

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
1 December 2005 (01.12.2005)

PCT

(10) International Publication Number
WO 2005/113399 A1

(51) International Patent Classification⁷: **B66B 1/34, 3/00**

(21) International Application Number:
PCT/US2004/013450

(22) International Filing Date: 30 April 2004 (30.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): **OTIS ELEVATOR COMPANY** [US/US]; Ten Farm Springs, Farmington, CT 06032-2568 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **PENG, Pei-Yuan** [—/US]; 7 Rothe Lane, Ellington, CT 06029 (US). **VECCHIOTI, Alberto** [IT/US]; 142 Greenview Terrace, Middletown, CT 06457 (US). **MILTON-BENOIT, John** [US/US]; 68 Spence Street, Springfield, MA 01104 (US). **OH, Jae-Hyuk** [KR/US]; 5 Clearbrook Drive, Tolland, CT 06108 (US). **HOOTSMANS, Norbert, A. M.** [US/US]; 154 Great Pond Road, S. Glastonbury, CT 06073 (US).

(74) Agents: **LAPOINTE, Gregory, P.** et al.; 900 Chapel Street, Suite 1201, New Haven, CT 06510-2802 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

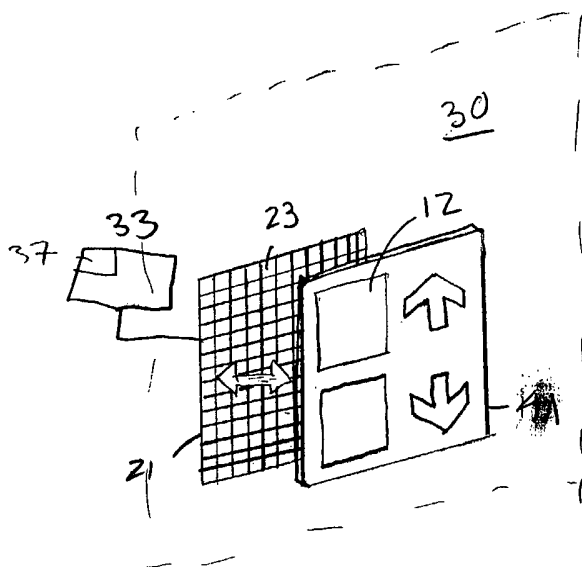
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: HAPTIC HOLOGRAM-ENABLED ELEVATOR CALL BUTTONS



(57) Abstract: A holographic data input device for projecting a holographic image (41) of an elevator call display and a device (21) for interacting with the holographic image to input data.

HAPTIC HOLOGRAM-ENABLED ELEVATOR CALL BUTTONS

BACKGROUND OF THE INVENTION

(1) Field of the Invention

The present invention relates to an apparatus, and method for using such an apparatus, to provide for the interactive, holographic inputting of data into a system, especially data related to an elevator destination.

(2) Description of Related Art

Holography is a traditionally photographic technique for producing three-dimensional images. In conventional photography, a picture is created by allowing light to strike a chemical (typically, silver bromide) embedded in a layer (or layers, if it's a color image) of gelatin on a strip of film. The result is a two-dimensional record of the way the objects in front of the camera lens reflected the available light when the shutter snapped open.

With reference to FIG. 1, there is illustrated the apparatus by which a hologram is produced. A hologram records not just reflected light, but light interference patterns. Utilization of such interference patterns leads to a three-dimensional image that reproduces not only darkness, light, and color, but depth, texture, shape, and the relative position of objects. To create the light interference patterns, a laser is necessary owing to the coherent nature of its light. White light based holography is still in the development phase. A holographic image 14 is created with a laser light beam 17 and split it into two separate beams by passing it through a half-silvered mirror acting as a beam splitter 15. The two resultant beams then pass through lenses that make them expand. One of the two beams is directed onto a very high-contrast, finely-grained photographic reference film 11. The second beam is aimed at the holographic image object 14 being photographed so that some of the light is reflected onto the photographic

film 11. The second beam is aimed at the object 14 being photographed so that some of the light is reflected onto the photographic film 11. This second stream of light is called the object beam. Because the object beam has been scattered en route to the photographic film, the two beams are no longer perfectly in phase. The now out-of-step waves interfere with each other, creating very fine lines called fringes.

