(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 336 490 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
**13.02.2013 Bulletin 2013/07**

(51) Int Cl.:
***E21F 5/00*** *(2006.01)* ***E21F 11/00*** *(2006.01)*

(21) Application number: **10161919.5**

(22) Date of filing: **04.05.2010**

(54) **Survival module for one-way double barrel tunnels**

Überlebungsmodul für Einbahn-Doppelrohrtunnel

Module de sauvetage pour tunnels à sens-unique doubles

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR**

(30) Priority: **17.12.2009 IT MI20092211**

(43) Date of publication of application:
**22.06.2011 Bulletin 2011/25**

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EP 2 336 490 B1

## Description

### BACKGROUND OF THE INVENTION

**[0001]** The present invention relates to a survival module for one-way double barrel tunnels.

**[0002]** As is known, one-way double barrel tunnels conventionally comprise, at preset spacings, joining ducts which operate to allow an evacuation from a tunnel barrel to the other tunnel barrel, as, for any reasons, dangerous condition occur.

**[0003]** To that end, at the joining duct, it is necessary to provide a plurality of separating regions with openable openings to allow pedestrian and, in same cases, also vehicular crossings. Such a joining duct is disclosed for example in KR 2009 0007769.

**[0004]** Prior solutions for meeting the above requirements provide to make very complex structures which are made, as necessary, in situ, without making criteria allowing to provide standard solutions and an optimum operation thereof.

### SUMMARY OF THE INVENTION

**[0005]** Accordingly, the aim of the present invention is to solve the above mentioned problem, by providing a survival module for one-way double barrel tunnels, which may be prefabricated and easily and quickly installed, thereby allowing related safety criteria to be standardized.

**[0006]** Within the scope of the above mentioned aim, a main object of the invention is to provide such a survival module allowing to form, in a very easy and practical manner, a region safely separated from dangerous zones in one of the tunnel barrels, thereby allowing the users both to quickly evacuate the dangerous region and to resist against high temperatures.

**[0007]** Another object of the present invention is to provide such a survival module which, owing to its specifically designed constructional features, is very reliable and safe in operation.

**[0008]** Another object of the present invention is to provide such a survival module which can be easily made starting from easily available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

**[0009]** According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a survival module for one-way double barrel tunnels, **characterized in that** said survival module comprises, within a joining duct for joining a double-barrel tunnel, a chamber comprising, at end portions thereof, an access prefabricated structure with an inlet door and an outlet door arranged adjoining an electric apparatus storing closed space, above said closed space a cylindric body including a fan and related fire barrier gate being arranged.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of a survival module for one-way double barrel tunnels, which is illustrated, by way of an indicative, but not limitative, example in the accompanying drawings, where:

Figure 1 is a schematic top plan view showing a double-barrel tunnel with a walking-on and carriageable joining duct;
Figure 2 shows a double-barrel tunnel with a walking-on joining duct;
Figure 3 is a cross-sectional view substantially taken along the section line III-III of figure 1;
Figure 4 shows a further cross-sectional view substantially taken along the section line IV-IV of figure 1;
Figure 5 shows a further cross-sectional view substantially taken along the section line V-V of figure 1;
Figure 6 shows yet another cross-sectional view substantially taken along the section line VI-VI of figure 2;
Figure 7 is a front elevation view showing a prefabricated access construction:
Figure 8 shows the prefabricated access construction as seen from the top and cross-sectioned at a high level thereof;
and
Figure 9 is a left side elevation view of the access structure.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0011]** With reference to the number references of the above mentioned figures, the survival module for one-way double barrel tunnels, according to the present invention, comprises a module chamber, schematically indicated by the reference number 1, formed in a joining duct 2 arranged between the one-way barrels or tubes 3 and 4 of a double-barrel tunnel.

**[0012]** According to the invention said chamber comprises, at each end portion thereof, a prefabricated structure, generally indicated by the reference number 10, which includes an inlet door 11 and an outlet door 12 which are arranged adjoining a closed space 13 which may be used for storing or recovering electric apparatus therein.

**[0013]** Above the closed space 13 a cylindric body 20 including a fan 21 interconnected to a fire barrier gate 22 is provided.

**[0014]** In said prefabricated structure 10 it is further possible to provide a series of safety elements comprising a video camera 30 for monitoring the encompassing environment, a fume detector 31 and an environment pressure switch 32.

**[0015]** Moreover, a fitting sleeve 5 adjoining the fan 21

and a hot wire flow-meter 35 are also provided.

**[0016]** On the front of the above structure are furthermore arranged an asymmetric projector 40 and a closed space interface 41 cooperating with an intercommunication audio system 42.

**[0017]** The prefabricated structures 10, for an exclusively walking-on duct, are arranged in a front framework, generally indicated by the reference number 15, operating as a duct encompassing and closing element.

**[0018]** For a walking-on and carriageable duct, said structures 10 are coupled to one another by concrete coupling walls 16 which, at a middle portion thereof, comprise adjoining walls 16 including openable doors for allowing emergency means or vehicles to pass therethrough.

