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(71) Applicant: **INVENTIO AG**
CH-6052 Hergiswil (CH)

(72) Inventors:
 • **Kocher, Johannes, Masch.-Ing.**
6044 Udligenswil (CH)
 • **Mc Govern, Eamon, B.Eng(Hons)EI-Mech E**
6003 Luzern (CH)

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(54) **Combination elevator doors**

(57) The present invention relates to sliding doors (10;12) used on landings and cars of elevator systems (1). In particular the invention provides door arrangements that permit greater versatility in the space utilization within a hoistway (2) of an elevator system (1). The landing and car (4) are provided with horizontally sliding doors (10;12) each formed from one or more panels (11;

13) wherein the number of panels (11) in the landing door (10) is unequal to the number of panels (13) in the car door (12). Accordingly, the dimensions of the door-receiving spaces (B;A) for the landing door (10) and the car door (12) are unequal giving the installation designer greater flexibility to manipulate the layout of equipment within the hoistway (3).

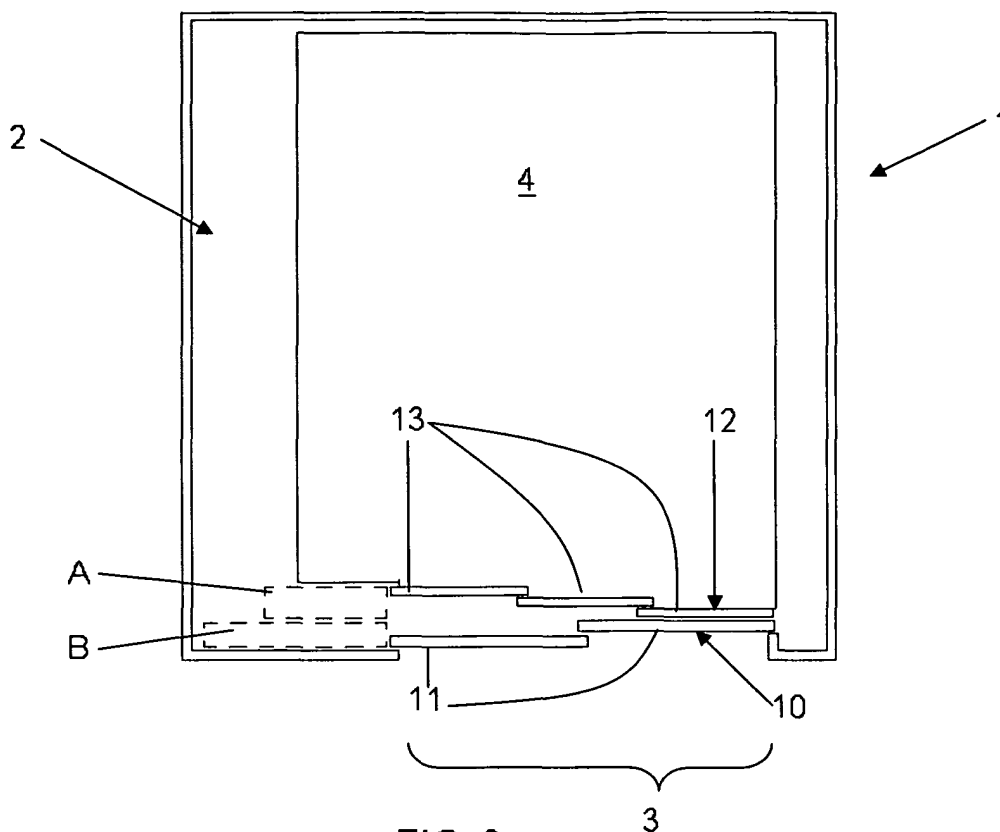


FIG. 3

Description

[0001] The present invention relates to sliding doors used on cars and landings of elevator systems. In particular the invention provides door arrangements that permit greater versatility of space utilization within a hoistway of an elevator system.

