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(71) Applicant: **APOD Technologies OÜ**

13619 Punane tn 6-219 (EE)

(72) Inventor: **MRGOLE, Gregor**

1360 Vrhnika (SI)

(74) Representative: **Müller Hoffmann & Partner**

Patentanwälte mbB

St.-Martin-Strasse 58

81541 München (DE)

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(54) **ADAPTABLE MULTIFUNCTIONAL MODULE FOR PUBLIC AREAS**

(57) An adaptable multifunctional module (1) that it is formed as a stand-alone enclosed structure with a door (2), inside which an adjustable chair, lighting, a baggage storage room, an adjustable work bench and the like can be found, wherein the module (1) has a payment system, a system for monitoring of living conditions such as temperature, humidity, airborne oxygen content, ventilation system, with at least one sensor selected out of the group

of sensors for detecting the amount of CO₂, O₂, temperature, humidity, movement, smoke, weight and heart rate, and a disinfection system. The entire module function is controlled by a control device that monitors the booking, payment and use of the module, regulates the conditions inside the module, and activates the alarm in case of problems.

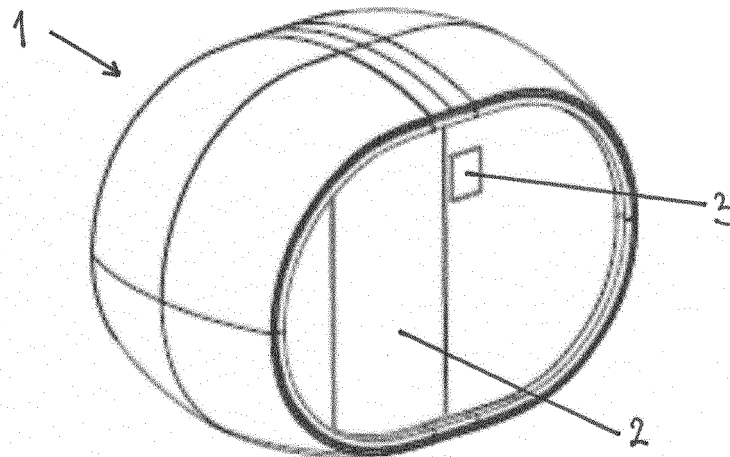


Figure 1

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Description

[0001] The invention belongs to the area of buildings or structures for special purposes, more precisely to the area of small structures for the limited residence of a limited number of persons, such as enclosed waiting rooms. The invention also touches upon the area of furniture, especially furniture for a specific purpose, as well as the area of signaling devices. The subject of the invention is an adaptable multifunctional module for public areas.

[0002] Public spaces, especially airports, train and bus stations, are often packed with visitors and heavily crowded areas where it is difficult to find a quiet place for work, rest and/or relaxation. The waiting rooms of airports and stations are noisy, the chairs are fixed, and the comfort is minimal. That is why individual solutions for various problems began to appear, such as massage chairs, chairs with variable backrests and chairs that can be covered, thereby at least partially isolating the person sitting on the chair from the environment.

[0003] An example is JP 2006/061309 A describing a seat having a cover in the rear of the seat, whereby the cover can be pulled out of a storage position over the head of a user sitting on the seat. Between the seat, i.e. the user on the seat, and the headgear there is a space enabling air to circulate, however, that does not eliminate the noise in the lobby.

[0004] WO 2013/030431 A1 describes an improvement of the above-mentioned partially covered chair which can be installed in public spaces and which includes a seating part and a backrest with adjustable incline. After paying the rental of the seat, the backrest becomes movable and the seat turns into a recliner, while also activating the movement of the cover which enables covering of the entire chair. The chair also has a control unit that checks the execution of the payment and the movement of the backrest and the cover. In a section under a table it is also possible to store luggage. This chair also has a limited space in which it is impossible to work, especially when the chair is not in the recliner position. Also, the control unit of the chair is limited in its functions.

[0005] These examples are useful but do not provide a quiet and comfortable space for work or rest. The technical problem solved by the present invention is therefore the design of an independent structure that will allow the placement in various public areas and will provide a spacious and peaceful environment for at least one person. In particular, the invention must guarantee the safety of the user.

[0006] Utility models CN 202 658 919 U and CN 202 645 056 U describe a resting unit that can be installed in waiting rooms of bus or train stations and airports, wherein the unit interior stores at least one bed or recliner for one or more users. This solution is suitable for several people but does not offer privacy or more features.

[0007] DE 10 2004 052 133 A1 describes a module for

waiting areas at the airport and train stations which includes a wall that closes an interior space, a door, a sitting part or a bed in the interior, and a drive unit for the movement of the door and beds. Entry into the module is possible when the door is in the open position and the seat is in an upright position. The depth of the module is smaller than its height and width.

