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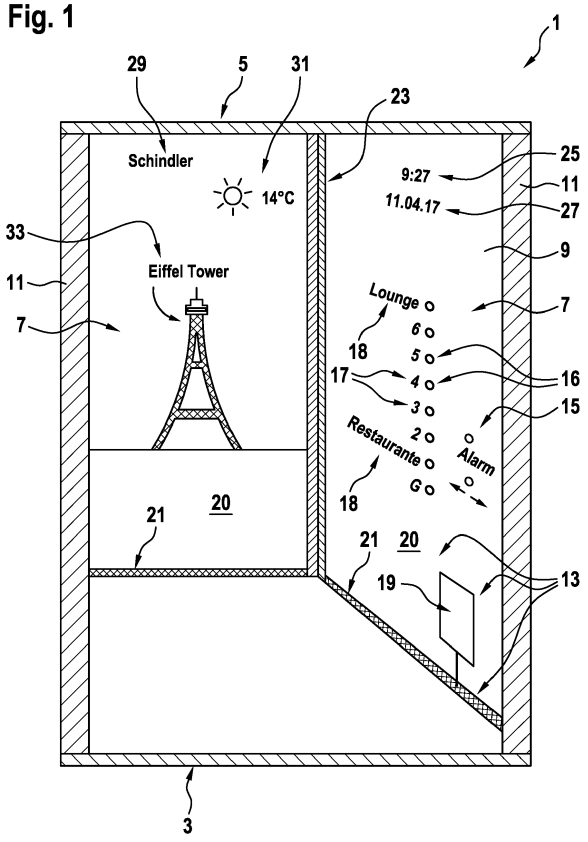
(71) Applicant: **Inventio AG**
6052 Hergiswil (CH)

(72) Inventor: **JOSHI, Sourabh**
411044 Pune (IN)

(54) ELEVATOR CABIN WITH A WALL COMPRISING A SEE-THROUGH DISPLAY

(57) An elevator cabin (1) comprising a bottom (3), a ceiling (5) and a side wall (7) comprising a plurality of side wall portions (9) is proposed. Therein, at least one of the side wall portions (9) is transparent. The elevator cabin (1) is characterized in that the transparent side wall portion (9) comprises a see-through display (13) integrated therein or attached thereto, wherein the see-through display (13) is touch-sensitive and configured for emulating a cabin operation panel (15). Particularly, the see-through display (13) may be touch-sensitive and may be adapted to implement a virtual cabin operating panel (15) which may be easily adjusted to various application situations using software updates only.

Fig. 1



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Description

[0001] The present invention relates to a specifically equipped elevator cabin and an elevator comprising such elevator cabin.

[0002] Elevators generally comprise one or more elevator cabins, sometimes also referred to as elevator cars. Such elevator cabin may be accessed by passengers and may be displaced along a travel path in order to transport the passengers to various levels or floors within a building.

[0003] Generally, the elevator cabin is configured as a load carrying structure composed of structure components. Typically, the elevator cabin has a bottom and a ceiling and one or more side walls extending between the bottom and the ceiling. Conventionally, the structure components of the elevator cabin are made with metal such as steel, with transparent materials such as glass or with a combination thereof. For example, the elevator cabin may have a rectangular bottom and ceiling with four side walls extending in between. Alternatively, the elevator cabin may have a circular, semi-circular or any other curved-shaped bottom and ceiling one or more curved side walls extending in between. Each side wall or part of a side wall may form a side wall portion. A sidewall portion may be for example a planar portion or a partial curved portion of the entire sidewall surrounding an interior space of the elevator cabin.

[0004] Typically, the elevator cabin comprises a cabin operation panel (COP). The COP serves as a human-machine interface via which passengers may input e.g. an intended destination floor or may initiate specific functions such as triggered cabin door closure/opening, alarm functions, etc.

[0005] Conventionally, the COP is a separate component or device and may be integrated into one of the side wall portions. For example, the COP may comprise several push buttons to be pressed by passengers for destination floor selection and/or function triggering. Alternatively, the COP may comprise other types of buttons such as for example capacitance-sensitive sensors. Furthermore, the COP may comprise a display on which for example selected destination floors may be indicated. Additionally or alternatively, the buttons of the COP may be for example illuminated for indicating selected destination floors.

[0006] CN 203284020 discloses a see-through type door with an indicating light source.

[0007] There may be a need for an elevator cabin with improved functionality. Particularly, there may be a need for an elevator cabin providing improved human-machine interface functionalities, reduced system costs and/or increased aesthetics. Furthermore, there may be a need for an elevator comprising such elevator cabin.