[0002] Telescopic, sliding doors have been widely used in many diverse applications for a great number of years. A common application employed within the elevator industry is as exemplified in US 3,389,504 which shows a two panel side-opening door installed on a car movable within a hoistway together with a similar two panel side-opening door mounted across an entrance on a neighboring landing of the hoistway. Both doors interlock and telescopically slide into respective door-receiving spaces to the side of the entrance to permit access to the car. Obviously, the room taken up by the door-receiving spaces in the hoistway cannot be used for any other purpose.

[0003] Hitherto installation designers, who are under continual pressure to reduce the space consumption of modern elevator systems, were restricted by this requirement and have had no scope to utilize the door-receiving spaces required by the conventional car and landing door arrangement.

[0004] This problem was partially addressed by EP 1069066 which describes an elevator installation with landing doors, and in some instances car doors, that can be laterally displaced beyond the width of the hoistway into recesses provided in opposing hoistway walls or alternatively into recesses provided in a new front module for the entrance to the hoistway. Accordingly, the hoistway is not dimensioned to fully accommodate the door-receiving spaces. Whereas this technique is beneficial in designing new installations, it will be appreciated that it is not appropriate for modernizing existing installations since it requires extensive building work, either to cut out the required recesses in the hoistway walls or to install a new front module at each landing.

[0005] The principal objective of the present invention is to overcome the shortcomings of the prior art by providing combination elevator door arrangements which permit more flexibility for the utilization of space within hoistways of elevator systems. Furthermore, the invention should be equally suitable for the modernization of existing elevator systems as well as for the design of new installations.

[0006] These objectives are achieved by the invention as defined in the appended claims. In particular, the invention does not require purpose-built recesses in the hoistway walls or new front modules at each landing to accommodate landing doors that extend beyond the width of the hoistway. Accordingly, it can be applied to an existing elevator system without entailing excessive building work.

[0007] By way of example only, preferred embodiments of the present invention will be described in detail

with reference to the accompanying drawings, of which:

FIG. 1 is a sectional plan view of an elevator system employing a conventional telescopic door arrangement;

FIG. 2 shows the telescopic door arrangement of Fig. 1 in an open position;

FIG. 3 is a sectional plan view of an elevator system employing a telescopic door arrangement according to a first embodiment of the present invention;

FIG. 4 shows the telescopic door arrangement of Fig. 1 in an open position;

FIG. 5 is a sectional plan view of an elevator system employing a door arrangement according to a second embodiment of the present invention;

FIG. 6 shows the door arrangement of Fig. 6 in the open condition; and

FIG. 7 is a sectional plan view of an elevator system employing a telescopic door arrangement according to a third embodiment of the present invention.

[0008] Fig. 1 illustrates an elevator system 1 mounted within a building. The system 1 includes an elevator car 4 which is movable vertically within a hoistway 2 to transfer people between floors of the building. The hoistway 2 is defined by two opposing side walls 14, a rear wall 15 and a front wall 16. On each floor of the building an entrance 3 is provided to the hoistway 2 through the front wall 16. For safety reasons a horizontally sliding landing door 5 is mounted on each entrance 3 to the hoistway 2. The landing door 5 is composed of two vertically aligned panels 6. Similarly, a two-panel 8 horizontally sliding door 7 is mounted on the car 4.

[0009] In use, when the elevator car 4 reaches a designated floor, the car door 7 interlocks with the neighboring landing door 5 and both slide telescopically into respective door-receiving spaces A and B within the hoistway 2 to one side of the entrance 3 as shown in Fig. 2. In the stored positions, the panels 6 and 8 of the car and landing doors are arranged one behind the other.

[0010] In this arrangement the telescopic landing door 6 is formed using the same number of panels as the car door 8. Accordingly, the receiving space B required to store the landing door 6 is substantially equal to the receiving space A for the car door 10.

[0011] Figs. 3 and 4 show an elevator system 1 incorporating a telescopic, side-opening door arrangement according to the present invention. In contrast to the prior art, the landing door 10 comprises two panels 11 and the car door 12 comprises three panels 13. With this arrangement, there is a reduction in the width of the receiving space A required for the car door 10 when in the open position (Fig. 4) as compared to the prior art and accordingly a reclaimed space C within the hoistway 2 can be used for other purposes.