**[0019]** From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

**[0020]** In particular, the fact is to be pointed out that the invention provides a safety structure including therein all the necessary safety elements, thereby greatly facilitating the installation operations and providing optimum standardized safety.

**[0021]** The invention, as disclosed, is susceptible to several modifications and variations, all of which will come within the scope of the invention.

**[0022]** Moreover, all of the constructional details can be replaced by other technically equivalent elements.

**[0023]** In practicing the invention, the used materials, provided that they are compatible to be intended use, as well as the contingent size and shapes, can be any, depending on requirements.

## Claims

1. A survival module for one-way double barrel tunnels (3, 4), said survival module comprising, within a walking on and carriageable joining duct (2) for joining a double-barrel (3, 4) tunnel, a chamber (1) comprising, at the end portions thereof, an access prefabricated structure (10) with an inlet door (11) and an outlet door (12), **characterized in that** said inlet and outlet doors are arranged adjoining a closed space (13) for storing therein electric apparatus, above said closed space (13) a cylindric body (20) including a fan and related fire barrier gate (22) being arranged, and that said structure (10) is a modular prefabricated structure.

2. A survival module, according to the preceding claim, **characterized in that** said survival module comprises, at said structure (10), a video camera (30).

3. A survival module, according to the preceding claims, **characterized in that** said survival module further comprises, at said structure (10), an analogic fume detector (31).

4. A survival module, according to one or more of the preceding claims, **characterized in that** said survival module further comprises an environmental monitoring pressure switch (32).

5. A survival module, according to one or more of the preceding claims, **characterized in that** said survival module comprises, at said structure (10), an asymmetrical projector (40).

6. A survival module, according to one or more of the preceding claims, **characterized in that** said survival module comprises, at said structure (10), an audio communication system (42).

7. A survival module, according to one or more of the preceding claims, **characterized in that** said survival module comprises, at said structure (10), a hot-wire flow meter (39).

8. A survival module, according to one or more of the preceding claims, **characterized in that** said structure (10) comprises a walking-on duct and is housed in a tunnel closing framework (15).

9. A survival module, according to one or more of the preceding claims, **characterized in that** said structure (10) comprises both a walking-on and a carriageable joining duct and is coupled to chamber defining concrete walls (16).

10. A survival module, according to one or more of the preceding claims, **characterized in that** said chamber is arranged, at a middle portion thereof, near carriageable passage openable doors.

## Patentansprüche

1. Überlebensmodul für Einbahn-Doppelrohrtunnel (3, 4), das Überlebensmodul umfassend, innerhalb eines begehbaren und befahrbaren Verbindungsdurchgangs (2) zum Verbinden mit einem Doppelrohrtunnel (3, 4), eine Kammer (1), die an den Endabschnitten davon eine vorgefertigte Zugangsstruktur (10) mit einer Einlasstür (11) und einer Auslasstür (12) umfasst, **dadurch gekennzeichnet, dass** die Einlass- und Auslasstüren anstoßend an einen geschlossenen Raum (13) zum Aufbewahren von elektrischen Vorrichtungen darin angeordnet sind, wobei über dem geschlossenen Raum (13) ein zylindrischer Körper (20) mit einem Gebläse und zugehörigem Feuerschutztor (22) angeordnet ist, und dass die Struktur (10) eine vorgefertigte modulare Struktur ist.

2. Überlebensmodul nach dem vorhergehenden Anspruch, **dadurch gekennzeichnet, dass** das Über-

lebensmodul an der Struktur (10) eine Videokamera (30) umfasst.

3. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Überlebensmodul ferner an der Struktur (10) einen analogen Rauchdetektor (31) umfasst.

4. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Überlebensmodul ferner einen Umgebungsüberwachungsdruckschalter (32) umfasst.

5. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Überlebensmodul ferner an der Struktur (10) einen asymmetrischen Projektor (40) umfasst.

6. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Überlebensmodul ferner an der Struktur (10) ein Audiokommunikationssystem (42) umfasst.

7. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Überlebensmodul ferner an der Struktur (10) ein Hitzdrahtdurchflussgerät (39) umfasst.

8. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Struktur (10) einen begehbaren Durchgang umfasst und in einem Tunnelabschlussrahmenwerk (15) untergebracht ist.

9. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Struktur (10) sowohl einen begehbaren als auch einen befahrbaren Verbindungsdurchgang umfasst und an eine Kammer gekuppelt ist, die Betonwände (16) definiert.

10. Überlebensmodul nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Kammer an einem Mittelabschnitt davon in der Nähe von für Durchfahrt öffnungsbereiten Türen angeordnet ist.

**Revendications**

1. Module de sauvetage pour tunnels doubles à sens unique (3, 4), ledit module de sauvetage comprenant, à l'intérieur d'un conduit de jonction à la fois accessible à pied et carrossable (2) destiné à joindre un tunnel double (3, 4), une chambre (1) comprenant, au niveau de ses parties d'extrémité, une structure d'accès (10) préfabriquée munie d'une porte d'entrée (11) et d'une porte de sortie (12), **caractérisé en ce que** lesdites portes d'entrée et de sortie sont agencées de manière à être adjacentes à un espace fermé (13) destiné à stocker, à l'intérieur de celui-ci, un appareil électrique, au-dessus dudit espace fermé (13) un corps cylindrique (20) incluant un ventilateur et une porte coupe-feu associée (22) étant agencée, et **en ce que** ladite structure (10) est une structure modulaire préfabriquée.