[0008] At least some of such needs may be met by the subject matter of one of the independent claims. Advantageous embodiments are disclosed in the dependent claims and in the following specification.

[0009] According to a first aspect of the invention, an elevator cabin is proposed. The elevator cabin comprises a bottom, a ceiling and at least one side wall comprising a plurality of side wall portions. Therein, at least one of the side wall portions is transparent. The elevator cabin is characterized in that the transparent side wall portion comprises a see-through display integrated therein or attached thereto, where the see-through display is touch-sensitive and configured for emulating a cabin operation panel. In other words, the see-through display may be specifically adapted for emulating functions which are normally provided by the COP in an elevator cabin. Accordingly, a kind of virtual COP may be established.
According to a second aspect of the invention, an elevator comprising an elevator cabin according to an embodiment of the above first aspect of the invention is proposed..

[0010] Some principles or benefits of embodiments of the present invention may be seen as being based, inter alia and without restricting a scope of the invention, on the following ideas and recognitions:

> In modern elevators, improved aesthetics and functionality are becoming more and more important. For example, some modern elevators comprise a travel path for the elevator cabin which is not enclosed in an intransparent elevator shaft or hoistway. Instead, the elevator cabin may be moved for example along a guide rail which is exposed with respect to an environment. In such elevators, some or all wall portions may be made at least partially with transparent materials such as glass such that passengers may observe the environment through the side wall which, in this case, acts like a window.

[0011] It is now proposed herein to modify such transparent elevator side wall such as to implement a see-through display.

[0012] Such see-through display may be a transparent electronic display which allows a passenger to see through the display while, simultaneously, enabling displaying information or other visual content to be recognized by the passenger. In other words, the see-through display may be transparent like a window but may include electronics which may be controlled to display e.g. characters, icons, images or other content.

[0013] For example, the see-through display may include a matrix, preferable a 2-dimensional matrix, of pixels which each may be controlled to locally modify optical characteristics such as a transparency, reflectivity and/or light emittance of the see-through display. Each pixel may comprise electronics such as one or more transistors, diodes, etc. The electronics may be deposited onto one substrate or between two transparent substrates. Each pixel may be controlled e.g. via electrical conductors, preferably via transparent conductors or very thin conductors.

[0014] Particularly, as each of the pixels in the display

matrix may be addressed individually, various contents may be visualized using the see-through display. Accordingly, visual contents visualized by the see-through display may be non-static, i.e. may be varied and adapted using software only. If new visual contents are to be displayed, a software update may be sufficient, not necessarily requiring any hardware modifications.

[0015] The see-through display may be applied in the elevator cabin in order to display for example passenger information, i.e. information interesting to cabin passengers. For example, information about the selected destination floors may be displayed. Therein, for example a number of a floor to be approached may be displayed. Alternatively or additionally, other features of a destination floor such as for example names of habitants, companies or shops located on this floor may be visualized. Particularly, such information about floors in a building to be served by the elevator cabin may be easily and quickly adapted for example in cases where habitants, companies or shops in a floor change throughout the time. Such modification may be implemented using software updates only.

[0016] Furthermore, other information e.g. about a current location of the cabin, about a current speed of the cabin, etc. may be displayed. Furthermore, e.g. information about the brand of the elevator manufacture and/or any kind of advertisement may be displayed. Such displayed information may be easily varied over time, using for example software updates only.

[0017] Accordingly, the see-through display may enable e.g. an augmented reality in which, while looking though the see-through display like through a window, additional information is displayed to the passenger.

[0018] The see-through display may also be adapted such as to sense a location being touched by a user. Accordingly, the see-through display may not only serve as a human-machine interface for displaying information to passengers but may also serve as human-machine interface for enabling inputting information by the passengers. The touch-sensitivity may be established using various techniques. For example, pixels or partial areas of the see-through display may be provided with a capacitance-sensitivity.

[0019] According to an embodiment, the see-through display consists of a switchable glass (also known as smart glass). A switchable glass is glass or glazing whose light transmission property can be altered depending on at least one environmental condition or using condition. Such conditions could be voltage, light or temperature, etc. When one, two or more of these conditions is or are applied the light transmission property of the switchable glass will be altered and its appearance can be changed from transparent to translucent and/or to intransparent.

[0020] For example, the see-through display may display touch-sensitive areas representing "floor buttons". When a passenger touches such virtual floor button, this may be sensed by the see-through display and the associated information may be processed and/or forwarded to an elevator control which may then, based on this information, control elevator motion and/or other elevator functions. Other function buttons such as e.g. an alarm button, a door-open button, etc. may also be embodied in the virtual COP.