[0008] WO 2011/135114 A1 describes a module that includes a housing, a flexible chair, lighting, audio equipment, a luggage and clothing section, telecommunication equipment as well as a payment mechanism. The housing has a movable roof and a monitor on the front and can be installed in any waiting room, such as airport lounges. The module isolates the user from the environment, thus enabling him/her to work or rest without disturbance.

[0009] Although the two solutions provide a quiet space, the module functions are limited, thereby diminishing the user's convenience. The present invention differs from the known state of the art in that it provides a greater number of module functions, greater flexibility and thus user convenience. At the same time, it also ensures high user safety.

[0010] An according adaptable multifunctional module may be designed as a stand-alone closed construction with a door, inside which an adjustable chair, lighting, a luggage storage, an adjustable work bench and the like can be found, wherein the module includes:

- a payment system on the basis of which the module can be used,
- a system for monitoring living conditions such as temperature, humidity, oxygen content in the air,
- a ventilation system,
- at least one sensor selected from the group of sensors for detecting the amount of CO₂, O₂, temperature, humidity, movement, smoke, weight and heart rate, and
- a disinfecting system, preferably based on a lighting, such as LEDs or a halogen UV lamp, that emits light of a given wavelength intended to destroy or inactivate viruses and/or bacteria;

wherein the entire module operation is controlled by a control device comprising an algorithm capable of performing at least the following functions:

- monitoring of booking, payment and use of the module,
- control of the opening and closing of the door,
- regulating the temperature and humidity as well as the air flow inside the module,
- regulating the level of oxygen inside the module through communication with the ventilation system,
- and control of an alarm that will be triggered if at least one problem is detected, such as too much CO₂ or too little O₂, too high temperature, in case the user's heartbeat stops, if smoke appears etc., and in con-

nection with the alarm the door will automatically open.

[0011] The door is equipped with a lock which operates in a way similar to a hotel room lock, but it can be opened without a card. The door is opened with an electronically controlled electric motor installed at the door and controlled by the control unit and/or through a mobile application. The control device has a preferential connection with a touch screen or an electronic pad inside the module, so that during use a mobile application can be connected to it.

[0012] The control unit is preferentially in direct communication with a cloud platform created with an appropriate computer server where all the module information, conditions, operation, reservations, user profiles, etc. are collected. The server also has multimedia contents that can be accessed if the module is additionally equipped with a multimedia system, preferentially comprising a display, speakers and/or similar audio and video players. Via a control unit, it can be connected to the cloud platform where the desired multimedia content for playback is selected.

[0013] With the help of temperature, humidity, oxygen and carbon dioxide sensors, the conditions in the module are regulated. The positions of the sensors are preferably as follows:

- the temperature sensor is situated below the table, near an inlet intended for air injection;
- the O₂ sensor is at an exhaust air fan; and
- the CO₂ sensor is at a blown air fan, as this gives precise information about the quality of air inside the module.

[0014] Alternatively, all sensors may be arranged at the same position, e.g. in a common housing. The sensors may be arranged above a suspended ceiling and may be provided with outlet air fans.

[0015] The conditions in the module can be adjusted via the communication interface with the control device; preferentially, this interface is a multimedia system that also allows the use of the module (reservation and/or payment of use). The interface is preferentially connected to an application on the telephone and a control device that controls the module. The application can send a signal to the control unit that adjusts the conditions in the module according to the data entered. Sensors read different values and then adjust the supply of fresh air. If there is too much CO₂ or moisture, ventilation is activated more intensively, and excess carbon dioxide is removed. Ventilation is carried out in such a way that there are two fans on the edge of the module - one for inlet and the other for exhaust air. By regulating these, the exact amount of air entering and leaving the module can be controlled. The air supplied through the air-conditioning system is heated/cooled before it enters the room and dehumidified if necessary. The module temperature is

controlled by the air conditioner based on data received from the sensors and based on the wishes of the users input via the interface which are then converted by the control device into a command for the air conditioner to increase or decrease the temperature.

[0016] In addition, to secure a better sense of comfort, the module also includes the possibility of dimming the room, sound insulation, ionization with ionizer, anti-stress programs with massage, aromatherapy and color therapy, as well as measuring the level of stress of the person who uses the capsule. By doing this, the user can set the chair position, turn lights on/off, adjust the fan (ventilation) speed, set the desired temperature, turn on/off the TV or audio system, etc., via the interface or application. The module is preferentially equipped with an emergency call button, in case of problems with the capsule or user problem.

[0017] Preferably, the adaptable multifunctional module can memorize individual settings for the user, insofar as they are stored in the multimedia system.

