(54) Title: HANDICAPPED PASSENGER INTERFACE WITH TOUCH SCREEN ELEVATOR DESTINATION ENTRY DEVICE

(57) Abstract: A screen which may (13) or may not (13a, 13b) be smooth, within an elevator destination call entry device (11, 11a, 11b) presents a normal pattern of a twelve-key (20) or N-key (45) pattern, optionally with other keys (22-25) and information (29-31) and directory selection (33). In response to activation of a handicapped-service request button (17), with a smooth panel (13), an annunciator (16) informs passengers to either tap the screen numbers of times, trace one or more numbers in script, or move a finger over a pattern (37) which is announced. Passengers may be instructed to simply enter one or more numbers on a screen (11a, 11b) which either has tactile outlines (42) of areas indicating numerical keys, or tactile areas which represent numerical keys themselves.
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Handicapped Passenger Interface With Touch Screen
Elevator Destination Entry Device

Technical Field
This invention relates to a computer controlled and responsive touch screen which reacts to activation of a handicapped-service request button to announce to passengers either to tap a screen numbers of times indicating a desired floor, to trace script numerals on a screen indicative of a desired floor, to move a finger across the screen and tap the screen when a number desired to represent a floor is announced, or to select a floor by tapping tactile representations of a floor selection keypad on a screen.

Background Art
It has heretofore been common for elevator destination call entry systems to comprise a pattern of buttons representing a twelve-key keypad, similar to a telephone key pad, for use by both persons having a visual handicap or other floor-selection handicap as well as persons not so handicapped. In addition to keys 0-9 representing digits of a floor number, a star key indicates an exit floor and a minus key (-) allows designation of floors below a main floor. With the advent of touch screens, twelve-key selection pads are combined with paramount floor and/or directory floor selection keys as well as indications of selected floor, and direction to the assigned elevator. Architects and building owners have indicated strong preference for touch screens as opposed to conventional, twelve-key tactile button entry systems, notwithstanding the suitability thereof for handicap persons.

In the prior art, it is common to have one form of call entry system for persons having call-entry related handicaps, and a separate call entry system for persons not so handicapped. An example is illustrated in U.S. patent publication 2004/0000453.

Disclosure of Invention
Objects of the invention include: an elevator destination call entry system which comprises a multi-patterned touch screen which is nonetheless capable of accommodating persons having a call-entry handicap; an elevator destination call
entry device which has both the flexibility and aesthetics of a touch screen device and the ease of use suitable for call entry-handicap persons; an improved elevator call entry device.

According to the present invention, a touch screen coacting with a controlling and responsive controller provides a pattern of a conventional twelve-key or N-key destination call entry device and optionally at least one of (a) a pattern of principal floor selection buttons, (b) selected floor indications, (c) assigned elevator indications, and (d) tenant indication and selection capability; in response to activation of a handicapped-service request button, the device, capable of implementation with a smooth screen, announces that passengers should (e) tap the screen numbers of times to indicate a desired destination, (f) write in script with a finger, numbers indicative of a desired floor, (g) move a finger across a keypad while floors indicated under the finger are announced, and tapping the keypad in response to enunciation of a number involved in indicating the desired floor, (h) or when the device includes a screen with tactile representations of a destination call entry pad, announcing that passengers should enter the destination floor by touching selected numbers indicated by said tactile representation. The invention includes announcing the selected floor, and entering a call for service from the floor where the entry device is located to the indicated destination floor.

The invention may be practiced by providing on the screen tactile representations of a twelve-key or N-key call entry pad which indicate the outlines of the keys or which indicate the individual keypads, each separated from the others. In accordance further with the invention, the tactile indications of call entry keys on the surface of the screen represent a pad which is larger than that presented on the touch screen in the absence of activation of said handicapped-surface request button.

In further accord with the invention, in response to activation of a handicapped-service request button, the pattern of a keypad on a touch screen may be larger than the pattern of a keypad on the screen in the absence of activation of said handicapped-service request button.

Other objects, features and advantages of the present invention will become more apparent in the light of the following detailed description of exemplary embodiments thereof, as illustrated in the accompanying drawing.
Brief Description of the Drawings

Fig. 1 is a side elevation view of a touch screen elevator destination call entry device useable in the present invention.

Fig. 2 is a side elevation view of the entry device of Fig. 1 with the pattern altered in response to activation of a handicapped-service request key.

Fig. 3 is a side elevation view of an elevator destination call entry device according to the invention, having tactile outlines of a twelve-key call entry pad on the surface of a touch screen in accordance with the invention.

Fig. 4 is a side elevation view of a touch screen elevator destination call entry device (with a pattern thereon omitted for clarity) having individual tactile portions, each of which represents one key of a ten-key pattern, in accordance with the invention.

