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(54) **Combination elevator doors**

Kombinierte Aufzugstüren

Portes d'ascenseur combinées

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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 hoist-

way (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);

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

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), wherein

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), **CHARACTERISED IN THAT** said space (C) is rectangular having a width defined by the difference in width between the car door-receiving space (A) and the landing door-receiving space (B) and a depth corresponding to one of the depth of the car door-receiving space (A) and of the landing door-receiving space (B).

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 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 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).
7. An elevator system (1) according to any preceding claim, wherein the space (C) is used for other equip-

ment.

Patentansprüche

1. Aufzugssystem (1) mit einem Schacht (2), der durch mindestens einen Eingang (3) zugänglich ist, der mit mindestens einer Stockwerkschiebetür (10) versehen ist, einer Kabine (4), die im Schacht (2) montiert und beweglich ist und mindestens eine Kabinenschiebetür (12) hat, wobei die Stockwerkstür (10) und die Kabinentür (12) jeweils aus einem oder mehreren Blättern (11; 13) gebildet sind, die Anzahl von Blättern (11) in der Stockwerkstür (10) ungleich der Anzahl von Blättern (13) in der Kabinentür (12) ist, die Kabinentür (12) sich im Gebrauch zusammen mit einer benachbarten Stockwerkstür (10) öffnet, die Kabinenblätter (13) sich beim Öffnen teleskopartig übereinander in einen Kabinentüraufnahmeraum (A) im Schacht (2) auf einer Seite des Eingangs (3) schieben und die benachbarte Stockwerkstür (10) sich in einen Stockwerküraufnahmeraum (B) im Schacht (2) auf einer Seite des Eingangs (3) schiebt, wobei sowohl die Kabinentür (12) als auch die benachbarte Stockwerkstür (10) in einer offenen Position völlig im Schacht (2) untergebracht sind und ein Raum (C) zwischen der Kabinentür (12), der Stockwerkstür (10) und einer Seitenwand (15) des Schachts (2) definiert ist, **dadurch gekennzeichnet, dass** der Raum (C) rechteckig ist mit einer Breite, die durch die Breitendifferenz zwischen dem Kabinentüraufnahmeraum (A) und dem Stockwerküraufnahmeraum (B) definiert wird, und einer Tiefe, die der Tiefe des Kabinentüraufnahmeraums (A) oder der Tiefe des Stockwerküraufnahmeraums (B) entspricht.
2. Aufzugssystem (1) nach Anspruch 1, wobei die Kabinentür (12) mehrere Blätter (13) und die Stockwerkstür (10) weniger Blätter (11) aufweist, so dass der Kabinentüraufnahmeraum (A) nicht so breit ist wie der Stockwerküraufnahmeraum (B).
3. Aufzugssystem (1) nach Anspruch 2, wobei die Stockwerkstür (10) aus einem einzigen Blatt (11) gebildet ist.
4. Aufzugssystem (1) nach Anspruch 1, wobei die Stockwerkstür (10) mehrere Blätter (13) und die Kabinentür (12) weniger Blätter (11) aufweist, so dass der Kabinentüraufnahmeraum (A) breiter als der Stockwerküraufnahmeraum (B) ist.
5. Aufzugssystem (1) nach Anspruch 4, wobei die Kabinentür (12) aus einem einzigen Blatt (13) gebildet

ist.

6. Aufzugssystem (1) nach einem der vorhergehenden Ansprüche, wobei jeder Eingang (3) zwei Stockwerkschiebetüren (10) und die Kabine (4) zwei Kabinenschiebetüren (12) aufweist, wobei sich die Kabinentüren (12) und die benachbarten Stockwerkstüren (10) von einer Mitte des Eingangs (3) aus öffnen und zu dieser hin schließen.
7. Aufzugssystem (1) nach einem der vorhergehenden Ansprüche, wobei der Raum (C) für andere Ausrüstungen verwendet wird.

