

(19)



(11)

EP 3 143 231 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

04.03.2020 Bulletin 2020/10

(51) Int Cl.:

E05F 15/70 ^(2015.01)

G08B 13/08 ^(2006.01)

(86) International application number:

PCT/US2015/030494

(21) Application number: **15792031.5**

(22) Date of filing: **13.05.2015**

(87) International publication number:

WO 2015/175614 (19.11.2015 Gazette 2015/46)

(54) **CONTROLLER FOR A DOOR OPERATOR**

STEUERGERÄT FÜR EINEN TÜRSCHLIESSER

DISPOSITIF DE COMMANDE POUR UN ACTIONNEUR DE PORTE

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

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(30) Priority: **15.05.2014 US 201461993349 P**

(43) Date of publication of application:

22.03.2017 Bulletin 2017/12

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Description

Related Applications

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 61/993,349 filed on May 15, 2014.

Technical Field

[0002] A door operator for a door is described and, more particularly, a door operator including interactive control and monitoring for selectively setting operating parameters of the door.

Description of Related Art

[0003] The purpose of door operators is to open and close a door. Automatic door operators are used on public buildings and residences to allow for access by the physically disabled or where manual operation of the door may be inconvenient to users. In public facilities, it is a required American National Standard that doors which provide ingress and egress have the ability to open automatically in order to allow handicapped people passage through the doorway.

[0004] A variety of electromechanical automatic door operators are known. A typical electromechanical door operator includes an electric motor and a linkage assembly for operatively coupling the drive shaft of the motor to a door so that the door will be opened and closed when the drive shaft rotates. Activation of the door operator is initiated by means of an electric signal generated in a variety of ways such as, for example, a pressure switch, an ultrasonic or photoelectric presence sensor, motion sensors, radio transmitters, wall switches, and the like. The door may then be closed under power or with a door closer. A conventional door closer uses an internal spring mechanism which is compressed during the opening of the door for storing sufficient energy so that the door can be returned to a closed position without the input of additional electrical energy.

[0005] In door operators, the automatic, powered opening system and door closer are controlled by switches, sensors and valves. Typically, technicians installing door operators perform set up and adjustment of different parameters. Each time, the technician must gain access to a control board of the door operator, usually by removing a cover or gate operator housing, to make the desired adjustments.

[0006] Commissioning and setting door operators and closers is typically done using one or more of the following methods: LED indicators light up and installer waits for button presses to change settings; seven (7) segment displays show a code and installer waits for button presses to change settings that may change the codes on the display (a combination of flashes, alternate lights or colors might be used to indicate progression through

menu items or a change in values); a scrolling alphanumeric display; or an alphanumeric display with region buttons or set buttons similar to an MFD (multi-function display) common in military or aviation. As door operators become more capable, powerful and flexible, the ability to manage and update settings within the operator, as well as installation and commissioning, is becoming more complicated.

[0007] WO2004/053269A1 discloses a system for detecting the position of a moveable barrier as it travels between open and closed positions. The system includes an indicator module positioned away from a door operator mechanism and the moveable barrier, in a position where the user has access to the module but is not in a position to directly see the operational status of the moveable barrier. The indicator module comprises a user interface coupled to an indicator controller which communicates via a link with the door operator controller and includes a plurality of indication devices, which may be a video display having touch screen capabilities.

[0008] There is a need for an improved system and method for establishing communication with door operators to initiate their performance and make any desired adjustments. Moreover, it would be advantageous to provide centralized control for setting the door operating parameters.

Disclosure of the Invention

[0009] According to the present invention there is provided a door operator as set forth in claim 1 and a method as set forth in claim 12. Bearing in mind the problems and deficiencies of the prior art, it is therefore an object of the present invention to provide an improved apparatus and method to display, change and interact with settings within and performance of door operators.

[0010] It is another object of the present invention to provide an improved apparatus including a graphical user interface with touch capability which can be used to set, adjust, command, test, troubleshoot, configure, upgrade, or monitor settings within and performance of door operators or closers.

A further object of the invention is to provide an improved apparatus including a graphical user interface with touch capability which can be used on any door operator or closer that requires input from a user for adjusting settings or commissioning the unit.

It is yet another object of the present invention to provide an improved apparatus including a graphical user interface with touch capability which allows for a logical menu structure that can access specific values without previous knowledge within a door operator or closer.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The above and other objects, which will be apparent to those skilled in the art, are achieved in the present invention with a door operator according to claim 1.

[0011] A method according to claim 12 is also provided for adjusting parameters within a door operator.

[0012] The user communicates with a door operator through a user input. An interface connected to the door operator, a circuitry is configured to receive a command signal from the user, a controller for deriving a control signal from the command signal, and a display configured to present the data in a graphical and alphanumeric format. The data comprises a set of information from a sensor connected to the door operator.

[0013] The present invention is directed to a door operator comprising a door operator housing, a door driver for opening and closing a door, a controller including a microprocessor connected to and controlling the door driver, and a graphical user interface embedded in the door operator during production and hidden under a cover which serves to surround and enclose the components of the door operator, and accessible by removal of the cover or at least a portion of the door operator housing, the graphical user interface comprising a pixel display screen capable of graphics and augmented with a planar touch select overlay being the user input device coupled to the microprocessor to display information stored in the controller and to receive instructions selected from the display screen by a user. The door operator includes a memory module coupled to the microprocessor and storing code executed by the microprocessor, wherein the microprocessor under control of the code displays to the user various menu items on the graphical user interface display and enables the user to select among the menu items using the display screen with touch select input such that the microprocessor derives a control signal. The door operator further includes circuitry configured to receive the control signal from the microprocessor and to carry the control signal to the door driver.

Brief Description of the Drawings

[0014] The features of the invention believed to be novel and the elements characteristic of the invention are set forth with particularity in the appended claims. The figures are for illustration purposes only and are not drawn to scale. The invention itself, however, both as to organization and method of operation, may best be understood by reference to the detailed description which follows taken in conjunction with the accompanying drawings in which:

Fig. 1 is a perspective view of an embodiment not according to the invention of a push-side mounted door operator.

Fig. 2 is a perspective view of an embodiment not according to the invention of a pull-side mounted door operator.

Fig. 3 is a plan view of a controller unit for use with the door operator as shown in Figs. 1 and 2.

Figs. 4A-4C are plan views of a remote controller built into a personal digital assistant (PDA) loaded with special purpose code.

Fig. 5 is a perspective view of a push-side mounted door operator according to the invention, wherein the door operator includes a display screen comprising a graphical user interface with a planar touch select interface.

Fig. 6 is a flow diagram of one embodiment of the graphical user interface for use with a door operator as shown in Fig. 5.

Fig. 7 is a flow diagram of an exemplary activation wizard displayed on the graphical user interface display screen for use with a door operator as shown in Figs. 5 and 6.

Mode(s) for Carrying Out Invention

[0015] In describing the preferred embodiment of the present invention, reference will be made herein to Figs. 5-7 of the drawings in which like numerals refer to like features of the invention.

Certain terminology is used herein for convenience only and is not to be taken as a limitation on the invention. For example, words such as "upper," "lower," "left," "right," "horizontal," "vertical," "upward," and "downward" merely describe the configuration shown in the FIGS. Indeed, the referenced components may be oriented in any direction and the terminology, therefore, should be understood as encompassing such variations unless specified otherwise.

As used herein, the term "open position" for a door means a door position other than a closed position, including any position between the closed position and a fully-open position as limited only by structure around the door frame, which can be up to 180 degrees from the closed position.

Referring now to the drawings, wherein like reference numerals designate corresponding or similar elements throughout the several views, a door operator not according to the present invention is shown in FIG. 1 and generally designated at 40. The door operator 40 is mounted adjacent to a door 42 in a door frame 44 for movement of the door 42 relative to the frame 44 between a closed position and an open position. For the purpose of this description, only the upper portion of the door 42 and the door frame 44 are shown. The door 42 is of a conventional type and is pivotally mounted to the frame 44 for movement from the closed position, as shown in FIG. 1, to an open position for opening and closing an opening through a building wall 48 to allow a user to travel from one side of the wall 48 to the other side of the wall 48.