Fig. 5 is a side elevation view of a touch screen elevator destination call entry device according to the invention employing an N-key call entry pattern.

Mode(s) for Carrying Out the Invention

Referring to Fig. 1, a touch screen elevator destination call entry device 11 is interconnected with a controller 12 and includes a touch screen 13, an announciator 16, such as a loudspeaker, and a handicapped-service request key 17. When handicapped service has not been requested, the touch screen 13 may have a pattern such as that illustrated in Fig. 1. In a typical case, when handicapped-service has not been requested, the touch screen will have a normal pattern of numerical button areas 20 for indicating a call request, which in the example of Fig. 1, comprises a twelve-key pattern of numerals, the star key and the minus key. The screen may also include distinct areas 22-25 representing buttons for selecting one of a plurality of primary floors, such as lobby, observation, basement and cafe, as illustrated. The pattern may also include an indication 29 of a selected floor, an indication 30 of the assigned elevator, and an indication 31 of the direction from the call entry device to the assigned elevator.

In the example herein, there is also a position 33 in the pattern on the touch screen which represents a call for a change in the pattern to one which includes a directory of tenants or of other floors by function. The pattern may include time and date indications 35.
In accordance with the invention, when the handicapped service request button 17 is activated, the announciator 16 will announce to passengers the manner in which a call may be entered. The invention may be practiced by the announciator announcing to passengers that they should tap the screen numbers of times, such as twice followed by a pause, and three times thereafter, to indicate floor 23. After a pause, the announcer will announce to passengers that floor 23 has been selected.

The invention may also be practiced by the controller causing the announciator to announce to passengers, when the handicapped-service button is activated, that passengers may indicate a desired destination floor by tracing out on the screen one or more numerals in script with a finger, which in this invention includes not only human fingers but also other pointers such as pencils or pens. In response to activation of the handicapped-service request button 17, the controller will cause a grid of numerous positions to be responsive to touching, the grid being on the order of 210mm by 160mm, so as to be able to detect a numeral which is entered in script by movement of a finger on the screen. After a first numeral is detected, the controller will cause a pause to see if there is a second numeral; if so, the controller will thereafter cause a floor number to be announced; if not, the controller will cause a single digit floor number that it has detected in script to be announced.

When, according to the invention, either tapping or tracing out numerals in script are used, the pattern on the touch screen 13 will not be presented as illustrated in Fig. 1, but instead, will be a pattern which results from the desired sensitivity to tapping or tracing of one or more numerals in script. In accordance with the invention, in response to the handicapped-service request button being activated, the pattern may be changed as is illustrated in Fig. 2. Therein, the pattern illustrated on the touch screen 13 becomes a series of areas 37 which represent a twelve-key pattern which is, however, larger than the pattern of button areas 20 (Fig. 1) used in a normal presentation. In this case, in response to activation of the handicapped-service request button 17, the announciator 16 will announce to passengers that they should move their finger across the touch screen and the announciator will indicate numerals being touched by the passenger. When the desired numeral (either for a single-digit floor or the first numeral of a two-digit floor) is touched and announced, the passenger should tap that portion of the screen to enter that number. After a suitable pause following the entrance of one number, the announciator 16 will announce the single digit numeral selected. If before the end of the pause, the finger is again moved across the areas 37,
the controller will sense the second number of a two-digit floor, following which the
announciator will announce to the passenger the two-digit floor selected. After
announcement, the controller enters a call request for travel from the floor where the
device 11 is, to the requested floor.

Referring to Fig. 3, a touch screen elevator destination call entry device 11a
includes a touch screen 13a which normally presents the same pattern as the touch
screen 13 of Fig. 1, which therefore will not be described with respect to Fig. 3. The
touch screen 13a, however, has tactile outlines 40 of a twelve-key call entry pad on
the surface thereof. When the handicapped-service request button 17 is activated, the
pattern will change from the normal pattern as described with respect to Fig. 1, to a
pattern which renders the controller responsive to the areas within the tactile outlines
40 of a twelve-key call entry pad. The announciator 16 will announce to passengers
that there is a tactile indication on the screen, and that they should push the portions
of the screen indicative of first and second (where appropriate) digits of the desired
destination floor. Passengers will then feel the pad to determine which of the areas of
the pad to push for a desired floor-indicating digit.

The tactile outlines 40 of Fig. 3 may be formed by means of an invisible
decal, that is, a transparent decal of outlines only, which will not significantly
interfere with the pattern described with respect to Fig. 1, but which are sufficiently
sized to be readily sensed by touch. On the other hand, the invention may be
practiced by etching the screen 13a to provide either a pattern of tactile outlines 40
which are in relief (in the same sense as a decal) or which are sensible depressions or
slits.