Revendications

1. Système d'ascenseur (1) comprenant :
 - une gaine d'ascenseur (2) à laquelle on accède par au moins une entrée (3) pourvue d'au moins une porte palière coulissante (10) ;
 - une cabine (4) qui est montée et apte à circuler dans la gaine (2), la cabine (4) ayant au moins une porte de cabine coulissante (12) ;
 - étant précisé que la porte palière (10) et la porte de cabine (12) se composent chacune d'un ou plusieurs panneaux (11 ; 13) ;
 - que le nombre de panneaux (11) de la porte palière (10) est différent du nombre de panneaux (13) de la porte de cabine (12) ;
 - qu'en fonctionnement, la porte de cabine (12) s'ouvre conjointement avec une porte palière (10) voisine ;
 - que lors de l'ouverture, les panneaux de cabine (13) se replient de manière télescopique dans un espace de réception de porte de cabine (A) prévu dans la gaine d'ascenseur (2) sur un côté de l'entrée (3), et la porte palière (10) voisine coulisse et entre dans un espace de réception de porte palière (B) prévu dans la gaine (2) sur un côté de l'entrée (3),
 - et qu'en position ouverte, la porte de cabine (12) et la porte palière (10) voisine sont toutes les deux entièrement logées dans la gaine (2) et un espace (C) est défini entre la porte de cabine (12), la porte palière (10) et une paroi latérale (15) de la gaine (2),
 - caractérisé en ce que** l'espace (C) est rectangulaire, avec une largeur qui est définie par la différence de largeur entre l'espace de réception de porte de cabine (A) et l'espace de réception de porte palière (B), et avec une profondeur qui correspond à la profondeur de l'espace de réception de porte de cabine (A) ou à celle de l'espace de réception de porte palière (B).
2. Système d'ascenseur (1) selon la revendication 1,

- dans lequel la porte de cabine (12) a plusieurs panneaux (13) et la porte palière (10) a moins de panneaux (11), de sorte que l'espace de réception de porte de cabine (A) est moins large que l'espace de réception de porte palière (B). 5
3. Système d'ascenseur (1) selon la revendication 2, dans lequel la porte palière (10) se compose d'un seul panneau (11). 10
4. Système d'ascenseur (1) selon la revendication 1, dans lequel la porte palière (10) a plusieurs panneaux (13) et la porte de cabine (12) a moins de panneaux (11), de sorte que l'espace de réception de porte de cabine (A) est plus large que l'espace de réception de porte palière (B). 15
5. Système d'ascenseur (1) selon la revendication 4, dans lequel la porte de cabine (12) se compose d'un seul panneau (13). 20
6. Système d'ascenseur (1) selon l'une quelconque des revendications précédentes, dans lequel chaque entrée (3) a deux portes palières coulissantes (10) et la cabine (4) a deux portes de cabine coulissantes (12), les portes de cabine (12) et les portes palières (10) voisines s'ouvrant et se fermant à partir du centre et vers le centre de l'entrée (3). 25
7. Système d'ascenseur (1) selon l'une quelconque des revendications précédentes, dans lequel l'espace (C) est utilisé pour un autre équipement. 30