The door operator 40 comprises a back plate 50, a motor assembly 52, a door closer assembly 54 including a linkage assembly 56 for operably coupling the door operator

40 to the door 42, and a controller 58. The back plate 50 has substantially flat rear wall 60 and end walls 62. The back plate 50 is securely mounted to the upper edge of door frame 44 using mounting bolts (not shown), or other fasteners. The back plate 50 extends generally horizontally with respect to the door frame 44. The motor assembly 52, door closer assembly 54, and controller 58 are fixed to the back plate 50. A cover (not shown) attaches to the back plate 50. The cover serves to surround and enclose the components of the door operator 40 to reduce dirt and dust contamination, and to provide a more aesthetically pleasing appearance. It is understood that although back plate 50 is shown mounted directly to the door frame 44, the back plate 50 could be mounted to wall 48 adjacent the door frame 44 or concealed within the wall 48 or door frame 44. Concealed door operators are well known in the art of automatic door operators.

A system and method is provided for sending and receiving information to and from the door operator 50 to allow for controlling, monitoring and adjusting information pertaining to operating parameters of the door operator. The control system assists a user, for example an installer, technician, service man or repair man to set, adjust, command, test, troubleshoot, configure, upgrade or monitor a door operator, as well as any other device connected to the same power grid. It is understood that a door operator can be any system that controls a barrier to entry, an exit, or a view, for example, a door operator, a garage door opener, or the like. The barrier could be a door or window for a small entity, or a gate for a large entity, (i.e., a vehicle) which can swing out, slide open, or even roll upwards. The operator, which moves the barrier or gate from an open position to a closed position, or vice versa, can be manual or automatic.

[0016] Referring to FIG. 3, a controller unit 70, not according to the invention, comprises a processor, e.g. a microprocessor or a microcontroller, with memory for storing instructions and data. Some of the memory is non-volatile, storing configuration information and program code. An LCD display screen 72 of the controller 70 displays various menus, icons, and other information to the user under direction of the processor. The display screen 72 displays information received or stored in the controller. Of course, any type of display may be implemented.

[0017] In one embodiment, the display screen 72 is self-illuminating to assist in dark work environments. The user can scroll through the menus and icons using an input device, for example, a joystick 74, which may include an internal push-to-activate switch. The processor is connected to the input device so that it can read the status of the input device. Moving the joystick 74 instructs the processor to cause the display to scroll through the menus. Pushing on the joystick 74 with an internal push-to-activate switch instructs the processor that the current menu items have been selected by the user.

Like door operators, the controller 70 may derive power from the power grid. However, the controller 70 may also

be battery-operated in case that a power failure occurs or is not plugged into a power source when using both sources of power. In an exemplary embodiment, the controller 70 comprises a rechargeable battery so that the device may be operated without the need for a separate power source. In another embodiment, the controller 70 also comprises a power cord that may be extended from the controller to access any available power grid. A power grid interface derives power from a power line and in turn supplies current to both the power supply and other circuitry. The power supply feeds power to various components of monitoring device including the rechargeable battery and CPU.

The display screen 72 is configured to present data in a graphical and alphanumerical format. In an exemplary embodiment, the controller 70 is capable of providing graphical and numerical depictions of the internal parameters of the door operator. The CPU communicates with the controller 70 to send information to the display screen 72. In another embodiment the controller 70 uses a combination of graphical representations, text messages, and light indicators to represent data. In another embodiment, text messages on the screen 72 inform the user of real time events as they occur. In yet another embodiment, the controller 70 may comprise light indicators that light up when a particular event takes place. The graphical or text representations will allow the technician to adjust or set the parameters. This is desirable in the industry as many users have different requirements for the use of their doors and technicians are required to make adjustments.

[0018] The input interface, along with joystick 74 control combined with internal components, such as a CPU and a memory, allow a user implementing the control system to receive, process, and send information. In use, setup and adjustment of the inverter and door operator are performed with the joystick 74. The LCD screen 72 shows the feature to be adjusted and the setting. A small potentiometer ("pot") beside the LCD interface can be used to adjust the LCD screen contrast. To scroll through menu items, the joystick is moved toward "MENU↑UP" to scroll up or toward "MENU↓DOWN" to scroll down. To change the value of a feature, the joystick is moved toward "INCR→" to increase the value or toward "←DECR" to decrease the value. To accept the value, the joystick is pushed inwardly. Once setup or adjustment of the desired features is completed, the joystick is used to scroll down the menu to the "SAVE" line, and the joystick is pushed in to accept all of the values.

[0019] Some of the features that may be set and adjusted include hand of the door, whether left hand or right hand mounted. The mounting of the door is also designated as a push or pull, depending on the side of the door on which the unit is mounted. There is a "Push N Go" feature, which may be on or off. If "off," the unit depends on an external switch for activation. If "on," the unit will operate with a slight movement of the door toward the open position. Even if "on," external switches may also

be used for activation.

[0020] Obstruction detection and delay sensitivity may be adjusted. The range of delay may be about 0 to about 5 seconds and adjustable in 1 second increments. During the opening cycle, the door will press against an obstruction for the obstruction delay time set and then close normally under spring force. During the closing cycle, the door will press against an obstruction for the time set under a feature entitled "Hold Time." The door will then reclose. If the obstruction is still present, power to the unit will turn off with only the spring force pushing the door against the obstruction.

A "Latch Boost" feature can be adjusted to "Off," "Low," or "High." For example, if during the last few inches of door closing, the door does not close due to mechanical door issues, environment issues and the like, additional force can be added to close the door.

The time the door is held at the fully open position can be adjusted from about 0 to about 30 seconds in, for example, 3 second increments. A delay to the motor start can be set in 1 second increments from, for example, about 0 to about 5 seconds before the unit starts to allow unlocking of electric hardware. The length of time a relay will stay energized for powered latch retraction can be adjusted, for example, in 3 second increments, from about 0 to about 30 seconds. Alarm Delay can be "Off" or set, for example, at about 30 seconds, about 60 seconds, and the like.

A number of items may be recorded and tracked. The number of open/close cycles the unit has experienced can be recorded. The number of days the unit has been powered to 120 VAC can be recorded. The time for the previous opening cycle and the previous closing cycle can also be recorded. Information regarding specific users of the door can also be recorded, such as RFID (radio frequency identification) tag scan frequency. The control unit can be used to set the closed and open position of the door. Again, once all adjustments have been made, the joystick is pushed in to save the values.

[0021] As shown in Figs. 4A-4C, in one embodiment not according to the invention, a remote controller 70' is built into a personal digital assistant (PDA) loaded with and executing special-purpose code. An RF (or other wireless) communication card plugs into a port of the PDA and performs wireless communication functions under control of the PDA. The screen of the PDA acts as the display of the remote controller, and the manual input devices of the PDA - a keyboard or stylus-like pen 76 - is used to scroll and select the menu items. The stylus-like pen 76 may select a desired menu item by contacting the PDA screen and touching the menu item. The PDA can also provide electrical power to the RF communication card.

[0022] As depicted in Fig. 4A, the display screen 72' shows menu items corresponding to parameters to be performed by the door operator. Each menu item is represented on the display screen 72' by an icon or button. The user may use a stylus-like pen 76 to select the de-

sired parameter to be adjusted by contacting the tip of the stylus pen against the display screen and pressing on the icon corresponding to the desired parameter. If the desired parameter is not listed, the user may press the "MENU↑UP" or "MENU↓DOWN" icon or button to view more options. A "BACK" or "↶" icon or button will return the user to the previous screen.

[0023] The user may select, for example, the obstruction detection and delay sensitivity setting, as shown in Fig. 4B. The range of delay may be about 0 to about 5 seconds and adjustable in 1 second increments, as shown on display screen 72'. The user may again use stylus pen 76 to adjust the range of delay by touching the stylus pen against the display screen and sliding the toggle to the desired value, or alternatively, by pressing the "INCR→" or "←DECR" icon or button to increase or decrease the value. Once setup or adjustment of the desired feature is completed, the user may press inwardly on the "SAVE" icon or button using the stylus pen 76 to accept the values. The display screen 72' is capable of displaying information received or stored in the controller in various graphical representations, including alphanumeric characters, symbols, still images, videos, or animated graphics, such as 'check' boxes to adjust the "Latch Boost" feature. As shown in Fig. 4C, when contacting the tip of stylus pen 76 against the display screen touch interface in the desired 'check' box, individual pixels in the display illuminate to depict a 'check' mark graphic in the box next to the selected setting.