2. Module de sauvetage, selon la revendication précédente, **caractérisé en ce que** ledit module de sauvetage comprend, au niveau de ladite structure (10) une caméra vidéo (30).

3. Module de sauvetage, selon les revendications précédentes, **caractérisé en ce que** ledit module de sauvetage comprend en outre, au niveau de ladite structure (10) un détecteur de fumées analogique (31).

4. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit module de sauvetage comprend en outre un pressostat de surveillance de l'environnement (32).

5. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit module de sauvetage comprend, au niveau de ladite structure (10), un projecteur asymétrique (40).

6. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit module de sauvetage comprend, au niveau de ladite structure (10) un système de communication audio (42).

7. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ledit module de sauvetage comprend, au niveau de ladite structure (10), un débitmètre à fil chaud (39).

8. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite structure (10) comprend un conduit accessible à pied et est abritée dans une ossature (15) fermant le tunnel.

9. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite structure (10) comprend un conduit de jonction à la fois accessible à pied et carrossable et est couplée à des murs en béton (16) définissant une chambre.

10. Module de sauvetage, selon une ou plusieurs des revendications précédentes, **caractérisé en ce que** ladite chambre est agencée, dans une partie médiane de celui-ci, près de portes ouvrantes sur un pas-

sage carrossable.