[0012] Although this solution would necessarily increase the depth of the car door receiving space A, and

thereby result in a reduction in the car 4 size for a given hoistway 2, it gives the installation designer the flexibility to use the reclaimed space C in the hoistway 2 for other equipment such as an elongated counterweight. Indeed, if the counterweight is elongated, its width can be reduced correspondingly, thereby permitting the car 4 to be widened to negate the size reduction effects imposed upon it by the increased depth of the car door-receiving space A.

[0013] It is perceived that the door arrangement of Figs. 3 and 4 would be particularly beneficial in a panoramic elevator system wherein the walls 14, 15 and 16 of the hoistway 2 and car 4 are substantially transparent. Understandably aesthetics is an extremely important factor in such an installation. With the prior art door arrangement of Figs. 1 and 2, the car door 7 must be guided along unsightly supports extending from the side of the car into the hoistway 2. With the door arrangement of Figs. 3 and 4 the length of the supports can be reduced and therefore the overall appearance of the system is improved.

[0014] Figs. 5 and 6 show an elevator system 1 incorporating a center-opening door arrangement according to a second embodiment of the invention. Two non-telescopic landing doors 10 are provided to close the entrance 3 and two telescopic doors 12 are mounted on the car 4. Both sets of doors 10 and 12 open from and close to the center of the entrance 3. In this particular embodiment, it will be noticed that the door-receiving space A for each of the car doors 7 does not extend outwards from the side of the car 4 into the hoistway 3. Accordingly, it is believed that this door arrangement would be particularly suitable for incorporation into a panoramic installation.

[0015] Fig. 7 shows a side-opening door arrangement which is similar to that of Fig. 4 but with two panels 13 forming the telescopic car door 12 and three panels 11 forming the telescopic landing door 10. The reclaimed space C in this instance could be used for hoistway cabling, a control box or, if applied to a hydraulic elevator system, a jack.

[0016] Although all of the embodiments specifically illustrated incorporate rectangular hoistways 2 and cars 4, it will be appreciated that the invention is equally applicable to cylindrical hoistways and cars having arcuate sliding doors.

[0017] Furthermore, it is envisaged that the invention is equally applicable to hydraulically, pneumatically or mechanically driven elevator systems.

Claims

1. An elevator system (1) comprising:

a hoistway (2) accessible through at least one entrance (3) provided with at least one sliding landing door (10);

a car (4) mounted and moveable within the hoistway (2), the car (4) having at least one sliding car door (12);

wherein, the landing door (10) and the car door (12) are each formed from one or more panels (11;13);