[0024] In another embodiment, the remote controller includes a port for downloading software, icon and/or other control, data for use by the remote controller in the course of operating its controlled systems. The data enables the remote controller, for example, to operate additional controlled systems, and to display new icons.

[0025] In one embodiment, the controller can be uploaded with an installation manual accessible to a technician for review. For example, an installation manual for a door operator may be displayed for a technician while working with the unit in the field. This information may be desirable during installation, maintenance, or adjustment of gate operators. Additionally, the controller may comprise a USB interface which may be used to upload or upgrade firmware for the controller. Further, a serial port interface provides yet another connectivity option for the controller to hook up to other devices for the transfer of communication.

[0026] According to the invention, a graphical user interface ("GUI") comprising a pixel display screen 72" capable of graphics and augmented with a planar touch select overlay is connected to the processor, e.g. a microprocessor or microcontroller, which controls movement of the door, wherein the GUI is coupled to the controller and the display screen with touch select overlay is the user input device. The pixel display screen 72" is embedded in a door operator during production and hidden under a cover (not shown) which serves to sur-

round and enclose the components of the door operator, as shown in Fig. 5. In such a configuration, an installer or technician would need to remove the door operator's cover or housing to access the GUI. In an embodiment not forming part of the invention, the pixel display screen may be positioned outside and adjacent to the door operator housing, such as on the same or an adjacent wall. To prevent unauthorized access to the unit, the GUI may require the input of a preregistered security code by an authorized user. The planar touch interface may employ any type of touch array, such as a capacitive and/or resistive touch array. The GUI is pixel-controlled and control software can light (or dim) or change the color of individual pixels to display still images or alphanumeric characters or symbols, as well as display videos or animated graphics. The pixel display may be LCD, LED or any other technology. An advantage of a pixel-controlled display is that the display is not limited to a linear menu structure, and instead may be configured as an applications ("apps") panel similar to a smartphone screen display. Activating an icon or button on a given screen using a user's fingers (or other touch-enabled interface) causes the display to change, such as going from a "start menu" to a subsequent screen to adjust a particular operating parameter setting.

[0027] A memory module coupled to the processor stores code executed by the processor. Any information with respect to the door operator which is stored in the memory module, such as a preloaded installation instruction manual, an activation or setup wizard, or installation and/or troubleshooting videos, may be displayed on the GUI display screen 72" to assist the user. For example, if an installer or technician needs assistance in connecting a presence sensor while in the field, the technician may use the display screen's touch select interface to navigate the GUI to select a preloaded instructional video, which can then be viewed on the display.

[0028] The memory module may include code comprising a self-diagnostic test of the door operator's operating parameters and internal circuitry, which can be performed by the processor. The processor sends a plurality of control signals to the door driver corresponding to designated parameters of door movement, the control signals are sent through the circuitry of the door operator, and the processor then receives data from the door driver responsive to the plurality of control signals. After selection by an installer or technician of the diagnostic test icon or button on the GUI display screen 72", the system is capable of performing a self-test to diagnose and analyze whether the parameters of the door are performing correctly, displaying the results to the user on the GUI display, and providing instructions to the user as to suggested fixes, if any, for incorrectly performing parameters or circuitry. Suggested fixes may include jumping a connector or similar and completing the self-test to diagnose circuits that are not operating properly. The controller system allows for both self- and user-interactive analytics and diagnostics of the door operator.

[0029] Fig. 6 provides an exemplary GUI which allows a user, installer, technician or the like, to set, adjust, troubleshoot, configure, or monitor settings within a door operator. The example is a flow of screens visible on the GUI to the user with soft icons or buttons to change settings for the inputs/outputs, input/output device numbers, functions and activations, with each selection dropping into a settings screen. In one embodiment, the GUI screen 200 may be comprised of separate blocks of options with soft icons or buttons 210 and a scrolling text bar 220 in the middle. In an initial block of buttons 230, the user may select basic door operation parameters such as door motion settings, diagnostics, setup wizard or factory reset of all settings. The user may also select whether to use the control system of the present invention to set up any additional door operator input or output functions such as a wall switch, presence sensor, or any other input or output including but not limited to those described herein. After selecting on block 230 whether to adjust an input or output, e.g. selecting input 235, the user then selects on block 240 the particular input or output to change, that is, the input or output to which the device is connected, e.g., as device No. 1, 245. The user then selects on block 250 the particular function for the input and, if the function is not shown, selects "More" 255, after which additional function blocks 260 are displayed. If, for example, "Activate" is selected 265, the user is then presented with the settings block 270 for that function, and the particular settings options are presented and the user may select and change those settings by subsequent setting screens. The GUI shows and identifies to the controller the selected door operator input or output and corresponding microprocessor input or output to the program module corresponding to the selected function to be performed.

[0030] Fig. 7 provides a flowchart of an exemplary activation wizard displayed on the GUI display screen. The example is a progression of steps taken in either a new installation of a door operator or in changing one or more operating parameter settings in an existing setup. A user is greeted with a startup screen 300 allowing the user to select, for example, a "New Install" or to "Change Settings" using the GUI's planar touch interface. After selecting an icon or button 310, for example, for "New Install," the user is walked through a series of instructions 320 for set-up of the door operator, with each set of instructions or steps displayed on a subsequent screen. In conjunction with each instruction, the GUI may display graphical representations or images to assist the user in performing the desired calibration, such as displaying an image of a dial to allow the user to adjust the opening or closing speed of the door driver. Other settings which may be set or adjusted using the GUI include but are not limited to obstruction detection and delay sensitivity, latch speed and position, backcheck speed and position, and latch boost.

The GUI may also be used to instruct the user on how to install additional optional door operator input or output

functions, such as a wall switch or presence sensor. In at least one embodiment, the GUI is configured to display an instruction video or animated graphic 330 to assist the user in performing the instructed operation, such as wiring a wall switch or presence sensor to the appropriate terminals.

The controller has many advantages, including providing installers and manufacturers with a means to set, adjust, command, test, troubleshoot, configure, upgrade, or monitor door operators.

Although the controller has been shown and described in considerable detail with respect to only a few exemplary embodiments thereof, it should be understood by those skilled in the art that it is not intended to limit the invention to the embodiments since various modifications, omissions and additions may be made to the disclosed embodiments within the scope of the appended claims without materially departing from the novel teachings and advantages of the controller, particularly in light of the foregoing teachings. Accordingly, it is intended to cover all such modifications, omissions, additions, and equivalents as may be included within the scope of the following claims. In the claims, means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents but also equivalent structures. Thus, although a nail and screw may not be structural equivalents, in that a nail employs a cylindrical surface to secure wooden arts together, whereas a screw employs a helical surface, in the environment of fastening wooden parts, a nail and screw may be equivalent structures.

[0031] While the present invention has been particularly described, in conjunction with a specific preferred embodiment, it is evident that many alternatives, modifications and variations as defined by the claims will be apparent to those skilled in the art in light of the foregoing description. Thus, having described the invention, what is claimed is:

Claims

1. A door operator (40), comprising:

a door operator housing;
a door driver for opening and closing a door (42);
a controller including a microprocessor, the microprocessor connected to and controlling the door driver;
a graphical user interface embedded in the door operator (40) during production and hidden under a cover which serves to surround and enclose the components of the door operator, and accessible by removal of the cover or at least a portion of the door operator housing, the graphical user interface comprising a pixel display screen (72") capable of graphics and augment-

ed with a planar touch select overlay being the user input device coupled to the microprocessor to display information stored in the controller and to allow the microprocessor to receive instructions selected from the display screen (72") by a user;

a memory module coupled to the microprocessor, the memory module storing code executed by the microprocessor,
wherein the microprocessor under control of the code displays to the user various menu items on the graphical user interface display screen (72") and enables the user to select among the menu items using the display screen (72") with touch select input such that the microprocessor derives a control signal; and
circuitry configured to receive the control signal from the microprocessor and to carry the control signal to the door driver.