[0021] Accordingly, by implementing the functions of a conventional COP with the see-through display, a separate device forming the COP may be dispensable, i.e. may be replaced by the virtual COP established by the touch-sensitive see-through display. Thereby, for example costs of the elevator cabin may be reduced, vandalism to a separate COP device may be avoided and/or visual appearance of the elevator cabin may be improved.

[0022] Particularly, special features may be established in the virtual COP proposed herein which may not be implemented or may be implemented only with substantial hardware efforts in conventional COPs.

[0023] For example, features varying over time such as names of habitants, companies or shops located in floors of a building may not only be displayed individually, and associated to each of a plurality of virtual "floor buttons", using the see-through display COP but may also be easily modified or replaced if needed. Such changes may be implemented using software updates only, i.e. no hardware modifications may be necessary.

[0024] According to an embodiment, the see-through display may be of an LCD-type.

[0025] In an LCD-type (liquid crystal display) display, a transparency and/or reflectivity of each pixel in a matrix of pixels may be modified in a controllable manner. For example, the transparency of a pixel may be switched from a maximum transparency to a minimum transparency, and vice versa, possibly including intermediate partial transparencies. Accordingly, variable black-and-white information or grey-scale information may be displayed. Additionally, including color filters may enable displaying colored information. The LCD-type display may enable simple and cost-effective implementation together with minimum energy consumption.

[0026] Alternatively, the see-through display may be of an LED-type.

[0027] In an LED-type (light emitting diode) display, each pixel may be controlled to locally emit light. Emitted light intensity may be varied in a controllable manner. Thereby, information may be displayed in monochrome or colored illuminated manner even in situations of little back-ground illumination. For example, even when the elevator cabin is moved through a dark environment, e.g. during night times, information may be displayed to passengers for example in the form of illuminated characters, icons or images.

[0028] According to an embodiment, the transparent side wall portion including the see-through display extends along at least 10% or at least 20% of the height of the elevator cabin, preferably along at least half of the height of the elevator cabin.

[0029] In other words, the transparent side wall portion

including the see-through display may extend along a substantial portion (i.e. > 10%), or preferably along a major portion (i.e. > 50%), of the height of the elevator cabin.

[0030] For example, the see-through display may extend at least along an upper half of the cabin. In such elevated position, a passenger may look though the see-through display while, at the same time, easily recognize or read any content displayed on the display and/or touch e.g. virtual buttons of a COP implemented using the touch-sensitive display.

[0031] Particularly, according to an embodiment, the transparent side wall portion including the see-through display extends along more than 90% of the entire height of the elevator cabin, preferably along substantially the entire height of the elevator cabin.

[0032] For example, the see-through display may extend along at least 90% or at least 95% of the entire height of the elevator cabin. At an upper end and/or a lower end of the see-through display, for example components such as fixation structures and/or covers shielding an electronics arrangement may be provided. If such components may be "hidden" below the bottom and/or above the ceiling, the see-through display may even extend along the entire height of the elevator cabin.

[0033] Such entire-height see-through display may have a pleasant visual appearance while allowing clear views through the entire side wall portion and displaying information at any desired location along the entire-height see-through display.

[0034] Furthermore, according to an embodiment, the transparent side wall portion including the see-through display may extend along more than 90% of the entire width of the elevator cabin, preferably along substantially the entire width of the elevator cabin.

[0035] Such entire-width see-through display may have a pleasant visual appearance while allowing clear views through the entire side wall portion and displaying information at any desired location along the entire-width see-through display.

[0036] It shall be noted that possible features and advantages of embodiments of the invention are described herein partly with respect to an elevator cabin and partly with respect to an elevator comprising such elevator cabin. One skilled in the art will recognize that the features may be suitably transferred from one embodiment to another and features may be modified, adapted, combined and/or replaced, etc. in order to come to further embodiments of the invention.

[0037] In the following, advantageous embodiments of the invention will be described with reference to the enclosed drawing. However, neither the drawing nor the description shall be interpreted as limiting the invention.

[0038] Fig. 1 shows an elevator cabin according to an embodiment of the present invention.

[0039] The figure is only schematic and not to scale.

[0040] Fig. 1 shows an elevator cabin 1. The elevator cabin 1 comprises a bottom 3, a ceiling 5 and a sidewall 7 enclosing an interior space of the elevator cabin 1. In the example shown, the bottom 3 and the ceiling 5 are rectangular and three planar sidewall portions 9 define the interior space of the elevator cabin 1 at three of its sides, i.e. at a rear side and at opposing lateral sides. A front side of the elevator cabin 1 may be opened and closed by a cabin door 11.