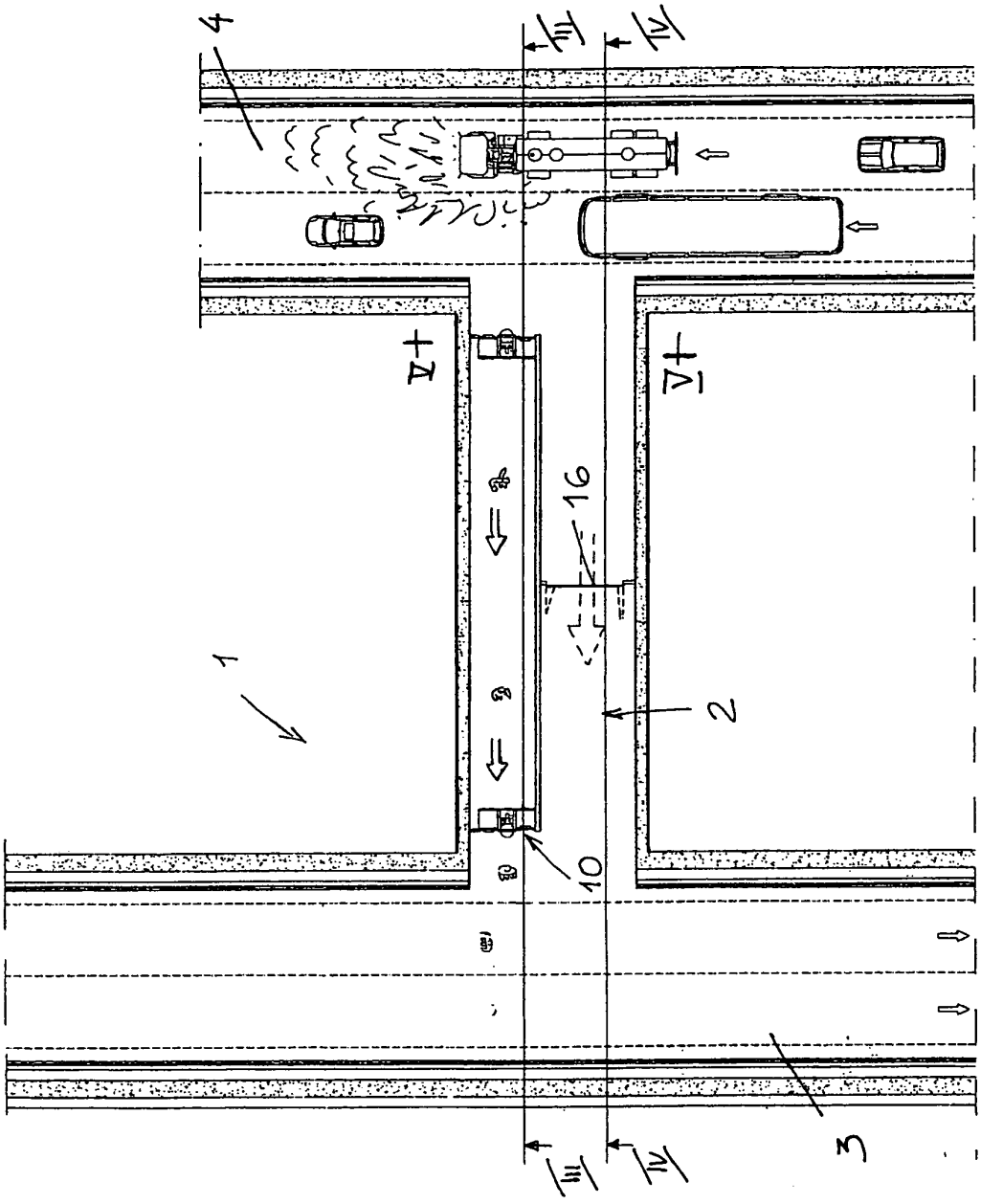


FIG. 1

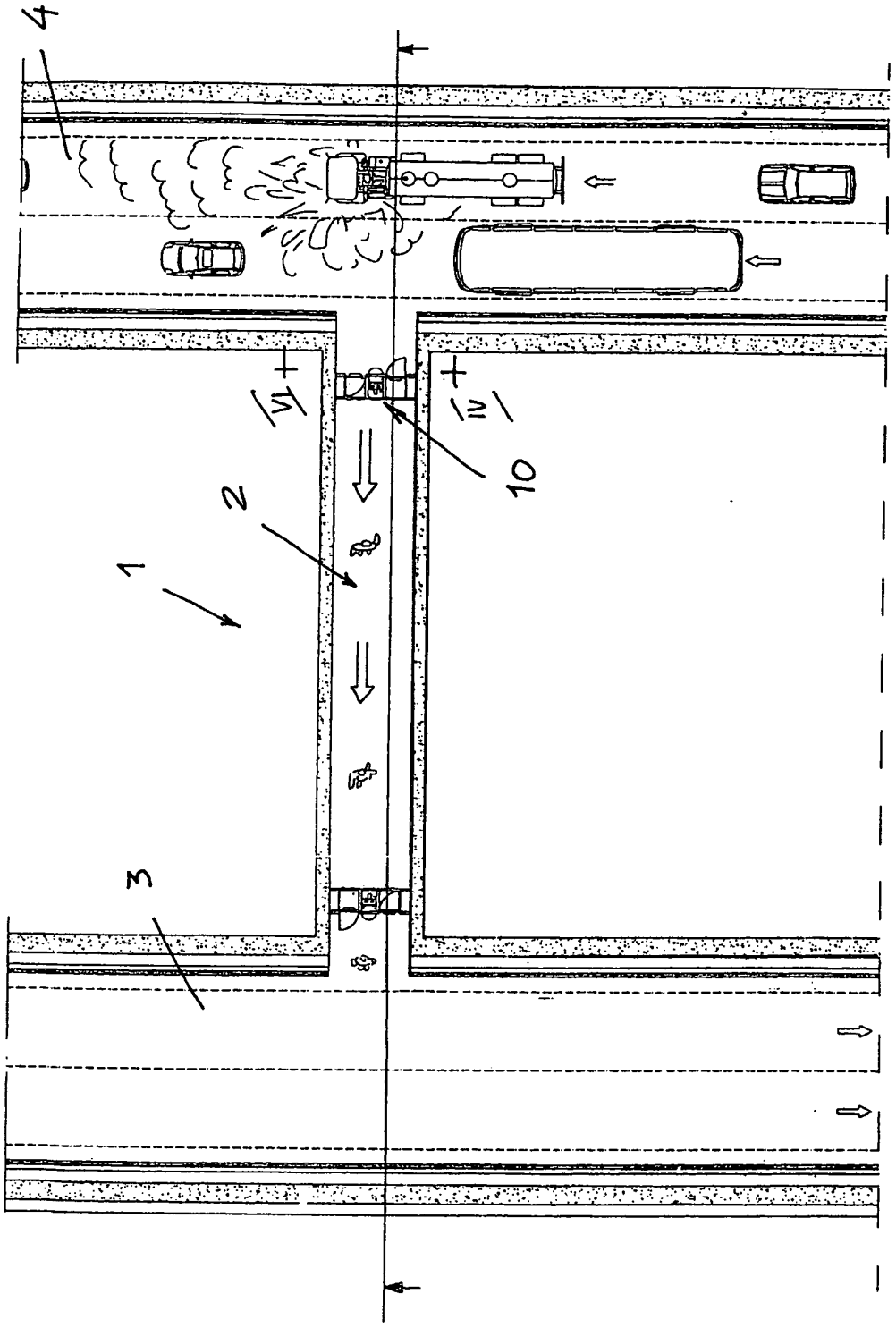


FIG. 2