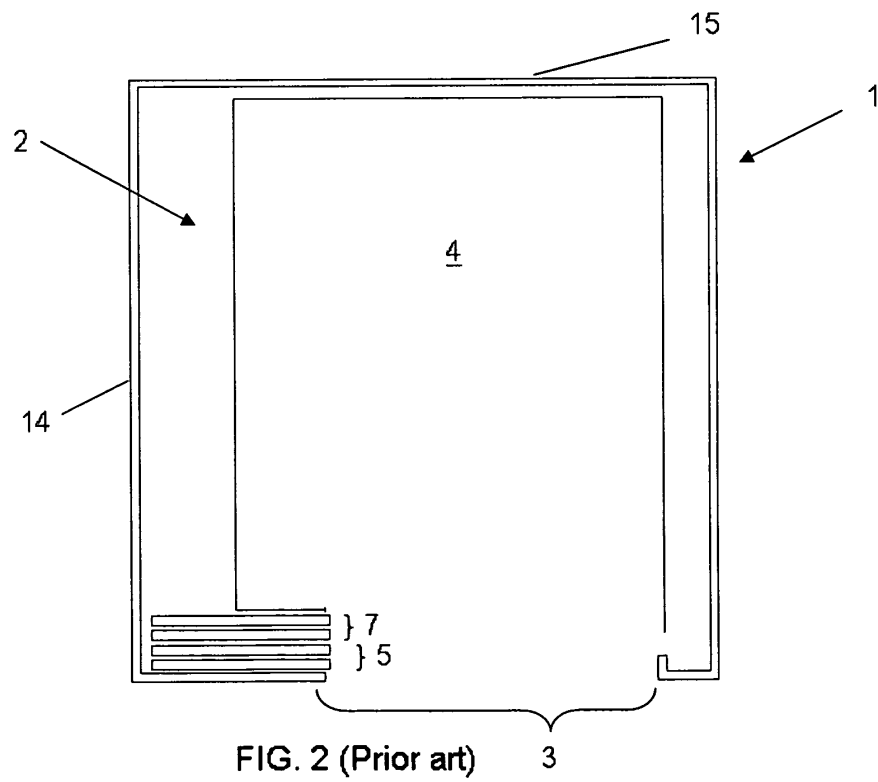
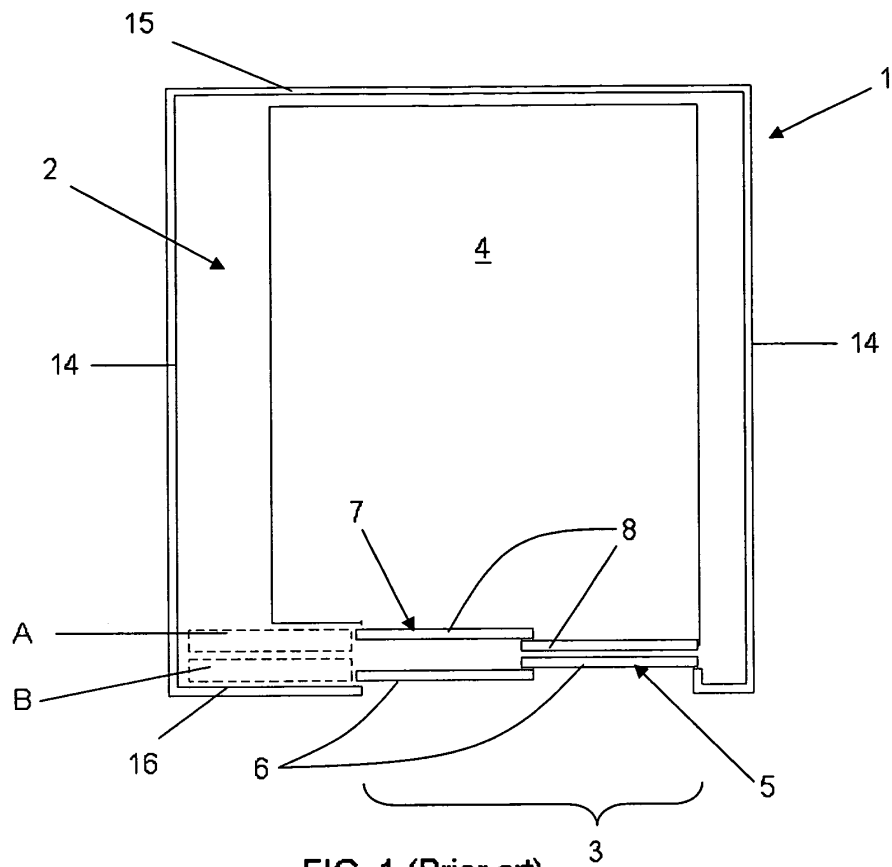
the number of panels (11) in the landing door (10) is unequal to the number of panels (13) in the car door (12); and

in use, the car door (12) opens together with a neighboring landing door (10)

CHARACTERISED IN THAT

in an open position, both the car door (12) and the neighboring landing door (10) are fully accommodated within the hoistway (2) and a space (C) is defined between the car door (12), the landing door (10) and a side wall (15) of the hoistway (2).