With reference to FIG. 2, there is further illustrated a more contemporary method by which a holographic image 41 may be created. Specifically, a three dimensional definition of a holographic image 41 is stored in a computer 33. The image definition is preferably stored in digital format in a memory device 37 in communication with computer 33. When desired, the digital definition of the holographic image 41 is retrieved by computer 33 from memory device 37 forming digital input 43. Digital input 43 is transformed via holovideo display 40 into holographic image 41. Holographic image 41 is projected through output aperture 45. Therefore, it is possible to store and recreate holographic images either photographically or through the use of a computer.

There exists a need to produce engaging and informative displays to impart information to elevator passengers. Traditionally, elevators have been summoned by pressing a simple "up" or "down" button indicating the desired direction of travel for a passenger. In addition, once inside the elevator, a typical array of buttons corresponding to the floor destinations available to a passenger are presented. There is a trend at present to provide elevator passengers with more flexibility and information regarding their itinerary. Specifically, it is desired that elevator passengers be able to initially choose the destination floor, while an elevator management system makes use of such information to direct the passenger to an appropriate elevator. In addition, the displays by which elevator passengers choose their final destination may contain additional information which will allow a user to interact with the display

so as to display additional information about possible destinations and, by so doing, enable the passenger to more readily select a destination. As holographic technology offers the ability to create interesting and engaging three dimensional representations, such as that of the building in which the elevators are located, there exists a need for an apparatus, and a method by which such an apparatus may be utilized, to enable elevator passengers to interact with holographic displays so as to choose destinations.

What is therefore needed is an apparatus and method by which an elevator passenger may interact with the holographic display so as to choose a preferred destination. Ideally, such a display would be interactive so as to enable the elevator passenger to query the apparatus for additional information regarding possible destinations.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide an apparatus, and method for using such an apparatus, to provide for the interactive, holographic inputting of data into a system, especially data related to an elevator destination.

In accordance with the present invention, a holographic data input device comprises means for projecting a holographic image of an elevator call display, and device for interacting with the holographic image to input data.

In further accordance with the present invention, a method for enabling data input to an elevator call display comprises the steps of providing a holographic image of an elevator call display, and interacting with the holographic image to input data.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 A diagram of the apparatus used to create a photographic hologram known in the art.

- FIG. 2 A diagram of a holovideo projector known in the art.
- FIG. 3 A diagram of a holographic elevator call display and haptic sensor of the present invention.
- FIG. 4 A diagram of an alternative embodiment of the holographic elevator call display of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

It is therefore a teaching of the present invention to provide an apparatus, and method for using such an apparatus, which allows a user to interact with a holographic image display so as to make a data selection. The interactive holographic image display may be either static or dynamic. In one embodiment, the user interacts with the holographic image display through the use of haptic sensors which allow the user to interact with the holographic image in such a manner that the holographic image appears to be a real three dimensional object having mass. As will be described below, the holographic images utilized in the present invention may be captured and projected photographically or created on a computer and projected using a holovideo display. While the system of the present invention is applicable to any and all instances in which a user is required to input data into the system, it is envisioned that the present invention will be of particular use in facilitating the selection of destinations by users of elevators.

With reference to FIG. 3, there is illustrated one embodiment of a holographic data input device of the present invention. In the present instance, holographic image 41 is a static representation of a three dimensional elevator call display. The holographic image 41 comprising the holographic call display contains, in the present example, two call display elements 12 corresponding to "up" and "down". As such, holographic image 41 represents a standard elevator call display arranged across a height and a width but having a relatively

shallow depth. In the present example, and in all examples following, holographic image 41 is projected via a holovideo display 40 (not shown) whereby the information defining holographic image 41 is stored in memory device 37 of computer 33.