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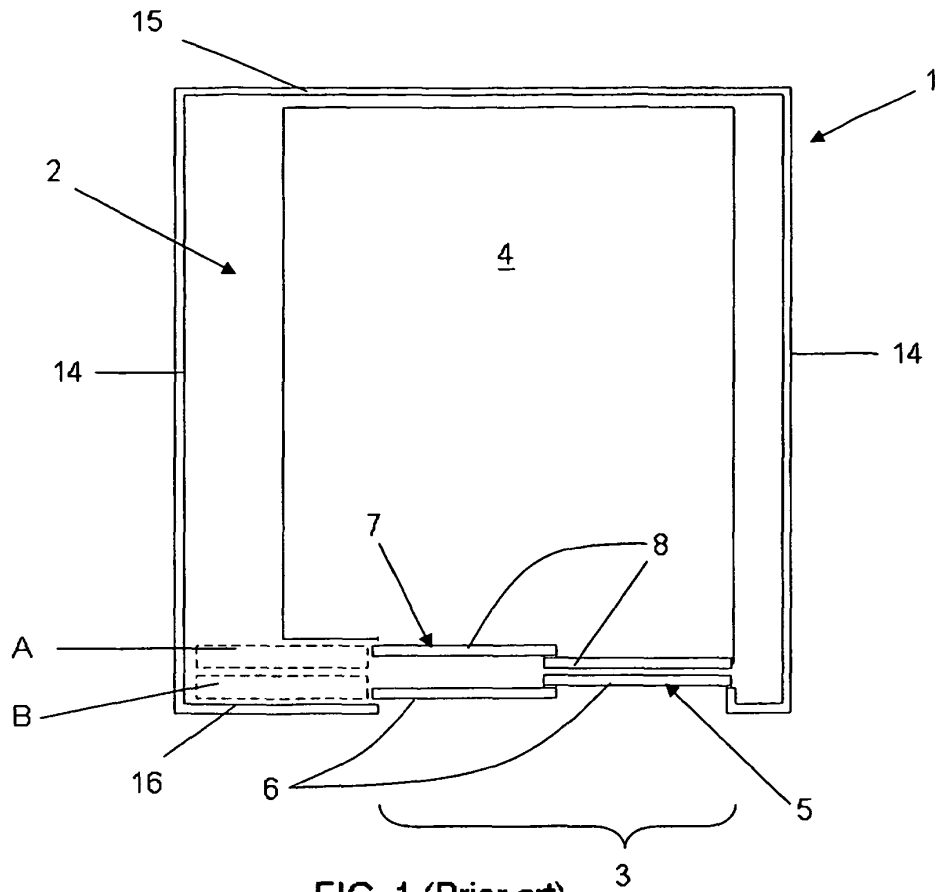


FIG. 1 (Prior art)

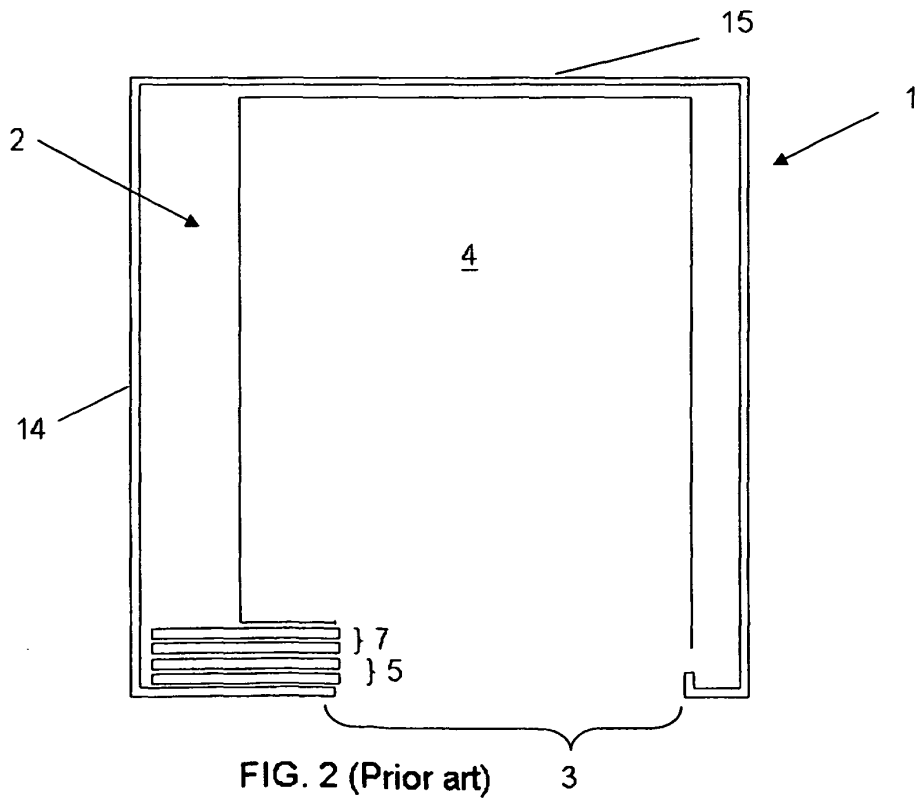


FIG. 2 (Prior art)