2. An elevator system (1) according to claim 1, wherein the car door (12) has a plurality of panels (13) and the landing door (10) has fewer panels (11) such that when opening, the car panels (13) telescope over each other into a car door-receiving space (A) in the hoistway (2) to a side of the entrance (3) and the neighboring landing door (10) slides into a landing door-receiving space (B) in the hoistway (2) to a side of the entrance (3), and consequentially the car door-receiving space (A) is not as wide as the landing door-receiving space (B).
3. An elevator system (1) according to claim 2, wherein the landing door (10) is formed from a single panel (11).
4. An elevator system (1) according to claim 1, wherein the landing door (10) has a plurality of panels (13) and the car door (12) has fewer panels (11) such that when opening, the car door (12) slides into a car door-receiving space (A) in the hoistway (2) to a side of the entrance (3) and the panels (11) of neighboring landing door (10) telescope over each other into a landing door-receiving space (B) in the hoistway (2) to a side of the entrance (3), and consequentially the car door-receiving space (A) is wider than the landing door-receiving space (B).
5. An elevator system (1) according to claim 4, wherein the car door (12) is formed from a single panel (13).
6. An elevator system (1) according to any preceding claim, wherein each entrance (3) has two sliding landing doors (10) and the car (4) has two sliding car doors (12), the car doors (12) and the neighboring landing doors (10) opening from and closing to a center of the entrance (3).