2. The door operator of claim 1 wherein the display screen (72") with touch select input comprises a resistive touch array.
3. The door operator of claim 1 wherein the display screen (72") with touch select input comprises a capacitive touch array.
4. The door operator of claim 1 wherein the graphical user interface display screen (72") is pixel controlled and is configured to illuminate individual pixels to display the information, the display capable of a representation selected from a group comprising alphanumeric characters, symbols, still images, videos, or animated graphics.
5. The door operator of claim 1 wherein each of the menu items corresponds to at least one operating parameter of a plurality of operating parameters to be performed by the door operator (40).
6. The door operator of claim 1 wherein the memory module includes code comprising a preloaded installation instruction manual, an activation wizard, at least one installation video, and at least one troubleshooting video.
7. The door operator of claim 1 further comprising an internal storage for recording and tracking data sent to or received from the door operator (40).
8. The door operator of claim 1 wherein the graphical user interface requires the input of a preregistered security code by the user to prevent unauthorized access.
9. The door operator of claim 1 further comprising a sensor connected to a door (42), wherein the con-

troller receives a response signal from the door (42) carrying data from the sensor responsive to the control signal to the door operator (40).

10. The door operator of claim 9 wherein the data comprises a door position. 5
11. The door operator of claim 1 wherein the memory module includes code comprising a diagnostic test, and wherein the microprocessor is capable of diagnosing and analyzing an operation of the door (42). 10
12. A method of adjusting parameters within a door operator (40), comprising the steps of: 15
providing a door operator (40) according to one of the previous claims,
displaying to the user on the display screen (72") menu items corresponding to parameters to be performed by the door operator (40); 20
selecting among the menu items by touching a menu item on the display screen (72"), such that the microprocessor derives a control signal; and
sending the control signal to the door driver to control a parameter of door movement. 25
13. The method of claim 12 further comprising a sensor connected to the door operator (40), wherein a response signal from the door operator (40) comprises a signal from the sensor. 30
14. The method of claim 12 further comprising the step of monitoring a door (42) that is connected to the door operator (40). 35
15. The method of claim 12 wherein the microprocessor diagnoses and analyzes an operation of a door (42) that is connected to the door operator (40). 40

Patentansprüche

1. Türbetätigungsanlage (40), umfassend: 45
ein Türbetätigungsanlagengehäuse;
einen Türantrieb zum Öffnen und Schließen einer Tür (42);
eine Steuerungseinrichtung, die einen Mikroprozessor einschließt, wobei der Mikroprozessor mit dem Türantrieb verbunden ist und ihn steuert; 50
eine grafische Benutzerschnittstelle, die während der Produktion in die Türbetätigungsanlage (40) eingebettet und unter einer Abdeckung verborgen wird, welche dazu dient, die Komponenten der Türbetätigungsanlage zu umgeben und zu umschließen, und die durch Entfernen der Abdeckung oder zumindest eines Ab- 55

schnitts des Türbetätigungsanlagengehäuses zugänglich wird, wobei die grafische Benutzerschnittstelle einen Pixelbildschirm (72") umfasst, der grafikfähig und mit einer ebenen Berührungsauswahl-Deckschicht erweitert ist, welche die Benutzereingabevorrichtung ist, die mit dem Mikroprozessor gekoppelt ist, um in der Steuerungseinrichtung gespeicherte Information anzuzeigen und dem Mikroprozessor zu ermöglichen, Anweisungen zu empfangen, die durch einen Benutzer aus dem Bildschirm (72") ausgewählt wurden;
ein mit dem Mikroprozessor gekoppeltes Speichermodul, wobei das Speichermodul einen Code speichert, der durch den Mikroprozessor ausgeführt wird,
worin der Mikroprozessor unter Steuerung des Codes dem Benutzer verschiedene Menüpunkte auf dem Bildschirm (72") der grafischen Benutzerschnittstelle anzeigt und dem Benutzer ermöglicht, unter Verwendung des Bildschirms (72") mit Berührungsauswahleingabe unter den Menüpunkten auszuwählen, sodass der Mikroprozessor ein Steuersignal ableitet; und
eine Schaltungsanordnung, die dafür konfiguriert ist, das Steuersignal vom Mikroprozessor zu empfangen und das Steuersignal zum Türantrieb zu übertragen.

2. Türbetätigungsanlage nach Anspruch 1, worin der Bildschirm (72") mit Berührungsauswahleingabe eine resistive Berührungsanordnung umfasst. 30
3. Türbetätigungsanlage nach Anspruch 1, worin der Bildschirm (72") mit Berührungsauswahleingang eine kapazitive Berührungsanordnung umfasst. 35
4. Türbetätigungsanlage nach Anspruch 1, worin der Bildschirm (72") der grafischen Benutzerschnittstelle pixelgesteuert ist und dafür konfiguriert ist, einzelne Pixel zu beleuchten, um die Information anzuzeigen, wobei die Anzeige zu einer Darstellung imstande ist, die aus einer Gruppe ausgewählt wird, die alphanumerische Zeichen, Symbole, Standbilder, Videos oder animierte Grafiken umfasst. 40
5. Türbetätigungsanlage nach Anspruch 1, worin jeder der Menüpunkte mindestens einem Betriebsparameter aus einer Vielzahl von Betriebsparametern entspricht, die durch die Türbetätigungsanlage (40) durchzuführen sind. 45
6. Türbetätigungsanlage nach Anspruch 1, worin das Speichermodul einen Code einschließt, der ein vorab geladenes Installationshandbuch, einen Aktivierungsassistenten, mindestens ein Installationsvideo und mindestens ein Fehlerbehebungsvideo umfasst. 50

7. Türbetätigungsanlage nach Anspruch 1, ferner umfassend einen internen Speicher zum Aufzeichnen und Nachverfolgen von Daten, die an die Türbetätigungsanlage (40) gesendet oder von dieser empfangen werden.
8. Türbetätigungsanlage nach Anspruch 1, worin die grafische Benutzerschnittstelle die Eingabe eines vorregistrierten Sicherheitscodes durch den Benutzer erfordert, um unberechtigten Zugang zu verhindern.
9. Türbetätigungsanlage nach Anspruch 1, ferner einen Sensor umfassend, der mit einer Tür (42) verbunden ist, worin die Steuerungseinrichtung als Antwort auf das Steuersignal an die Türbetätigungsanlage (40) ein Antwortsignal von der Tür (42) empfängt, das Daten vom Sensor überträgt.
10. Türbetätigungsanlage nach Anspruch 9, worin die Daten eine Türposition umfassen.
11. Türbetätigungsanlage nach Anspruch 1, worin das Speichermodul einen Code einschließt, der einen Diagnostest umfasst, und worin der Mikroprozessor zum Diagnostizieren und Analysieren eines Betriebs der Tür (42) imstande ist.
12. Verfahren zum Einstellen von Parametern innerhalb einer Türbetätigungsanlage (40), die Schritte umfassend:

Bereitstellen einer Türbetätigungsanlage (40) nach einem der vorhergehenden Ansprüche, Anzeigen von Menüpunkten, die durch die Türbetätigungsanlage (40) durchzuführenden Parametern entsprechen, für den Benutzer auf dem Bildschirm (72");

Auswählen unter den Menüpunkten durch Berühren eines Menüpunkts auf dem Bildschirm (72"), sodass der Mikroprozessor ein Steuersignal ableitet; und

Senden des Steuersignals an den Türantrieb, um einen Parameter der Türbewegung zu steuern.
13. Verfahren nach Anspruch 12, ferner einen mit der Türbetätigungsanlage (40) verbundenen Sensor umfassend, worin ein Antwortsignal von der Türbetätigungsanlage (40) ein Signal vom Sensor umfasst.
14. Verfahren nach Anspruch 12, ferner den Schritt umfassend: Überwachen einer Tür (42), die mit der Türbetätigungsanlage (40) verbunden ist.
15. Verfahren nach Anspruch 12, worin der Mikroprozessor einen Betrieb einer Tür (42), die mit der Tür-

betätigungsanlage (40) verbunden ist, diagnostiziert und analysiert.