Located in proximity to holographic image 41 is haptic sensor array 21. Haptic sensor array 23 provides a means for interacting with holographic image 41. Haptic sensor array 21 is comprised of an array of haptic sensor elements 23. As used herein, a "haptic sensor" is a sensor which allows a user to interact with a computer by receiving tactile feedback. Typically, such feedback is achieved by applying a degree of opposing force by the user along any one, or a combination of, the X, Y, and Z axes. Because of the shallow depth of the holographic image 41 of the present example, haptic sensor array 21 may be placed in close contact with the space into which is projected holographic image 41. In this manner, a user touching within the space occupied by holographic image 41 will serve to make contact with haptic sensor array 21. The haptic sensor elements 23 of haptic sensor array 21 are activated when physically touched in such a manner. The activated haptic sensor elements 23 are configured to communicate with computer 33 to indicate a region comprised of one or more haptic sensor elements 23 within which the user made physical contact. Computer 33 may then map the location of the haptic sensor elements 23 to the portions of holographic image 41 representing choices to the user, in the present case, "up" or "down". In this manner, a user may interact with the haptic sensor array 21 corresponding to a holographic image 41 so as to enter a data corresponding to a choice.

With reference to FIG. 4, there is illustrated an alternative embodiment of the present invention. The holographic data input device 30 allows for dynamic interaction with the user. As before, a holographic image 41 is displayed and appears to reside in space before a user. In the present example,

holographic image 41 is constructed and projected via a holovideo display 40. Holographic image 41 closely resembles the building in which holographic data input device 30 is located. A user may manipulate an input device 44 to touch the space occupied by a holographic image 41. Input device 44 may be a haptic stylus. A haptic stylus is a haptic sensor pointing device which is attached to a computer 33 in such a manner that the position and orientation of input device 44 may be sensed by computer 33. In addition to sensing the position and orientation of input device 44, the motion of input device 44 may be restricted in mechanical fashion through instructions issued by computer 33 so as to prevent any portion of input device 44 from entering into the space occupied by holographic image 41. In this manner, there is produced a sensation that the holographic image 41 has physical mass and cannot be readily violated by input device 44. In addition to a haptic device, input device 44 may consist of any alternative pointing device including, but not limited to, an outstretched finger of the user. In such an instance, it is necessary to employ alternative means to determine the location of input device 44. In one embodiment of the present invention, at least three acoustic transceivers 42 are situated so as to emit acoustic signals and to receive such signals after bouncing off of input device 44. In such an instance, computer 33 controls the emission of such acoustic signals by each acoustic transceiver 42 and measures the time in transit in between the emission of such signals and the reception of such signals. Computer 33 is then able to compute the position and three dimensional space of input device 44.

Once the position of input device 44 is determined, either through the use of a haptic sensor, acoustic transceivers, or any other appropriate method, the position of the input device 44 is correlated to a position on the holographic image 41 by computer 33 in communication with the memory device 37 upon which is stored the definition of holographic image 41. As a result, computer 33 is able to correlate the position of input

device 44 to a desired position on holographic image 41 and, hence, to a data selection by the user. The selection can be used to facilitate guiding the user to a chosen destination. Computer 33 may then display additional information via an additional holographic image 41'. The additional holographic image 41' is likewise stored in a memory device 37 in communication with computer 33. As an example, when input device 44 is placed in front of a particular floor of the building represented by holographic image 41, additional holographic image 41' may be displayed within which is contained additional information pertaining to the chosen floor.

