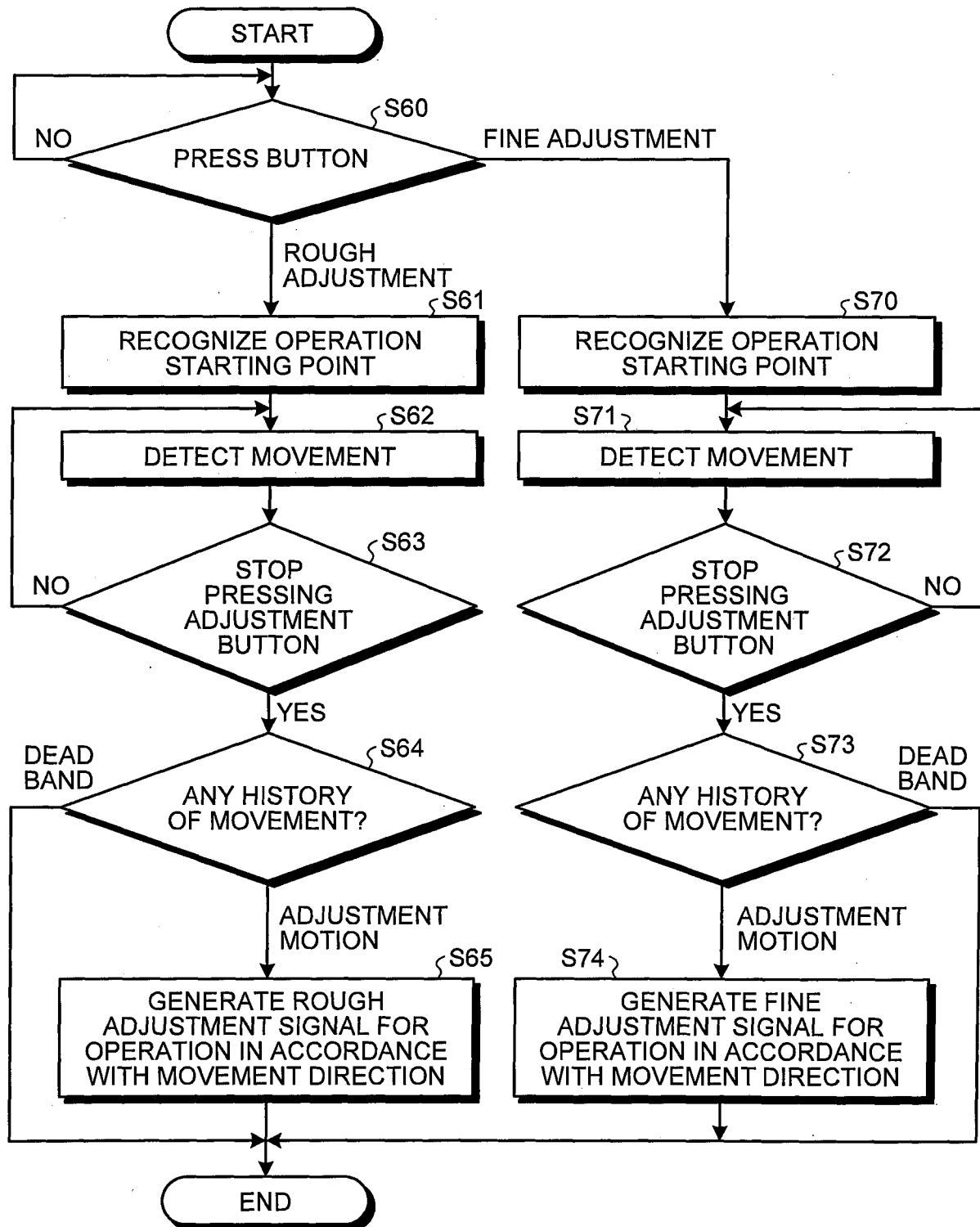


FIG.11



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FIG.12

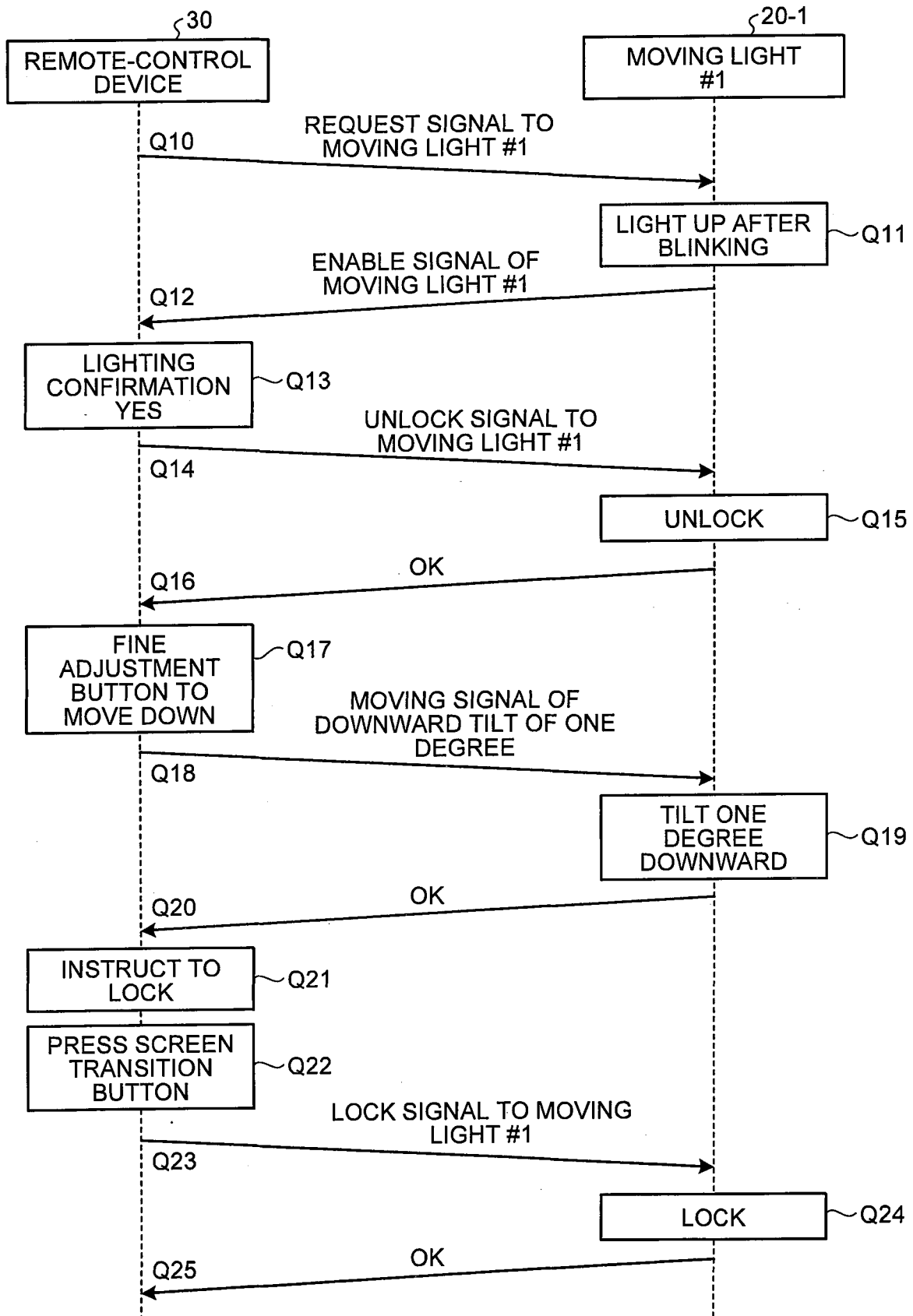
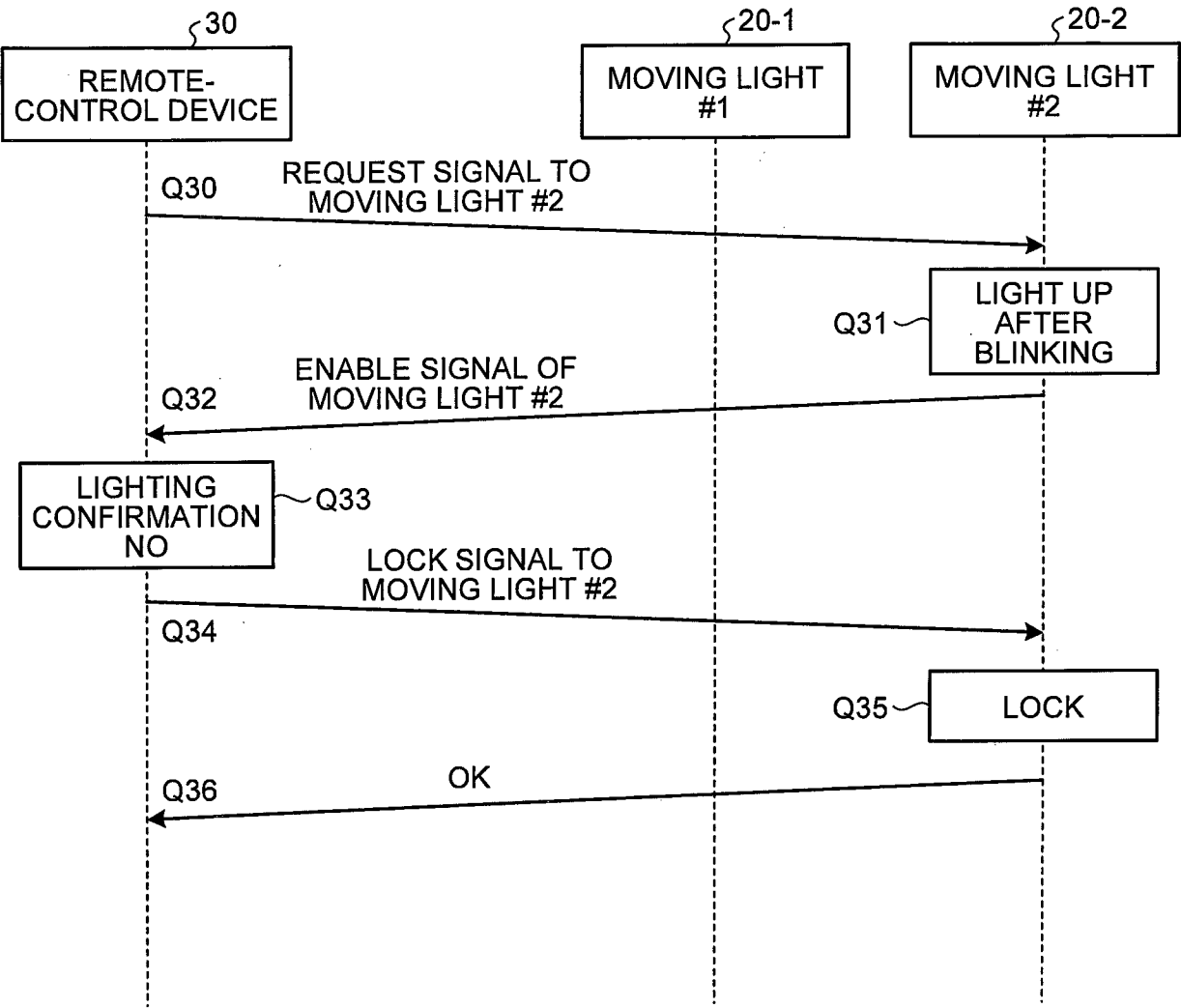


FIG.13



INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2016/060980

A. CLASSIFICATION OF SUBJECT MATTER
INV. H05B37/02 G06F3/0346
ADD.

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)

H05B G06F F21S H01H H04Q H04N

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

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

EPO-Internal, WPI Data, INSPEC, COMPENDEX, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/001665 A1 (BROCKMANN THOMAS [DK]) 7 January 2010 (2010-01-07)	1-3,12
Y	abstract; figure 1 page 1, paragraph 3 page 1, paragraph 10 - page 2, paragraph 25 page 2, paragraph 28-30; claims 9-14	4-11, 13-16
X	JP 3 131355 B2 (MATSUSHITA ELECTRIC WORKS LTD) 31 January 2001 (2001-01-31)	1-3,12
Y	the whole document	4-11, 13-16
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A	abstract; figures 1-5	2-11, 13-16
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Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No

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Information on patent family members

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