5 Revendications

1. Mécanisme d'actionnement de porte (40), comprenant :

un logement de mécanisme d'actionnement de porte ;

un moyen de commande de porte pour ouvrir et fermer une porte (42) ;

un contrôleur qui inclut un microprocesseur, le microprocesseur étant connecté au moyen de commande de porte et le commandant ;

une interface utilisateur graphique qui est intégrée à l'intérieur du mécanisme d'actionnement de porte (40) pendant la fabrication et qui est dissimulée au-dessous d'un capot, lequel capot sert à entourer et à renfermer les composants du mécanisme d'actionnement de porte, et à laquelle il est possible d'accéder en enlevant le capot ou au moins une partie du logement de mécanisme d'actionnement de porte, l'interface utilisateur graphique comprenant un écran d'affichage pixélisé (72") qui dispose d'une capacité graphique et qui est pourvu, en superposition, d'un moyen de sélection tactile plan qui constitue le dispositif d'entrée d'utilisateur et qui est couplé au microprocesseur de manière à permettre l'affichage des informations qui sont stockées dans le contrôleur et de manière à permettre que le microprocesseur reçoive des instructions qui sont sélectionnées à partir de l'écran d'affichage (72") par un utilisateur ;

un module de mémoire qui est couplé au microprocesseur, le module de mémoire stockant un code qui est exécuté par le microprocesseur ;

dans lequel le microprocesseur, sous la commande du code, affiche, à destination de l'utilisateur, divers éléments de menu sur l'écran d'affichage d'interface utilisateur graphique (72") et permet que l'utilisateur effectue une sélection au sein des éléments de menu en utilisant l'écran d'affichage (72") qui est muni d'une entrée de sélection tactile de telle sorte que le microprocesseur dérive un signal de commande ;

et

un circuit qui est configuré de manière à ce qu'il reçoive le signal de commande en provenance du microprocesseur et de manière à ce qu'il transfère le signal de commande au moyen de commande de porte.
2. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel l'écran d'affichage (72") qui est muni d'une entrée de sélection tactile comprend

- un réseau tactile résistif.
3. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel l'écran d'affichage (72") qui est muni d'une entrée de sélection tactile comprend un réseau tactile capacitif. 5
 4. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel l'écran d'affichage d'interface utilisateur graphique (72") est commandé par pixels et est configuré de manière à ce qu'il éclaire des pixels individuels pour afficher l'information, l'affichage présentant une capacité de présentation d'une représentation qui est sélectionnée parmi un groupe qui comprend des caractères alphanumériques, des symboles, des images fixes, des vidéos et des graphiques animés. 10
 5. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel chacun des éléments de menu correspond à au moins un paramètre de fonctionnement d'une pluralité de paramètres de fonctionnement à effectuer par le mécanisme d'actionnement de porte (40). 15
 6. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel le module de mémoire inclut un code qui comprend un manuel d'instructions d'installation préchargé, un assistant d'activation, au moins une vidéo d'installation et au moins une vidéo de dépannage. 20
 7. Mécanisme d'actionnement de porte selon la revendication 1, comprenant en outre un moyen de stockage interne pour enregistrer et assurer le suivi des données qui sont envoyées sur le mécanisme d'actionnement de porte (40) ou qui sont reçues depuis celui-ci. 25
 8. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel l'interface utilisateur graphique nécessite, de la part de l'utilisateur, l'entrée d'un code de sécurité préenregistré pour empêcher un accès non autorisé. 30
 9. Mécanisme d'actionnement de porte selon la revendication 1, comprenant en outre un capteur qui est connecté à une porte (42), dans lequel le contrôleur reçoit un signal de réponse en provenance de la porte (42) qui est porteur de données en provenance du capteur en réponse à l'application du signal de commande sur le mécanisme d'actionnement de porte (40). 35
 10. Mécanisme d'actionnement de porte selon la revendication 9, dans lequel les données comprennent une position de porte. 40
 11. Mécanisme d'actionnement de porte selon la revendication 1, dans lequel le module de mémoire inclut un code qui comprend un test de diagnostic, et dans lequel le microprocesseur dispose de la capacité de diagnostiquer et d'analyser un fonctionnement de la porte (42). 45
 12. Procédé de réglage de paramètres à l'intérieur d'un mécanisme d'actionnement de porte (40), comprenant les étapes constituées par :
 - la fourniture d'un mécanisme d'actionnement de porte (40) selon l'une des revendications qui précèdent ;
 - l'affichage à destination de l'utilisateur, sur l'écran d'affichage (72"), d'éléments de menu qui correspondent à des paramètres à effectuer par le mécanisme d'actionnement de porte (40) ;
 - la sélection, au sein des éléments de menu, par effleurement tactile d'un élément de menu sur l'écran d'affichage (72") de telle sorte que le microprocesseur dérive un signal de commande ;
 - et
 - l'envoi du signal de commande au moyen de commande de porte afin de commander un paramètre de mouvement de porte.
 13. Procédé selon la revendication 12, comprenant en outre un capteur qui est connecté au mécanisme d'actionnement de porte (40), dans lequel un signal de réponse en provenance du mécanisme d'actionnement de porte (40) comprend un signal en provenance du capteur. 50
 14. Procédé selon la revendication 12, comprenant en outre l'étape de surveillance d'une porte (42) qui est connectée au mécanisme d'actionnement de porte (40). 55
 15. Procédé selon la revendication 12, dans lequel le microprocesseur diagnostique et analyse un fonctionnement d'une porte (42) qui est connectée au mécanisme d'actionnement de porte (40).