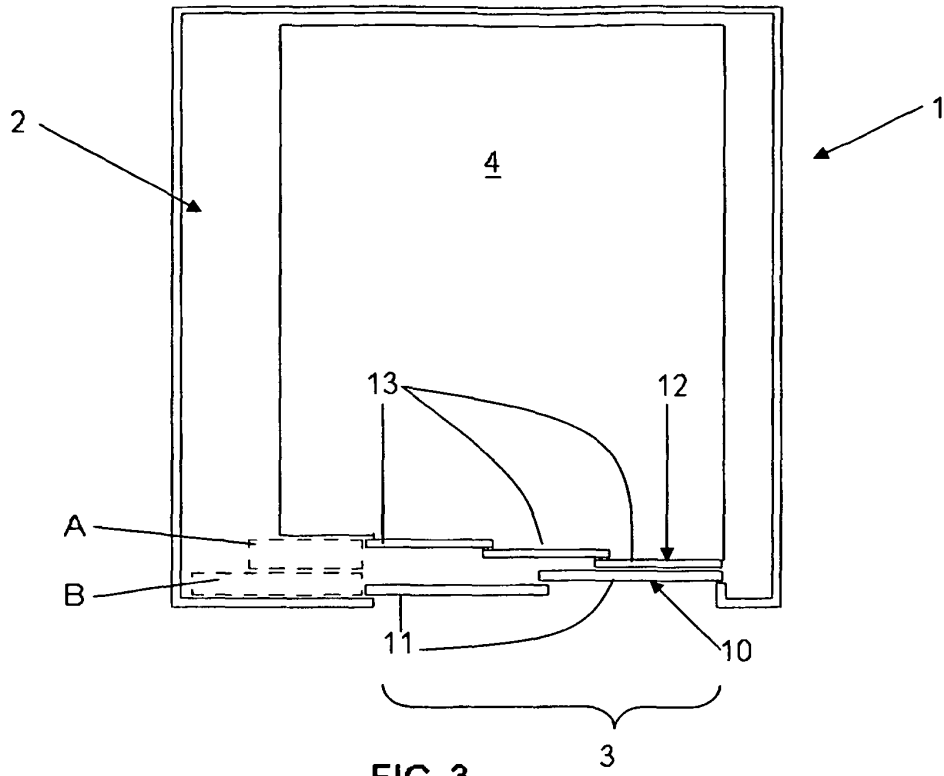


FIG. 3

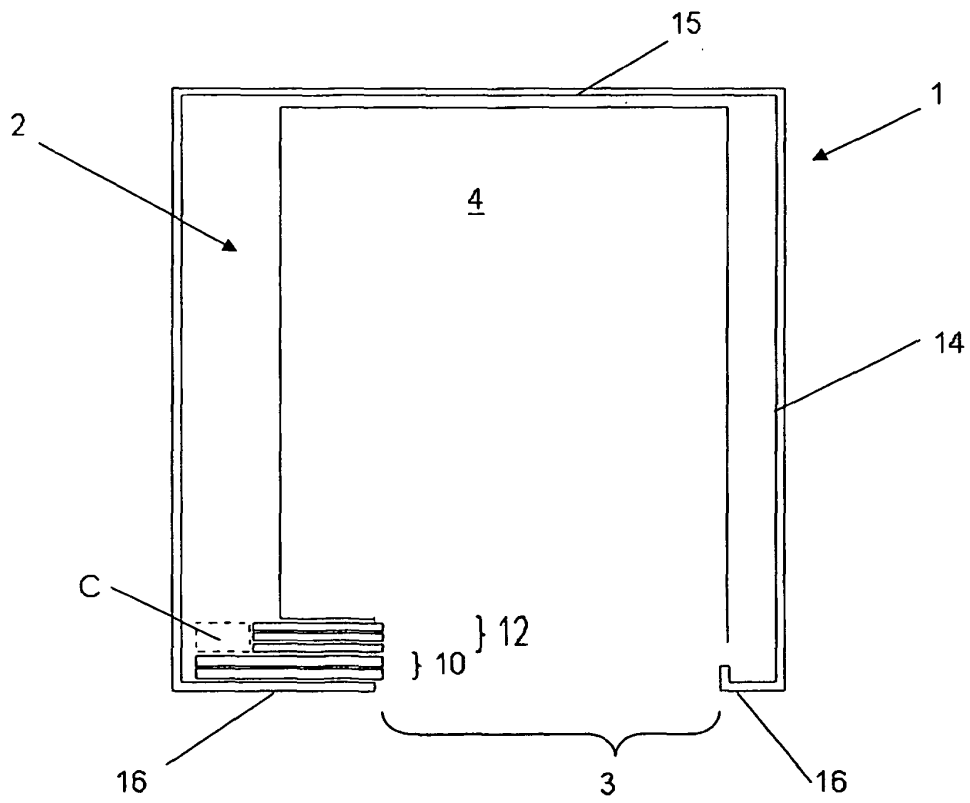