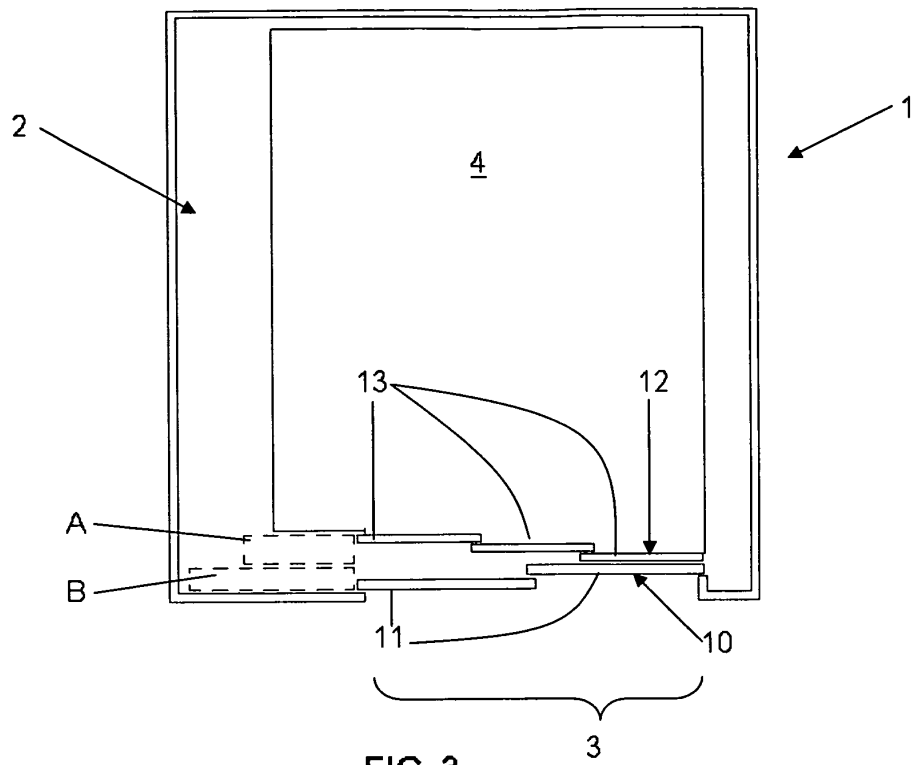


FIG. 3

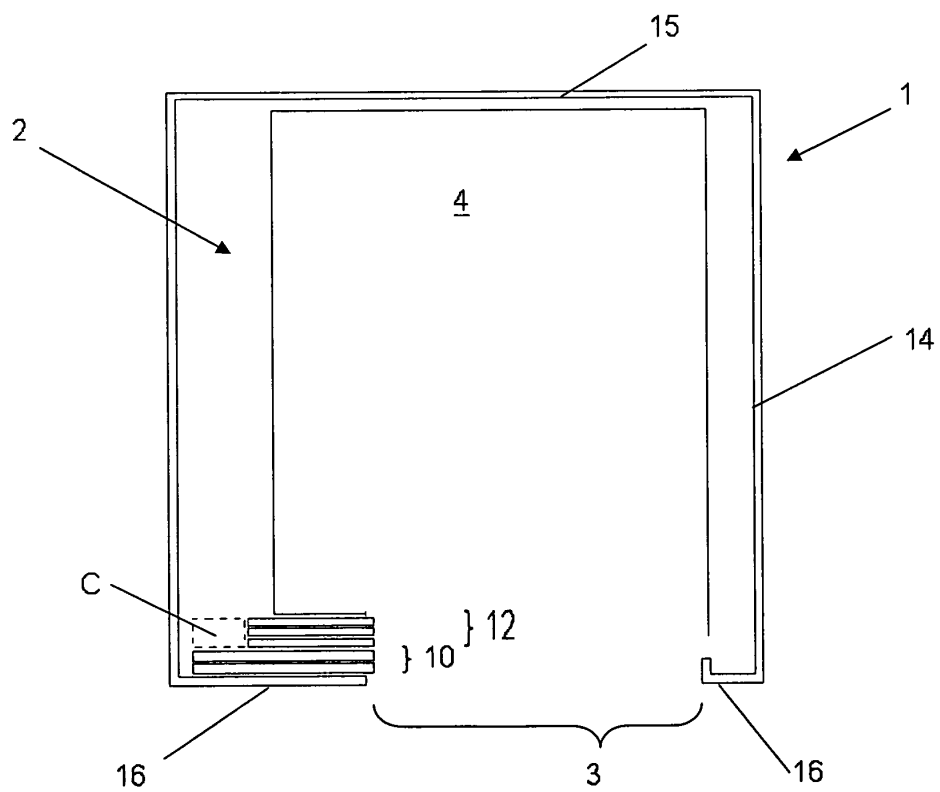