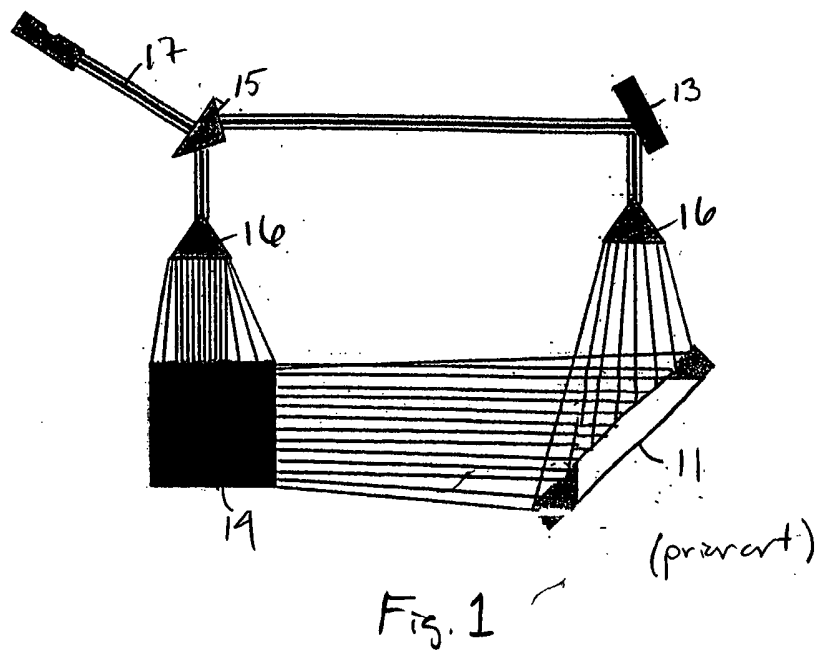
It is apparent that there has been provided in accordance with the present invention a haptic hologram-enabled elevator call buttons which fully satisfies the objects, means, and advantages set forth previously herein. While the present invention has been described in the context of specific embodiments thereof, other alternatives, modifications, and variations will become apparent to those skilled in the art having read the foregoing description. Accordingly, it is intended to embrace those alternatives, modifications, and variations as fall within the broad scope of the appended claims.

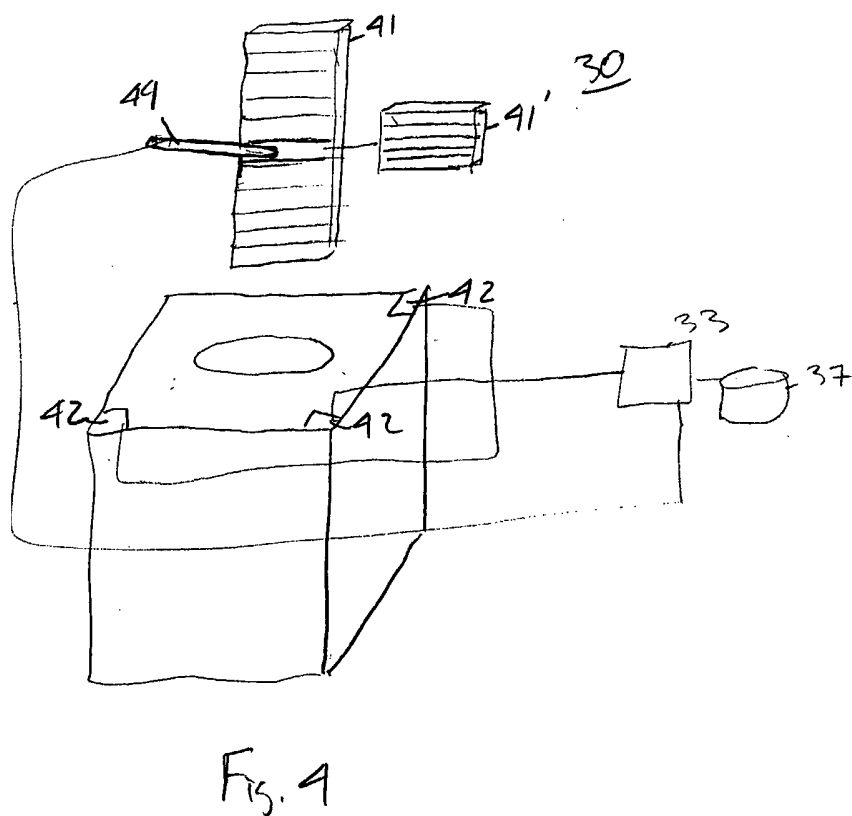
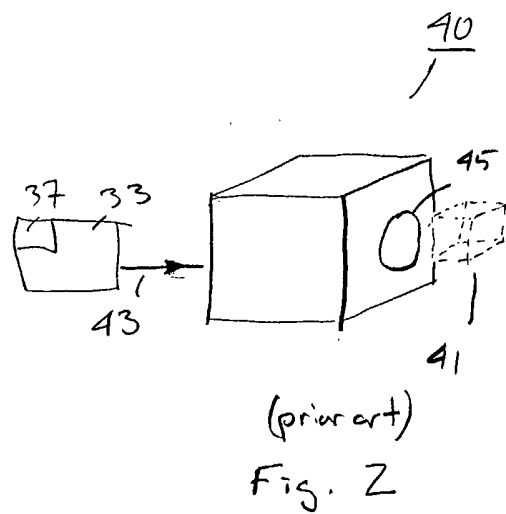
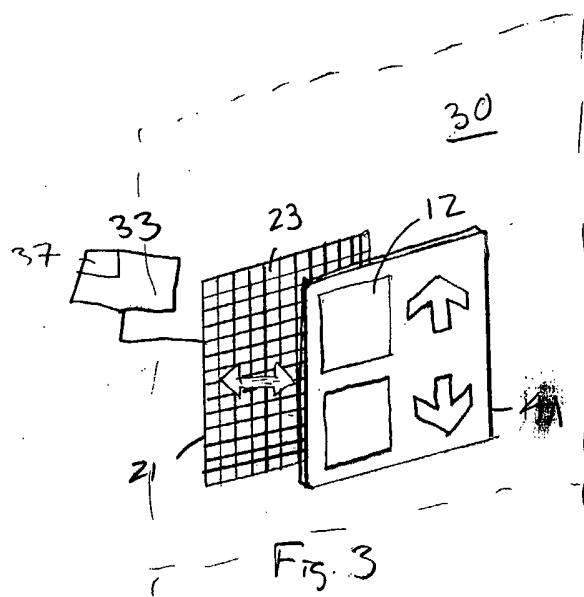
CLAIMS