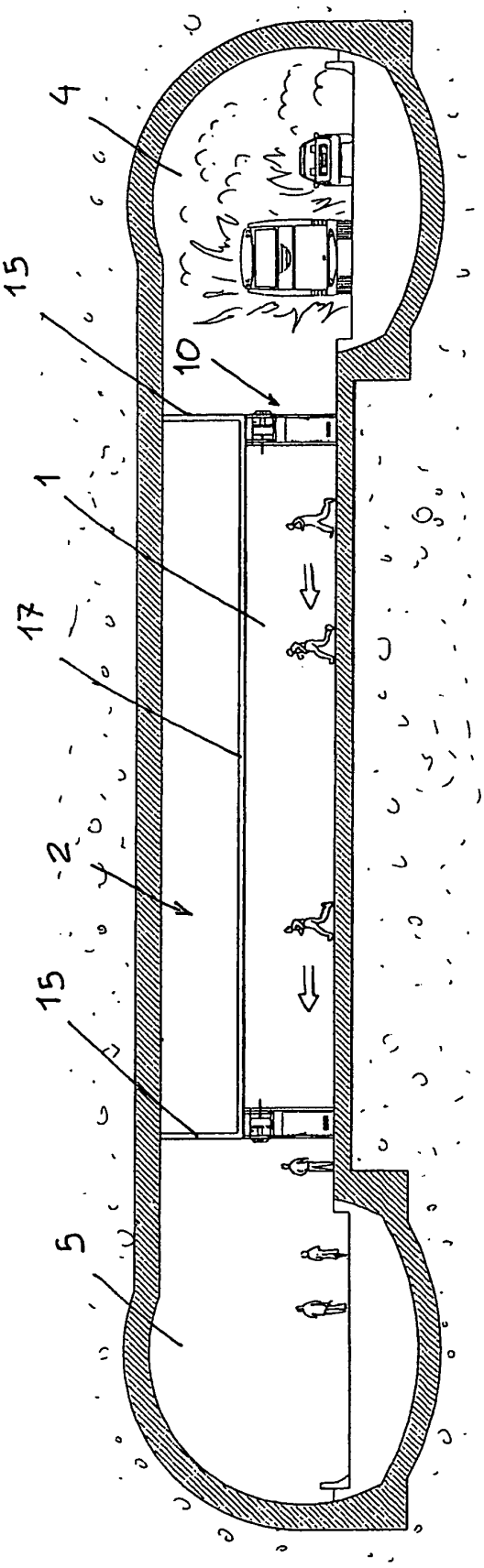


FIG. 3

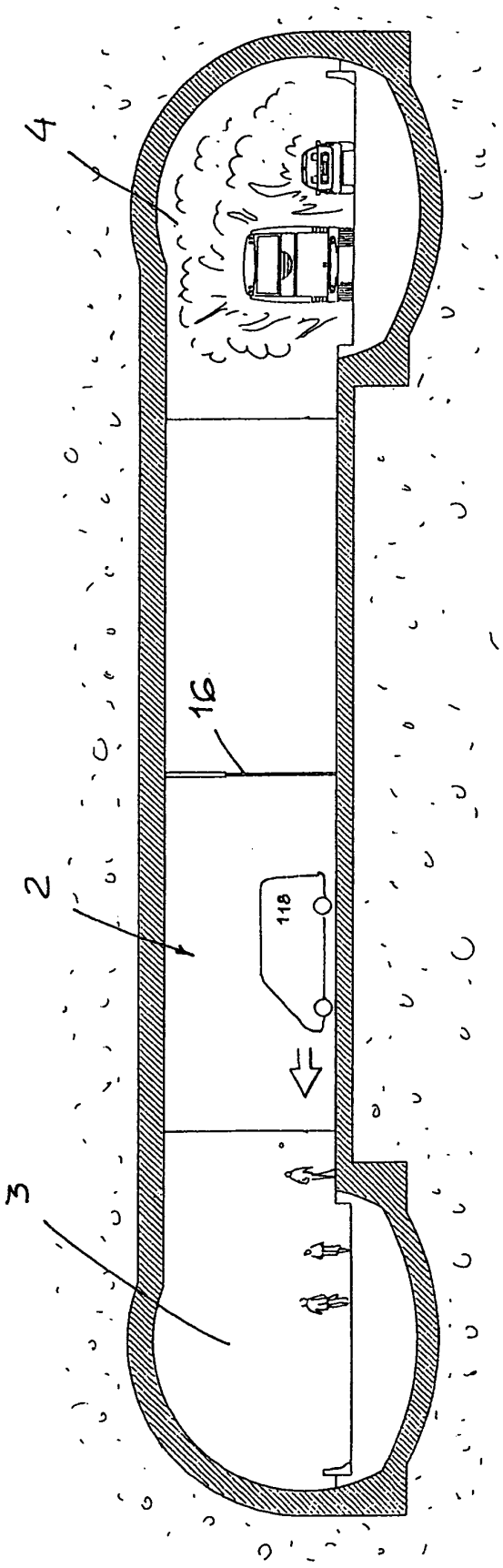


FIG. 4