FIG. 4

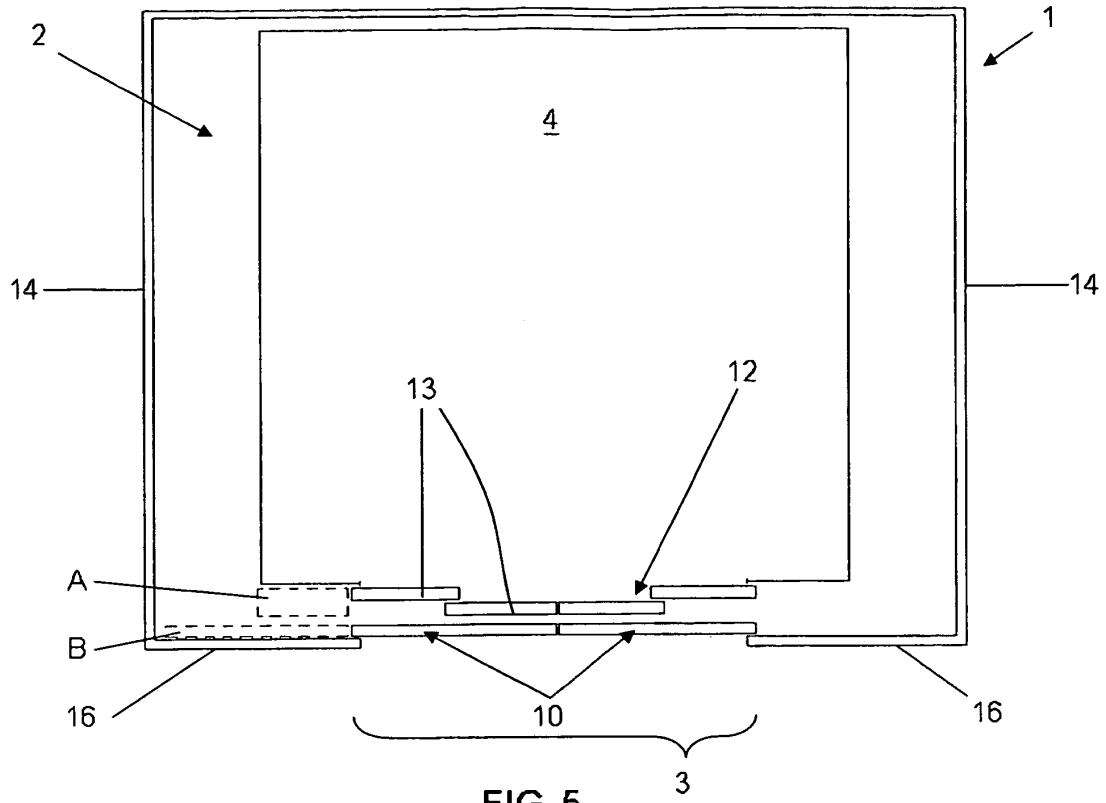


FIG. 5

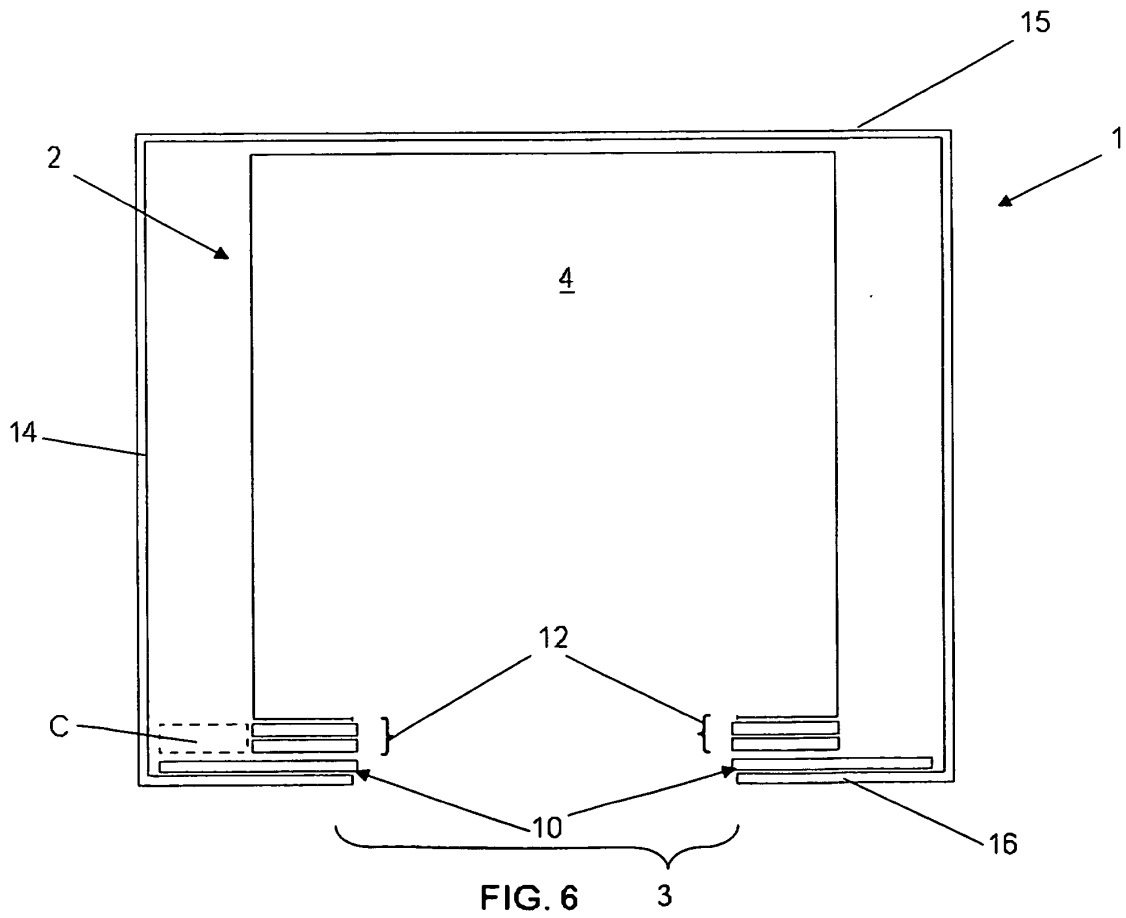