WHAT IS CLAIMED IS:

1. A holographic data input device comprising:
means for projecting a holographic image of an elevator call display; and
means for interacting with said holographic image to input data.
2. The device of claim 1 wherein said projection means comprises a holovideo display.
3. The device of claim 1 wherein said means for interacting comprises a haptic sensor.
4. The device of claim 3 wherein said haptic sensor is selected from the group consisting of haptic sensor arrays and haptic styluses.
5. The device of claim 1 wherein said means for interacting comprises a plurality of ultrasonic transceivers for determining a position of an input device.
6. The device of claim 1 wherein said holographic image is a dynamic holographic image.
7. A method for enabling data input to an elevator call display comprising the steps of:
providing a holographic image of an elevator call display;
and
interacting with said holographic image to input data.
8. The method of claim 7 wherein said providing said holographic image comprises providing said holographic image using a holographic display.

9. The method of claim 7 wherein said interacting with said holographic image comprises interacting with said holographic image via a haptic sensor selected from the group consisting of haptic sensor arrays and haptic styluses.
10. The method of claim 7 wherein said interacting with said holographic image comprises using a plurality of ultrasonic transceivers to determine a position of an input device.





INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/13450

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : B66B 1/34, 3/00
US CL : 187 391,395,396

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)
U.S. : 187/ 391,395,396,398,399; 345/156

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

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,031,519 A (O'BRIEN) 29 February 2000 (29.02.2000), see entire document.	1,2,6,7,8
Y	US 6,012,286 A (HAMMOND) 15 August 2000 (15.08.2000), see entire document.	3,4,5,9,10
A	US 5,485,897 A (MATSUMOTO et al) 23 January 1996 (23.01.1996), see figures 1,7-9.	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

22 April 2005 (22.04.2005)

Date of mailing of the international search report

21 JUL 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Jonathan Salata

Telephone No. 703-308-0956

DEBORAH A. THOMAS
PARALEGAL SPECIALIST

GROUP 1300