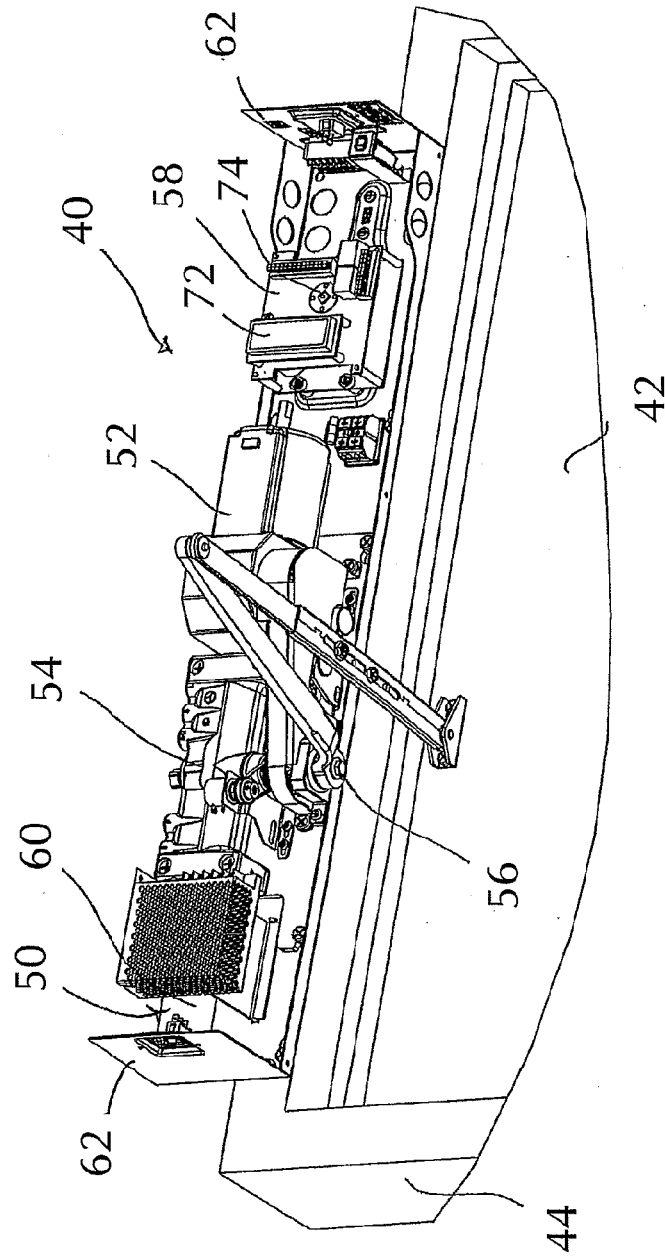


FIG. 1

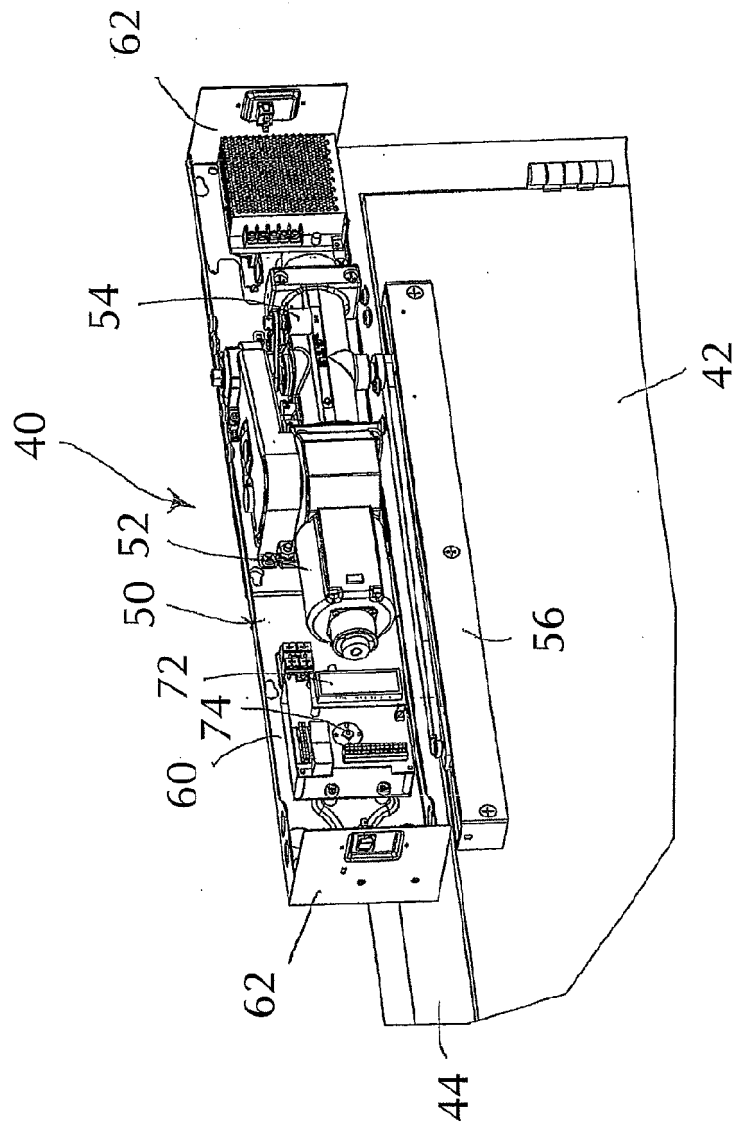


FIG. 2

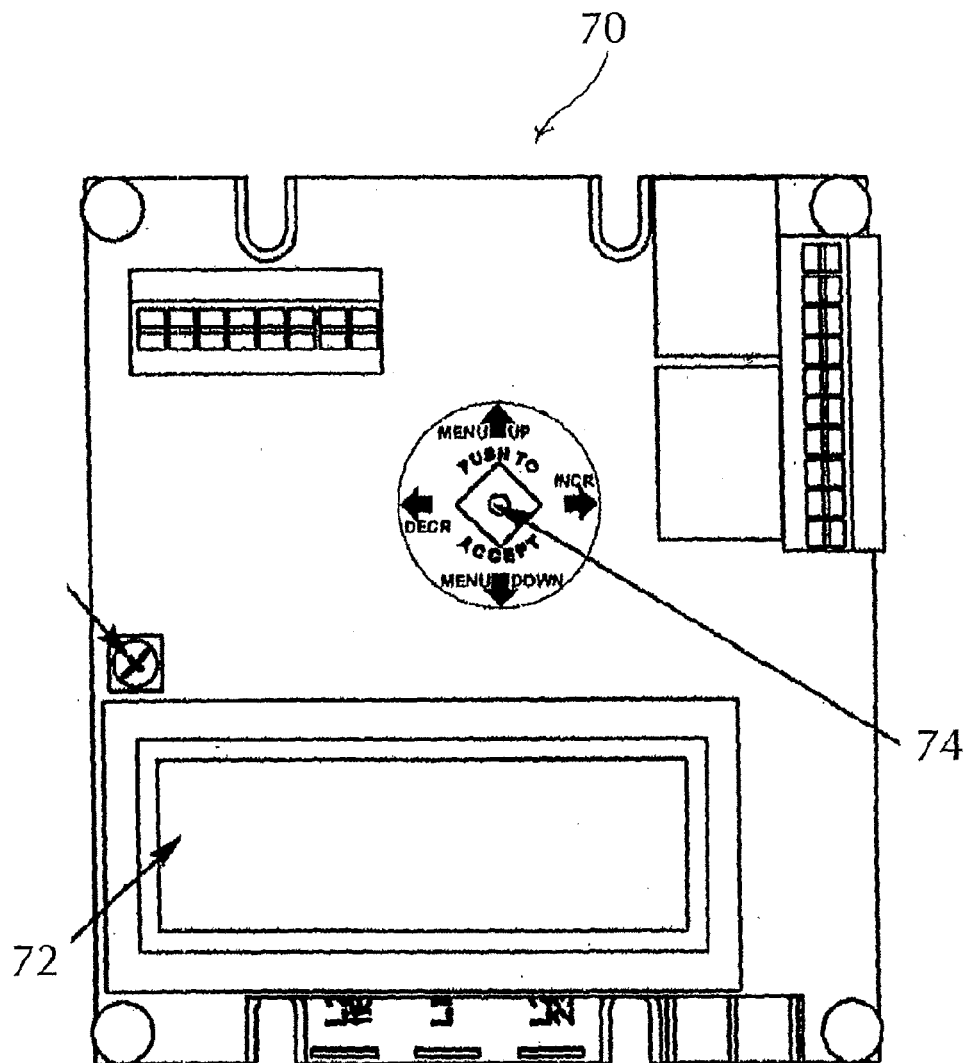