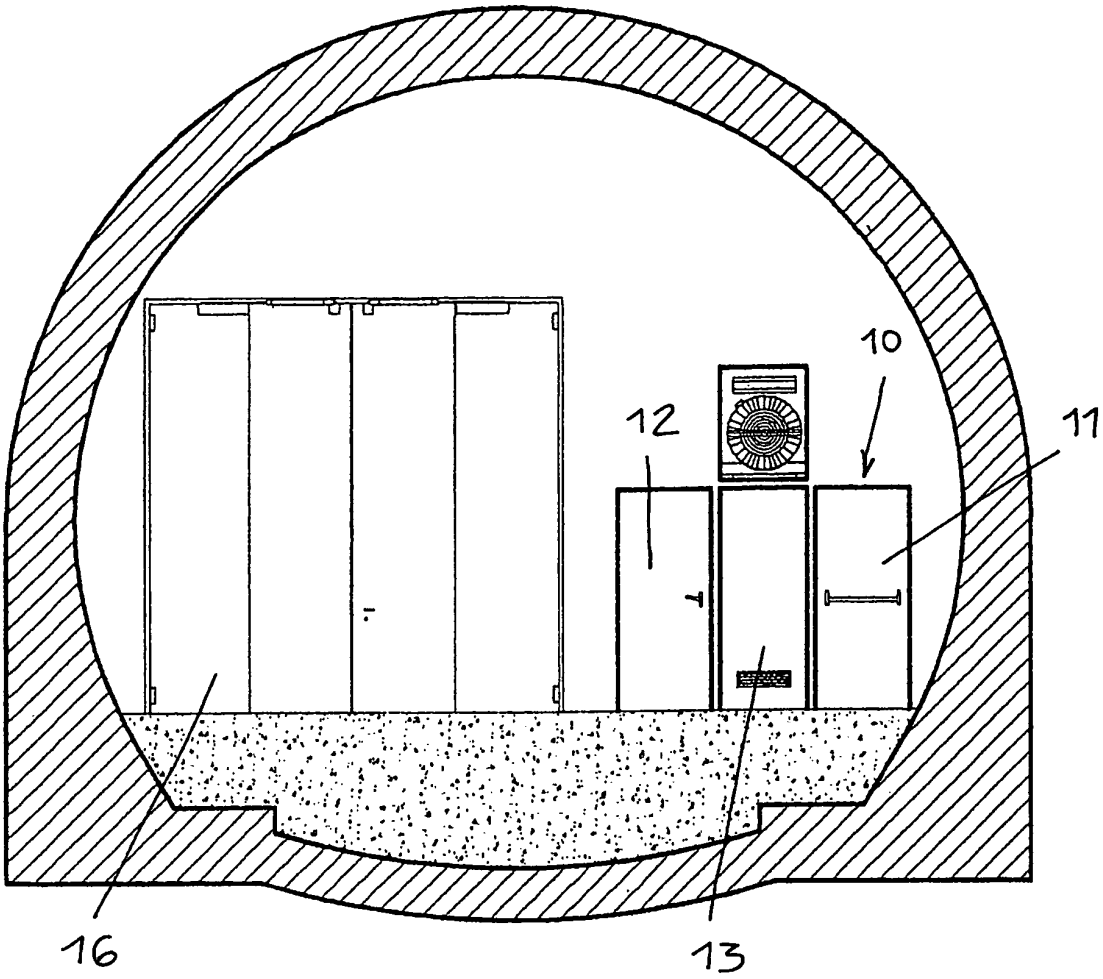


FIG. 5

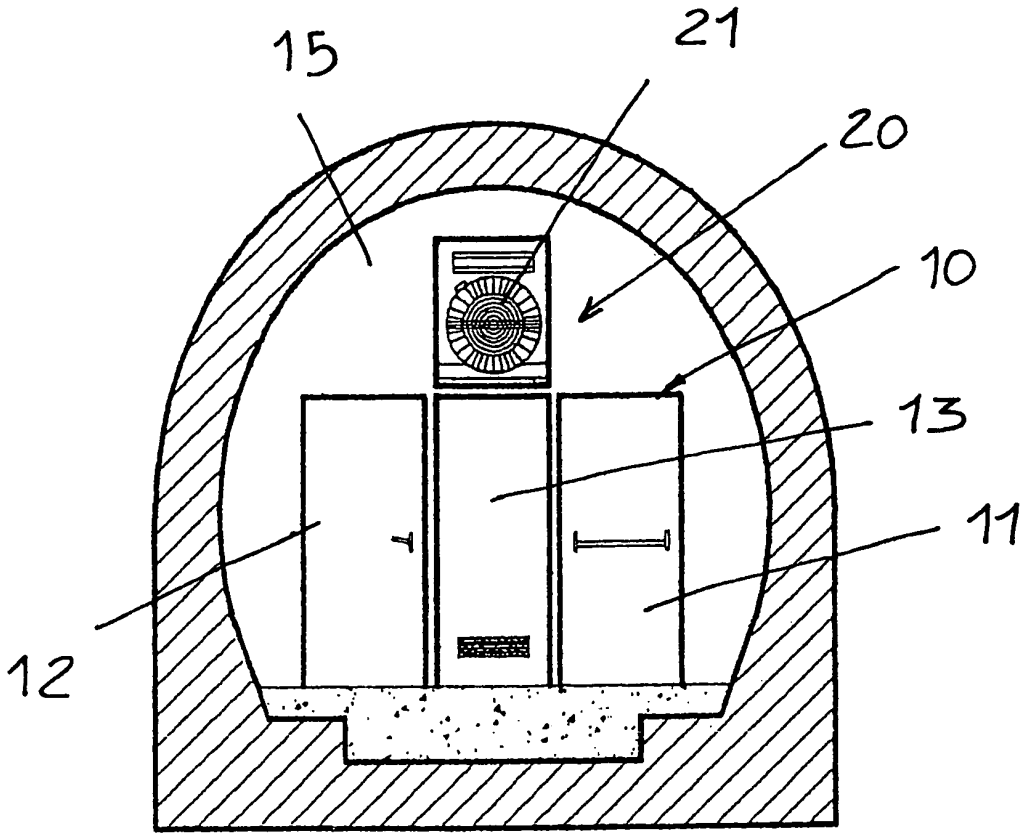


FIG. 6