Referring to Fig. 4, the invention may be practiced with a call entry device
lib having a touch screen 13b on which the areas representing numerical keys 42 are
themselves tactile, such as a roughening as indicated by the stippling in Fig. 4. Thus,
the controller 12 will cause the announciator 16 to announce to passengers to feel the
various areas representative of numerals which may be felt or sensed individually and
which may be selected by pressing them, and after allowing time for a second digit,
the controller 12 will cause the announciator 16 to announce the selected floor and
enter a service call for travel from the floor at which the device 11b is disposed to the
indicated destination floor.

The foregoing embodiments are all described with respect to a twe’-ve-key
keypad. However, as is illustrated in Fig. 5, an N-key numerical keypad 45 may be
presented in the pattern on the touch screen 13c in response to the controller 12. Operation in that case will require only the touching of one key to select any of the available floors.

In the embodiment illustrated in Fig. 5, when the handicapped-service request button 17 is pressed, the screen 13c will present a pattern of squares such as is illustrated in Fig. 4 except that there will be twelve (or some other number, N) of such squares in dependence on the number of floors indicated in the numerical panel pattern 45 (Fig. 5). The number, N, of floors indicated in an N-key pattern may be other than 12.
Claims

1. One or more elevator destination call entry devices disposed on at least one floor of a multi-floor building, comprising:
   a touch screen having a touch-responsive pattern displayed thereon;
   a controller responsive to said screen being touched to enter a call for an elevator to stop at said one floor in accordance with a dispatching routine responsive to the destination indicated by the touching of said screen by a prospective passenger;
   characterized by:
   said screen either being smooth or having a tactile representations of keys of floor selection keypad;
   said pattern including a selection keypad of a first size and at least one of (a) a set of principal-floor selection keys (b) a tenant selection capability, and (c) selected floor indicator, and (d) assigned elevator and direction designation indications;
   said call entry device including an announciator and a passenger operable handicapped-service request button;
   said controller, in response to activation of said handicapped-service request button,
   (e) if said screen is smooth, causing said announciator to instruct passengers to tap said screen numbers of times to indicate a destination floor, counting the number of times that the screen is tapped, causing said announciator to announce the destination floor indicated by tapping, and entering a call for service from said one floor to the said destination floor indicated by tapping,
   (f) if said screen is smooth, causing said announciator to instruct passengers to delineate one or more numbers in script anywhere on said screen to indicate a destination floor, determining, from the pattern on said screen, a delineated destination floor, causing said announciator to announce the delineated destination floor, and entering a call for service from said one floor to said delineated floor,
   (g) if said screen is smooth, causing said announciator to (i) instruct passengers to move a finger across said screen and pat the screen wherever a component of a desired destination floor number is announced, and to (ii) announce components of destination floors indicated by floor selection keys of said pattern which are patted, determining a destination floor represented by patted portions of
said screen, causing said announciator to announce the represented destination floor, and entering a call for service, from said one floor to said represented floor,

(h) if said screen has tactile representations, causing said announciator to instruct passengers to touch said screen at positions of said tactile key representations to indicate a selected destination floor, responding to touching of said tactile representations by causing said announciator to announce said selected floor, and entering a call for service from said one floor to said selected floor.

2. A device according to claim 1 wherein:
said screen has said tactile representations of keys of a keypad which is of a size larger than said first size.

3. A device according to claim 1 wherein:
said screen has tactile representations comprising either (iii) an outline of each of the keys in a floor selection keypad, or (iv) a plurality of individual tactile indications separated from each other, each representing one of the keys in a floor selection keypad.

4. A device according to claim 1 wherein:
said screen is smooth; and
said controller causes, in response to activation of said handicapped service request button, said pattern to include a selection keypad of a second size, larger than said first size.

5. A device according to claim 4 wherein:
said controller causes said pattern to include only a selection keypad of a second size, larger than said first size.

6. A device according to claim 1 wherein:
said selection keypad is a twelve-key pad.

7. A device according to claim 1 wherein:
said selection keypad is an N-key pad.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC: B66B 7/34c 2006.01)
B66B 3/006 2006.01)

USPC: 187/391
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)

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)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>A</td>
<td>US 6502668 B1 (Chida et al) 07 January 2003 (07.01.2003), see figures 1,6,7.</td>
<td>1-7</td>
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<tr>
<td>A</td>
<td>US 2003/0111299 A1 (Han et al) 19 June 2003 (19.06.2003), see entire document.</td>
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<td>A</td>
<td>US 6573884 B1 (Kinzie) 03 June 2003 (03.06.2003), see entire document.</td>
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