FIG. 3

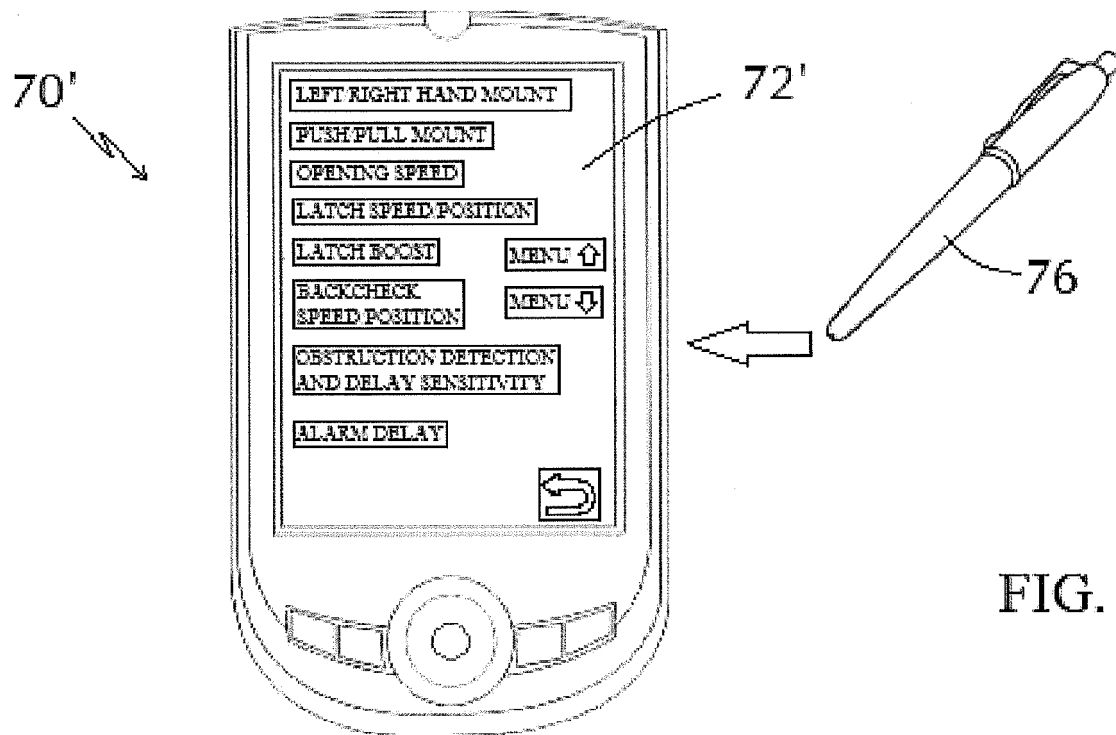
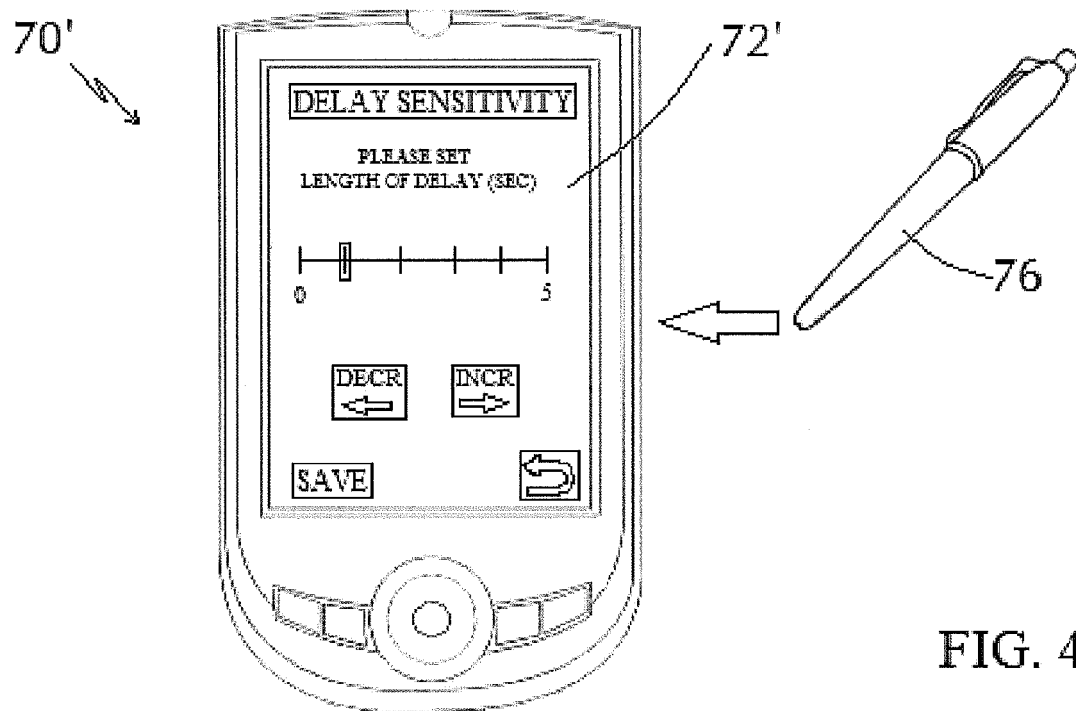
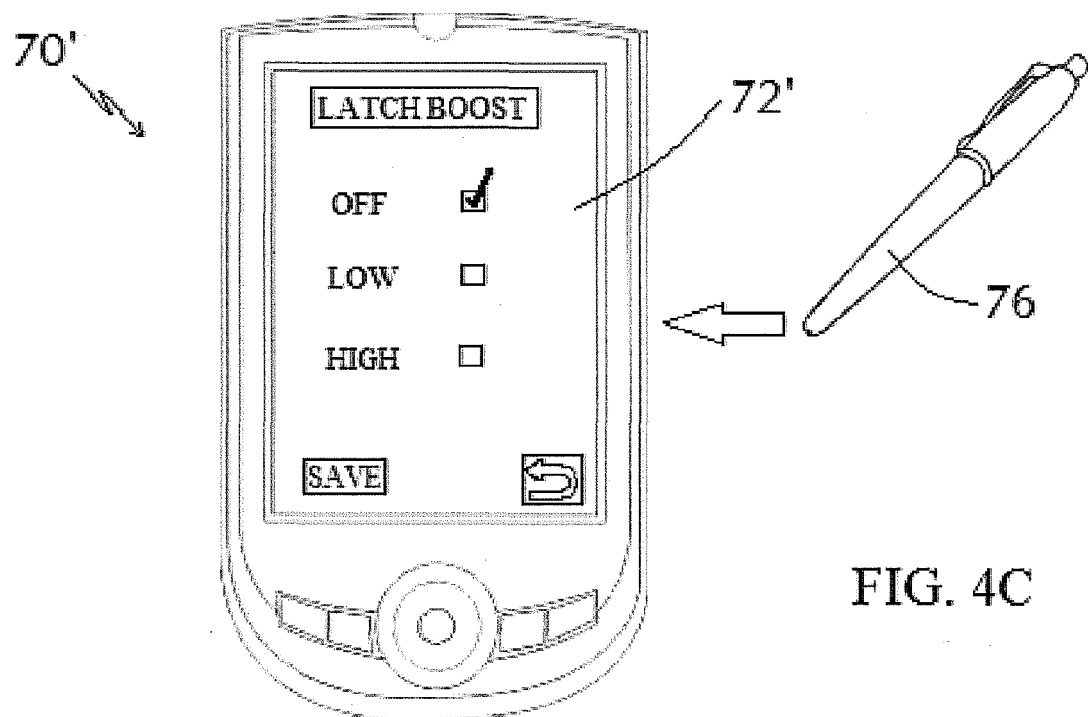