[0018] In addition, according to the invention the module can also include various electrical connections for charging various devices, USB ports, internet connection and multimedia equipment for watching TV programs, listening to music or playing computer games, as well as a communication device to talk to a technical team in case of module problems.

[0019] A module user communicates via a mobile application or a similar system. Preferably, a mobile application is used which sends data to the control unit via wireless signals. The application allows at least the following actions:

- reservation and/or payment of module rental,
- adapting the conditions in the module,
- saving the desired settings.

[0020] Additionally, the application may provide a full time available error reporting chat and/or the possibility to order goods and services from nearby shops/restaurants/bars. Each application is part of a cloud that collects user account information, payments, desired conditions in the module, etc. For communication between the mobile application and the control unit, user registration is required through the appropriate protocol. After registration, the user can access the data about the location and on the occupancy of modules, reservations, etc. When a user is in the module, he/she can control the conditions via the application, which is only possible during the time of the module use. In the period before or after use, access to the control unit via the mobile application is disabled by the proper programming of the application.

[0021] The procedure for using the adaptable multifunctional module is as follows:

- booking a module for a selected period at a selected location via a mobile application, or directly at the module;

- choice of payment method or carrying out the payment;
- unlocking and opening of the module door on the basis of payment;
- closing the door of the module after the user enters;
- facilitating the adjustment of conditions in the module;
- possible storage of information about the desired conditions in the module;
- monitoring the sensor data in the module;
- possible adjustment of conditions in the module via a control unit, such as the amount of oxygen in the room and the air flow;
- after the time has elapsed, the doors are automatically unlocked and opened, and the adjustment of the conditions in the module is disabled.

[0022] After use, the module itself is cleaned through a ventilation system with filters, disinfection lights and the like, but a cleaning team can also come and prepare the module for the next users.

[0023] The adaptable multifunctional module for public spaces according to the invention will be described hereinafter by means of implementation examples and images illustrating:

- Figure 1 A side view of the front of the module
 Figure 2 A module with a chair in a sitting position
 Figure 3 The module of Figure 2 with the chair in the lying position
 Figure 4 A possible arrangement of elements inside the module
 Figure 5 A possible arrangement of the elements inside the module from the perspective of the user sitting on the chair
 Figure 6 An exploded-view of the elements in the module and of the ventilation system

[0024] It should be noted that the following description is only exemplary and that the present invention is only defined by the claims.

[0025] As shown in Fig. 1 the multifunctional module 1 may be formed as an oval having a front door 2 and a multimedia interface 3 which allows for the use and payment of the module and for setting certain parameters such as the duration of the hire/use of the module and the like. The doors are preferably made of a material that can be blurred or dimmed when pressed but may also be made of glass with a possibility of covering in any known manner. Doors must enable manual and automatic locking and unlocking as well as manual opening and closing from the inside. Automatic door unlocking and opening is especially important in emergency cases, but it is also desirable at the end of the paid time of use/rental. Automatic locking and unlocking is preferably carried out automatically, except in two cases, namely:

- if the user presses an emergency button on the in-

side; and

- in case the sensors detect a fire in the unit itself.

[0026] In both cases, the module automatically switches off the power, enabling manual opening of the doors, while at the same time an emergency signal is immediately sent to the relevant emergency services.

[0027] Other walls of the module can come with or without windows, but preferably the module has one window on the side opposite to the door.

[0028] Wherever on an arbitrary location on the outer surface, the module may have at least one occupancy indicator (not shown in the images) which is preferably executed as a LED strip that can, for example, be lit red for 'Busy' and green or blue for 'Free.' The occupancy indicators can be several and their performance may vary. For example, on one side an indicator light can be positioned, while on other sides LED strips can be situated.

[0029] Figures 2 to 6 illustrate the module interior with one window 4 which can be dimmed or blurred, by which a movable table 6 and a chair 5, the positions of which can be adjusted, are positioned. The chair 5 preferably allows seating (Figure 2) as well as sleeping and resting positions (Figure 3), the latter being the so-called "zero gravity" position in which the forces on the human body are the smallest. The chair 5 is electronically adjustable via a system with a control unit, but also via a multimedia interface 3. The control unit can control the operation of three motors that define the positions within the chair. Preferably, a heart rate monitor for measuring the heart-beat of the user is built in the chair 5. As shown in Figure 6, the ceiling 11 with a light 112, the luminance and position of which can be adjusted via the control unit or the multimedia interface 3, can be lowered over the table 6 and/or above the chair 5. The light 112 may also provide chromotherapy. At the same time, at least one disinfecting light is installed on the ceiling, preferably built into it. It operates when the module is not occupied, in order to destroy viruses and bacteria before the next use. Lights operate by activating porphyrin molecules with their wavelengths, whereby reactive oxygen compounds are produced in microorganisms that damage cells and lead to the cellular death of microorganisms. Further, at table 6, charging ports as well as USB ports are provided in a supporting section 8 of the table 6.