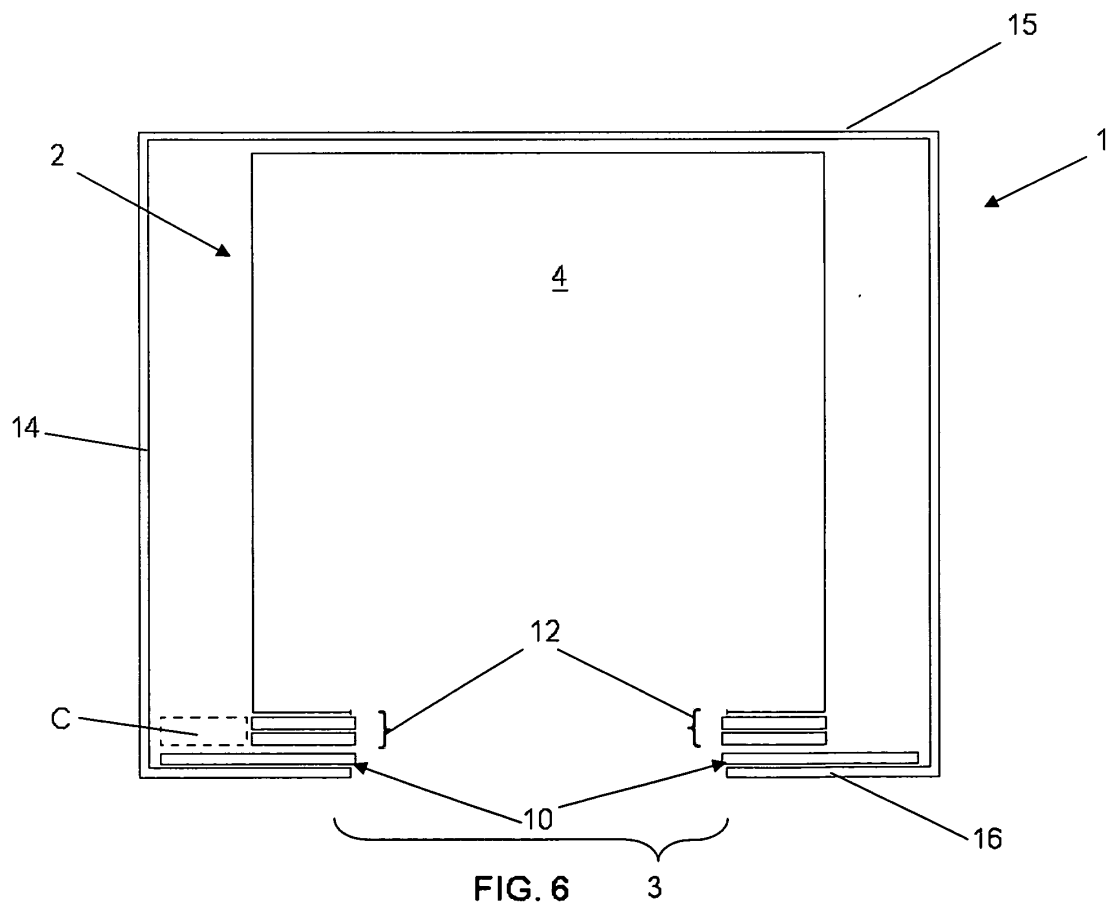
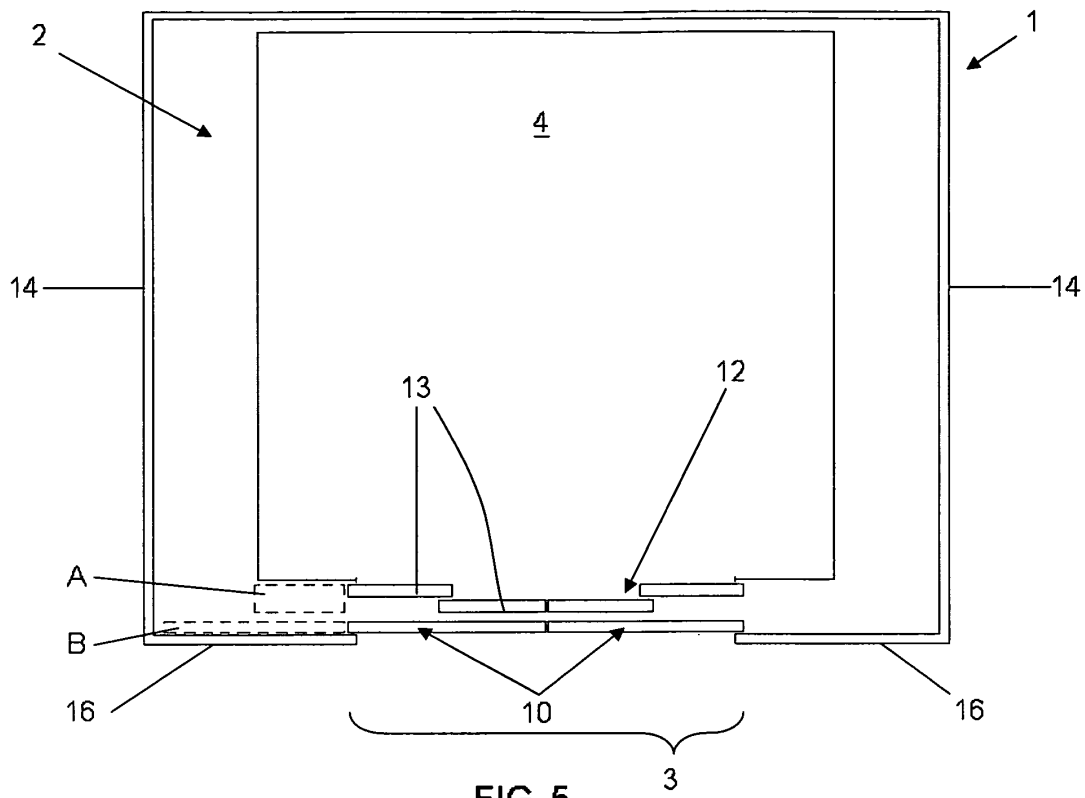