[0041] In the example shown, at least two of the sidewall portions 9 are provided with see-through displays 13. Each see-through display 13 may be provided with a transparent pane 20. Electronics are included in such pane 20 such as to define a two-dimensional matrix of pixels. Each of the pixels may be modified with respect to its optical characteristics, i.e. its transparency, reflectivity and/or light emittance. The optical characteristics of each of the pixels may be controlled using a controller 19. The controller 19 may be electrically connected to matrix connectors 21, 23 provided at a horizontal side and a vertical side of the pane 20. Accordingly, by suitably controlling the optical characteristics of the pixels in the matrix of the see-through display 13, variable characters, patterns, symbols, designs, etc. may be displayed on the see-through display 13.

[0042] The see-through display 13 can consist of a switchable glass (or smart glass) whose light transmission property can be altered depending on at least one environmental condition or using condition, e.g. voltage, light or temperature and so on. According to this, the switchable glass can appear transparent, translucent or intransparent or any status there in between. In other words, the switchable glass can be altered from blocking some (or all) wavelengths of light to letting light pass through.

Particularly, passenger information such as a time information 25, a date information 27, an elevator manufacturer information 29 and/or a weather information 31 may be displayed on the see-through display 13. Additionally or alternatively, for example sight information 33 such as for example a name of a monument may be displayed. Accordingly, the passengers in the elevator cabin 1 may be provided with an augmented reality.

[0043] Furthermore, in the specific embodiment shown in the figure, a car operating panel 15 is emulated using the see-through display 13. Such COP 15 comprises a multiplicity of virtual buttons 16. Such buttons 16 may be represented for example as areas with contrasted transparency, for example dark areas, for example when using an LCD-type see-through display 13. Alternatively, such buttons 16 may be represented for example as illuminated areas, for example when using an LED-type see-through display 13.

[0044] Particularly, in order to emulate the COP 15, the see-through display 13 may be touch-sensitive such that it may sense when a passenger touches one of the virtual buttons 16. For example, such information may be sensed and forwarded to the controller 19 of the see-through display 13. The controller 19 may then further forward such information for example towards an elevator controller in order to indicate a selected destination

floor.

[0045] By emulating the COP 15 using the see-through display 13, any kind of information may be displayed and for example attribute it to one of the virtual buttons 16. For example, floor numbers 17 may be displayed. Alternatively or additionally, further information 18 relating to a selectable floor such as a function (lounge, restaurant), names of shops, restaurants, bars, habitants, etc. may be displayed.

[0046] Particularly, the information displayed by the see-through display 13 may be varied over time. For example, the time information 25, date information 27, whether information 31 may be repeatedly updated. Furthermore, for example function information attribute it to one of the virtual buttons 16 of the COP 15 may be modified, for example if the location of the restaurant is changed to another floor or the function is changed e.g. from a restaurant to a bar. Modifications of such displayed contents may be implemented using software only, i.e. no hardware modifications may be necessary.

[0047] Finally, it should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined. It should also be noted that reference signs in the claims should not be construed as limiting the scope of the claims.

List of reference signs

[0048]

1	elevator cabin
3	bottom
5	ceiling
7	sidewall
9	sidewall portion
11	cabin door
13	see-through display
15	cabin operating panel
16	virtual buttons
17	floor numbers
18	further information
19	controller
20	pane
21	matrix connector
23	matrix connector
25	time information
27	date information
29	elevator manufacturer information
31	weather information
33	sight information

Claims

1. Elevator cabin (1), comprising:
a bottom (3);
a ceiling (5); and
a side wall (7) comprising a plurality of side wall portions (9);
wherein at least one of the side wall portion (9) is transparent;
characterized in that
the transparent side wall portion (9) comprises a see-through display (13) integrated therein or attached thereto, wherein the see-through display (13) is touch-sensitive and configured for emulating a cabin operation panel (15).

2. Elevator cabin according to claim 1, wherein the see-through display (13) consists of a switchable glass whose light transmission property can be altered depending on at least one environmental condition or using condition.

3. Elevator cabin according to claim 2, wherein the switchable glass is changeable from transparent to translucent and/or to intransparent.

4. Elevator cabin according to claim 1, wherein the see-through display (13) is of an LCD-type.

5. Elevator cabin according to claims 1 to 4, wherein the see-through display (13) is of an LED-type.

6. Elevator cabin according to one of the preceding claims, wherein the see-through display (13) is configured for displaying passenger information (25, 27, 29, 31, 33).