FIG. 6

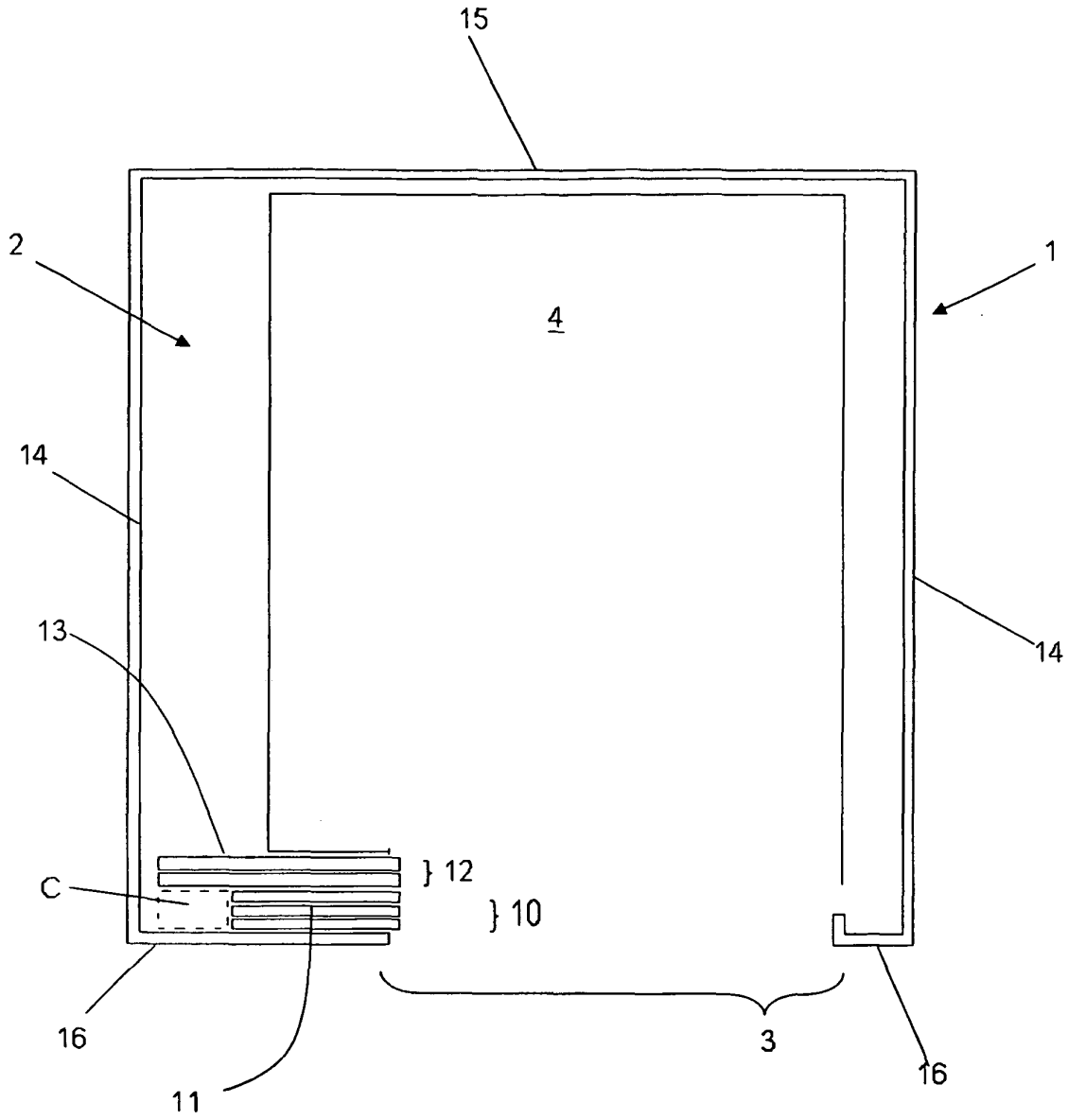


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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