FIG. 4



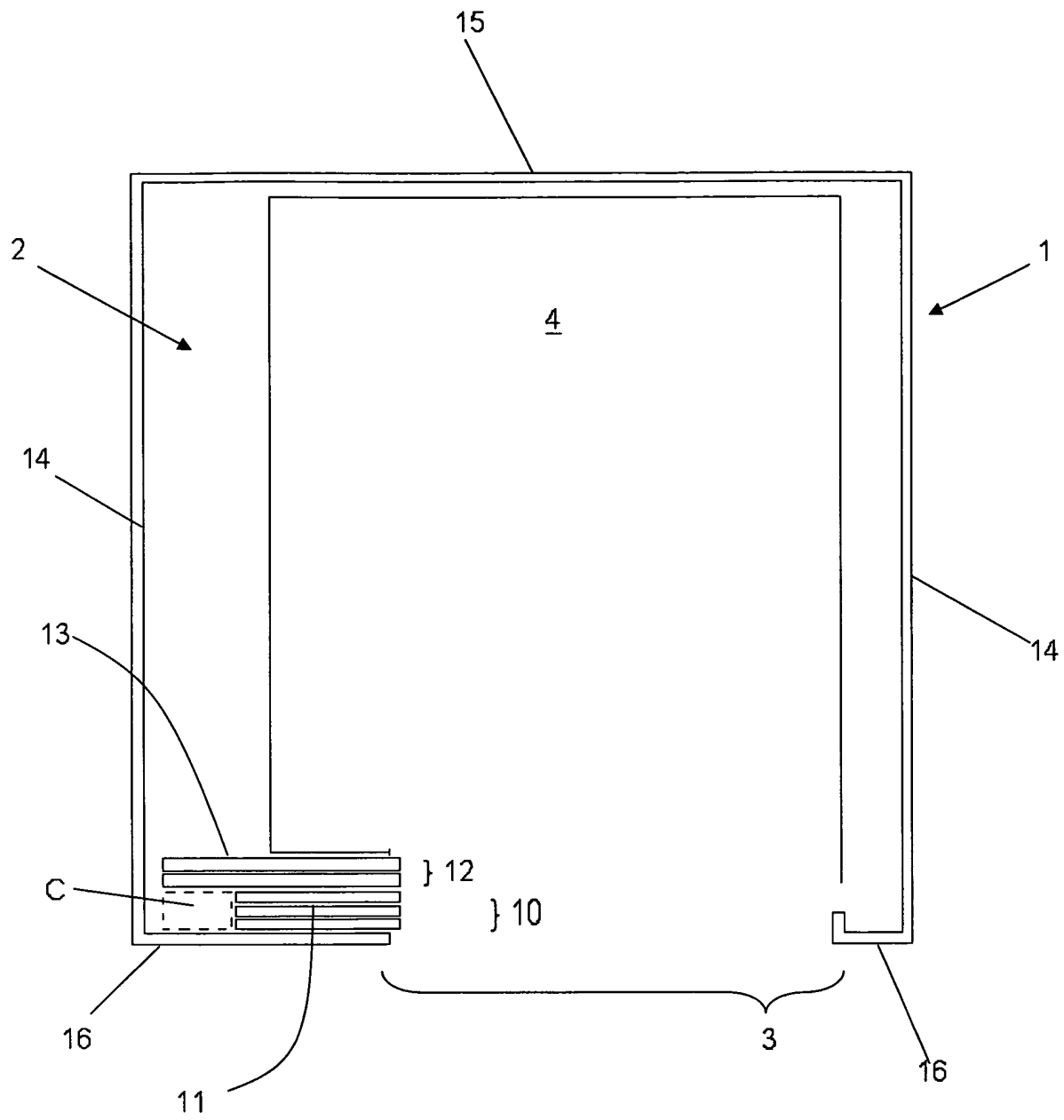


FIG. 7



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 00 2978

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 1 069 066 A (INVENTIO AG) 17 January 2001 (2001-01-17) * column 5, lines 44-49 * * column 7, lines 33-37 * * figures 1,15 * -----	1-6	B66B13/06 B66B13/30
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A	US 5 584 365 A (TONNA CHRISTIAN G) 17 December 1996 (1996-12-17) * abstract * -----	1-6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B66B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 1 June 2004	Examiner Eckenschwiller, A
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 00 2978

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82