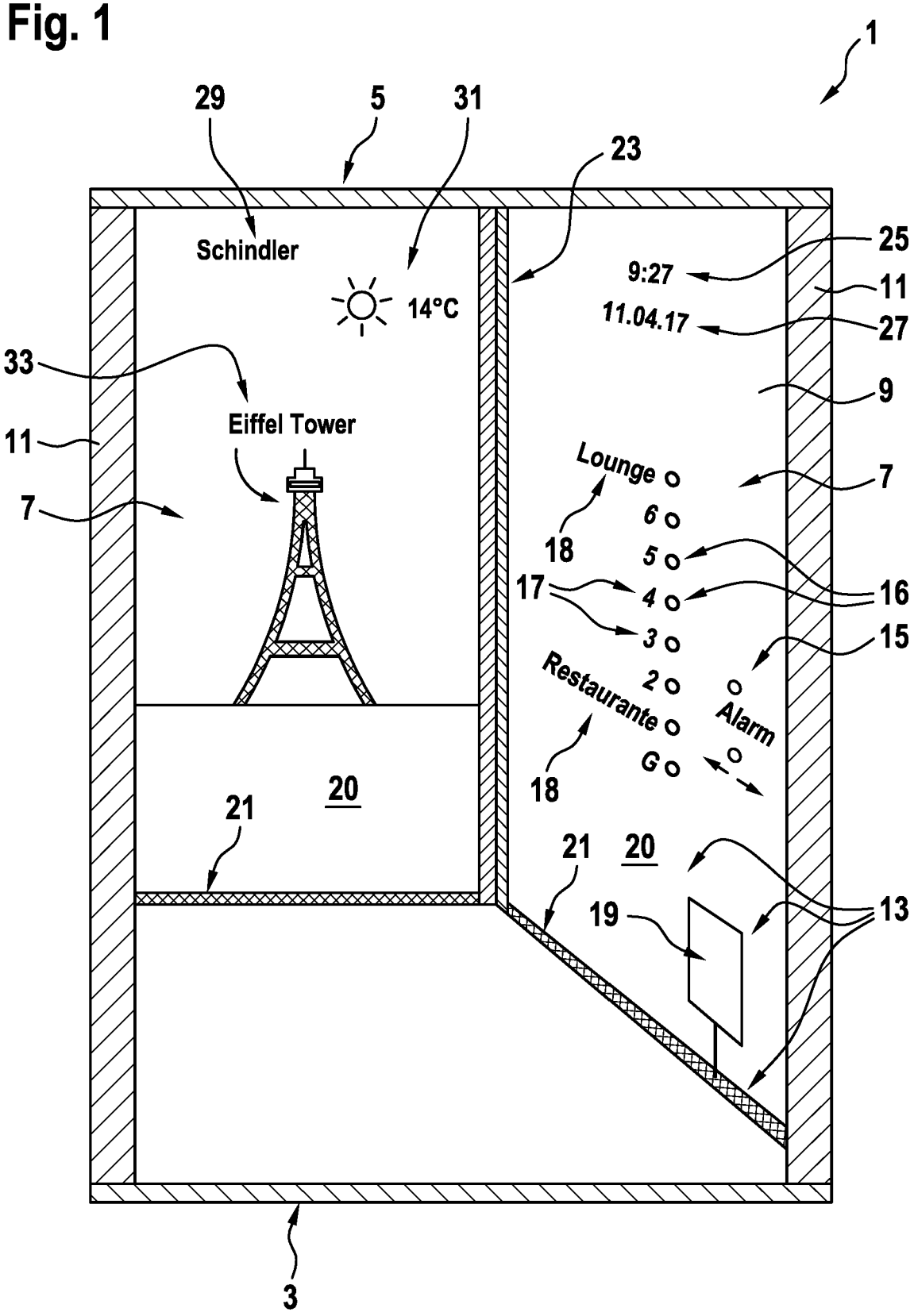
7. Elevator cabin according to one of the preceding claims, wherein the transparent side wall portion (9) extends along at least 10% of the height of the elevator cabin (1).

8. Elevator cabin according to one of the preceding claims, wherein the transparent side wall portion (9) extends along at least 90% of the entire height of the elevator cabin (1).

9. Elevator cabin according to one of the preceding claims, wherein the transparent side wall portion (9) extends along at least 90% the entire width of the elevator cabin (1).

10. Elevator comprising an elevator cabin (1) according to one of claims 1 to 9.

Fig. 1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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 0712

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

B66B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 October 2017	Oosterom, Marcel

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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