FIG. 4A





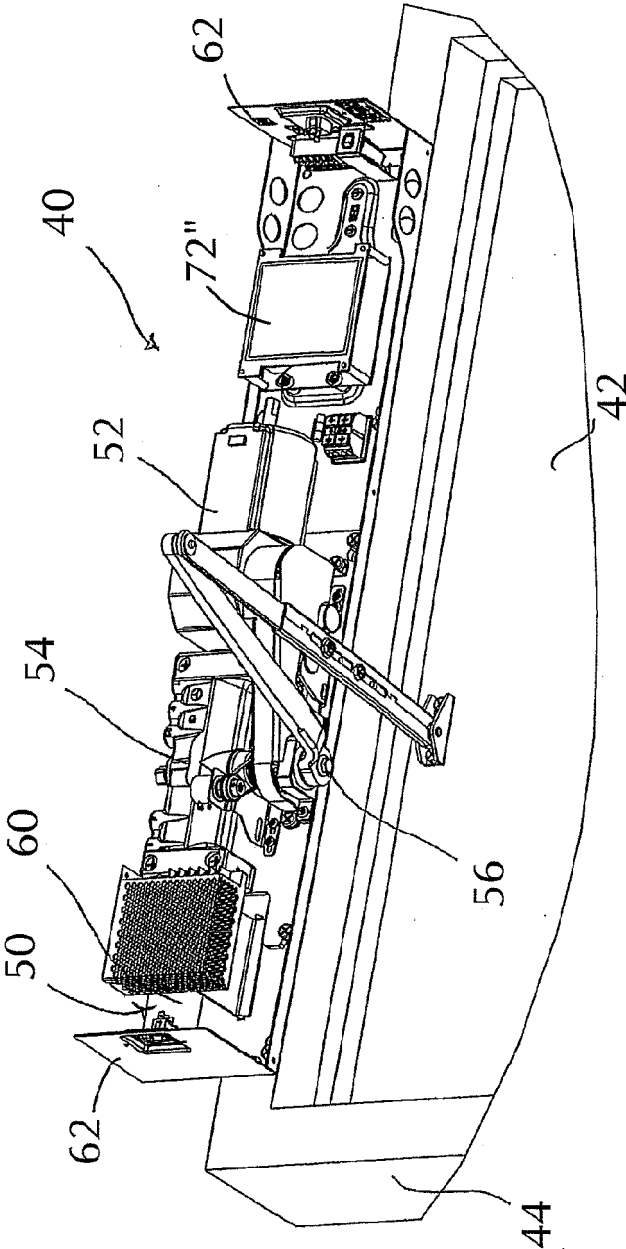
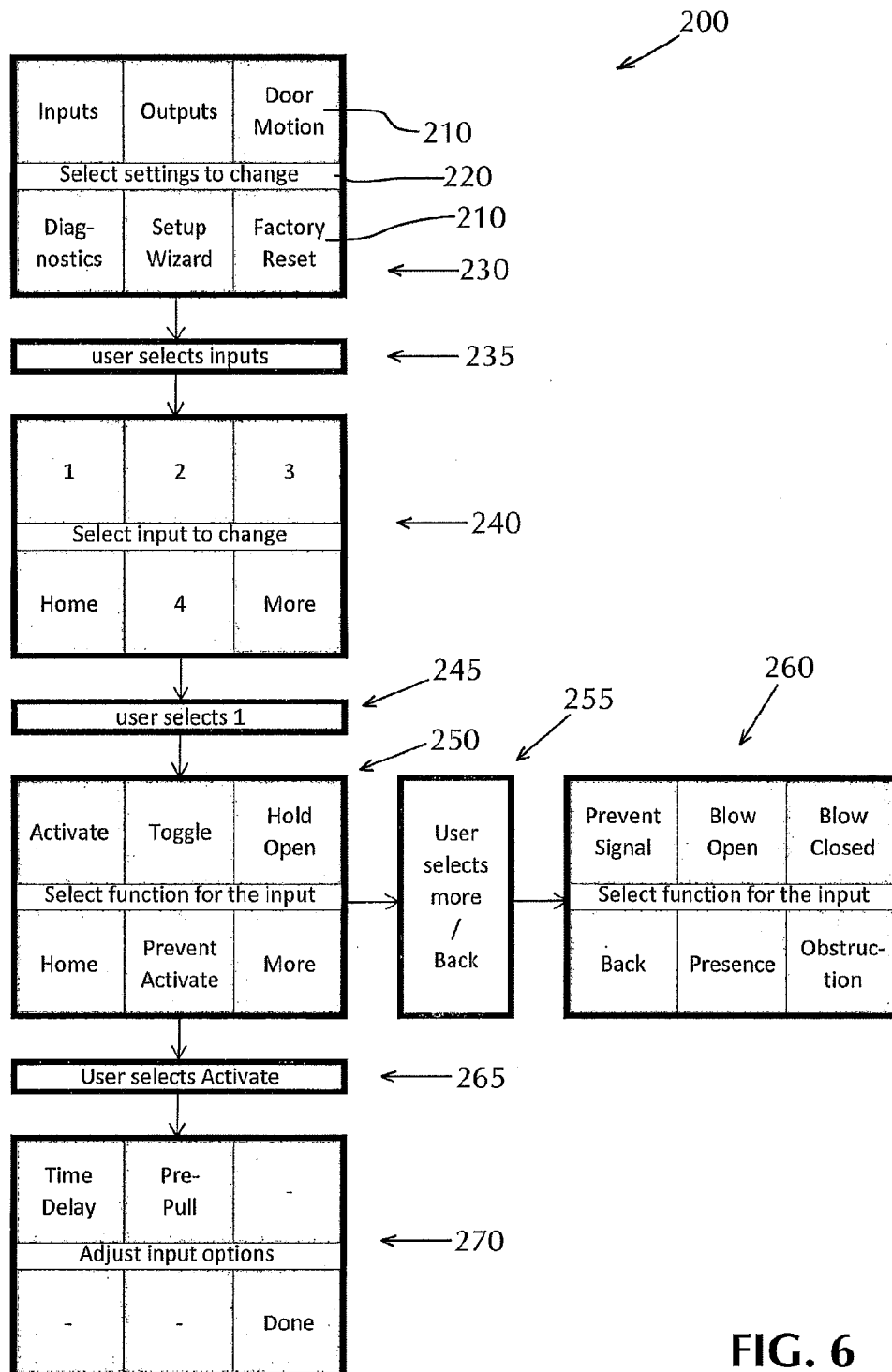
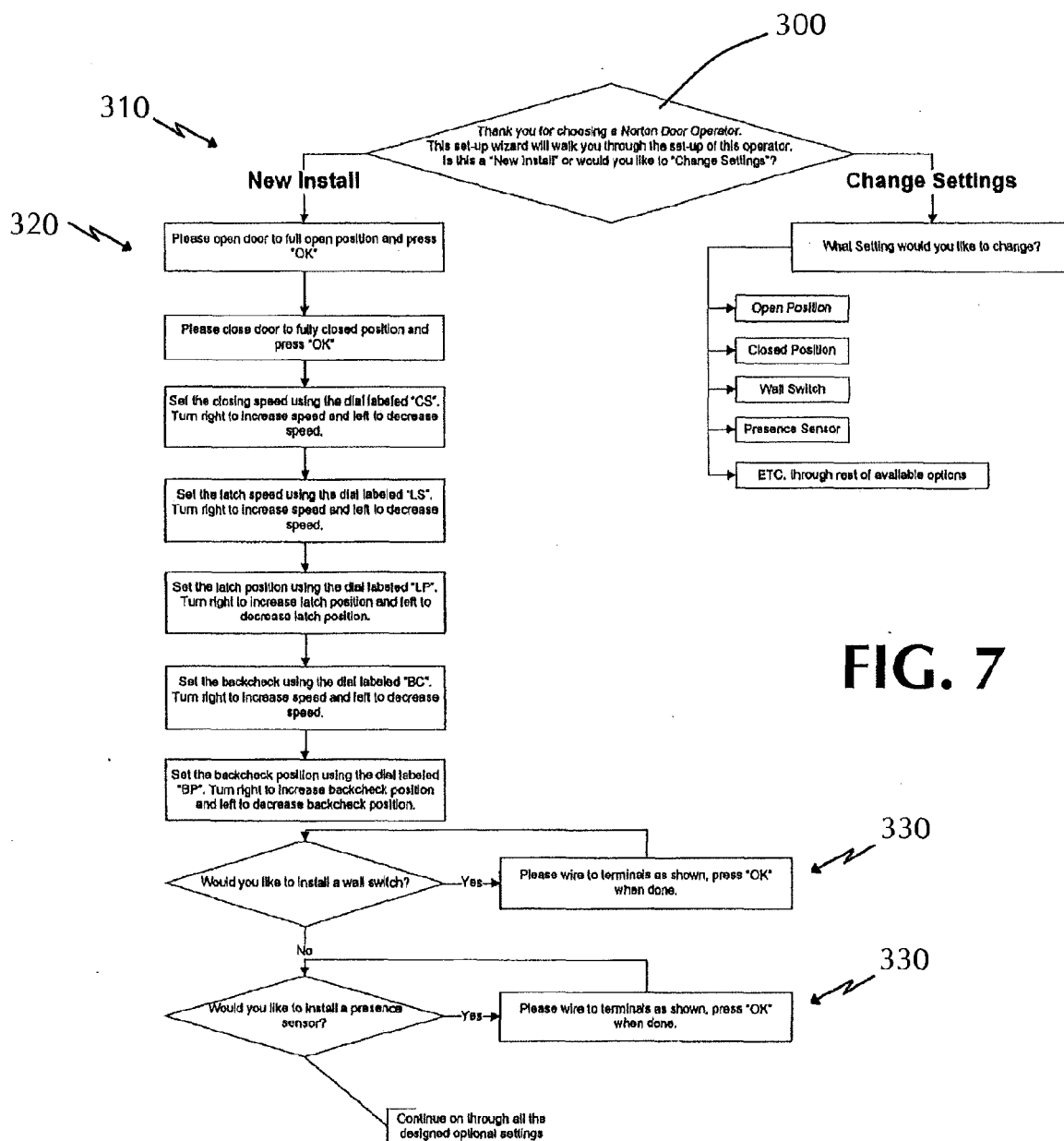


FIG. 5





REFERENCES CITED IN THE DESCRIPTION

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