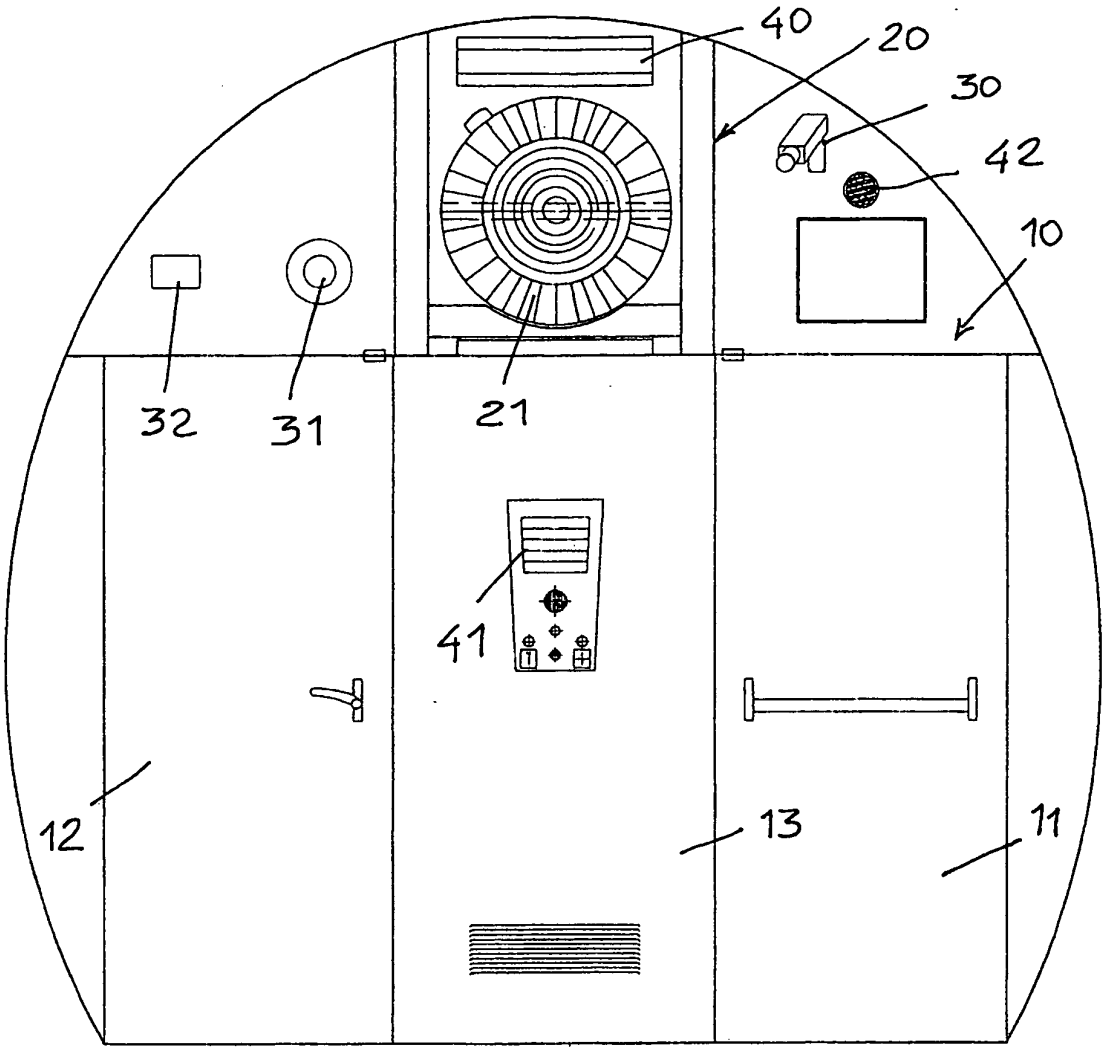


FIG. 7

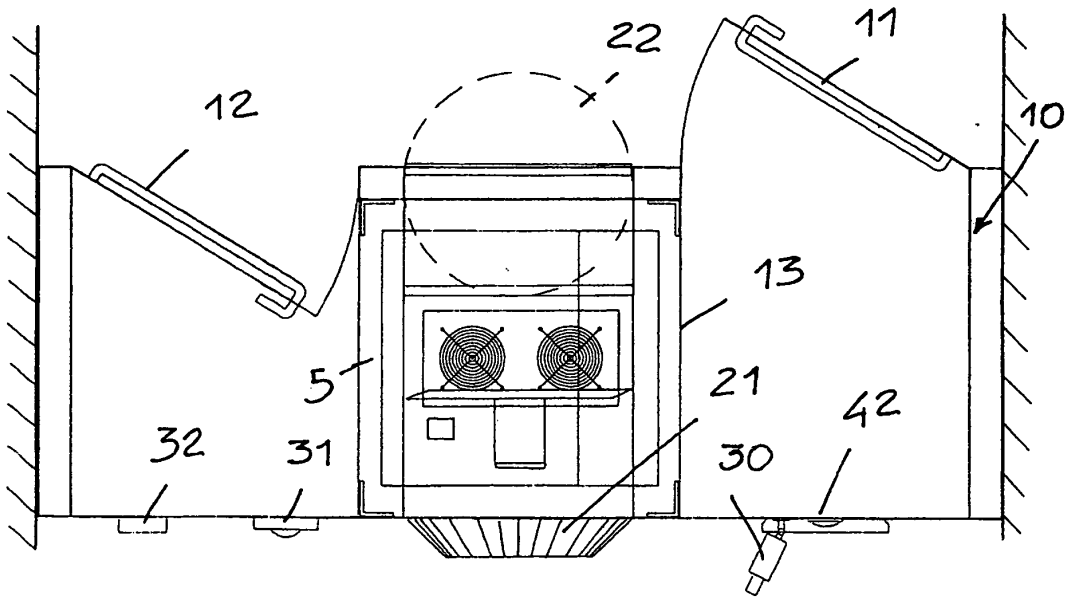


FIG. 8

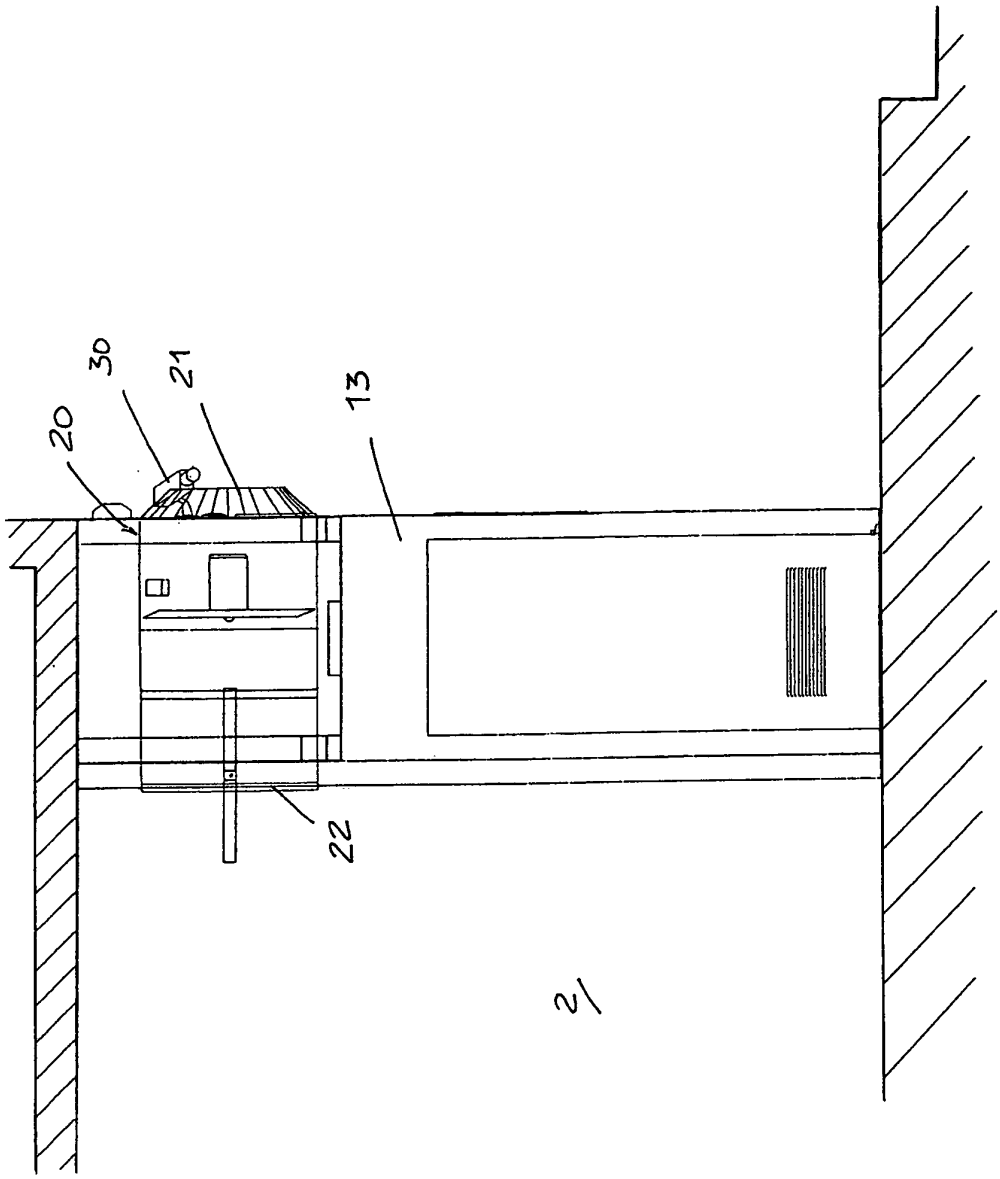


FIG. 9

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- KR 20090007769 **[0003]**