[0030] Figure 5 shows the interior of the module 1 from the perspective of a user sitting on the chair 5. On the side wall, a screen 10 connected to the control device and multimedia device 3 is installed, that can play or display various contents. Below the screen is a bench 81 on which baggage or other objects can be deposited. The bench 81 can be formed as the end of the supporting section 8.

[0031] Figure 6 is an exploded-view of some elements in the module 1 and of the ventilation system. Ventilation of the module 1 consists of two fans, namely an exhaust air fan 111 and an air injection fan 822, as well as ade-

quate air inlet and discharge lines. The supply air fan is located in the cassette 82 with electronic devices which is part of the supporting section 8, whereby the fan 822 blows the supply air under the chair, thus preventing the blowing of air straight onto the user of the module 1. The air intake is carried out at the sides of the module 1 (not shown in figures). The outlet air fan 822 is mounted on the ceiling and blows air from the module. The ventilation system of the module also includes an air conditioning device 821 which is positioned in the cassette 82 together with electronics and is directly connected to the supply air duct. Due to ventilation, the inlet air is entering the module 1 at that spot and the air conditioning 821 then cools or heats it according to the needs and settings.

Claims

1. An adaptable multifunctional module (1) for use in public areas that is formed as a stand-alone construction with a door (2) and inside which at least one of an adjustable chair (5), a light (112), a baggage storage room, and an adjustable work bench (81) is located, wherein the module (1) comprises additionally:

- a payment system on the basis of which the module can be used;
- a system for monitoring living conditions, in particular one of temperature, humidity, and oxygen content in the air;
- a ventilation system;
- at least one sensor selected from a group of sensors for detecting an amount of CO₂, O₂, temperature, humidity, movement, smoke, weight or a heart rate; and
- a disinfection system that is preferably based on a lighting that emits light of a given wavelength to inactivate viruses and/or bacteria;

wherein the entire module function is controlled by a control device which is configured to:

- monitor booking, payment and use of the module (1),
- control the opening and closing of the door (2),
- regulate the temperature and humidity and the air flow inside the module (1),
- regulate the level of oxygen inside the module (1) through communication with the ventilation system, and
- control an alarm that will be triggered if at least one problem is detected, such as too much CO₂ or too little O₂, too high temperature, if the user's heartbeat stops, in case of smoke or similar, and in connection with the alarm the door (2) will automatically open.

2. The adaptable multifunctional module (1) according to claim 1, wherein the ventilation system is composed of two fans (111, 822), the corresponding air supply and discharge lines and an air conditioner (821).

3. The adaptable multifunctional module according to claim 2, wherein

San supply air fan (821) is installed in a cassette (82) with electronic devices; the supply air is provided under the chair (5); that the air intake is carried out at the sides of the module (1); the exhaust air fan (111) is mounted on the ceiling and is blowing air from the module (1); the air conditioner (821) is positioned in the electronics cassette (82) and is directly connected to a supply air duct, whereby supply air is cooled or heated by the air conditioning system (821) according to the needs and the settings.

4. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein the door (2) is provided with a lock that can be opened without a card, and the door is opened by an electronically controlled electric motor mounted at the door, while the opening and closing and locking are controlled by the control unit.

5. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein the positions of the sensors are preferably the following:

- the temperature sensor is arranged below the table (6), near an air inlet line;
- the O₂ sensor is arranged in the exhaust air fan (111); and
- the CO₂ sensor is located at the exhaust air fan (111), as this gives precise information about the quality of the air inside the module.

6. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein the module can additionally also include one or more of the following components:

equipment for dimming the room, sound insulation, ionization with ionizer, aromatherapy and color therapy, equipment for measuring the level of stress of the person who uses the module, an emergency call button if there are problems with the module (1) or in case of user's distress, electrical connections for charging various devices, USB ports, an Internet connection and multimedia equipment for watching television programs, listening to music or playing computer games,

a communication device for communication with the technical team in case of problems with the module (1), or any combination of the mentioned.

7. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein the control device is configured to have a preferential connection with a touch screen or epad inside the module. 5 10
8. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein the user can communicate with the module (1) via a mobile application which enables at least the following actions: 15
- reservation and/or payment for module (1) rental,
 - adapting the conditions in the module (1), 20
 - saving the desired settings;

wherein each application being part of a cloud in which information comprising at least one of a user account, payments, and desired conditions in the module are collected. 25

9. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein when the user is present in the module, it can be connected to the control unit and can adjust the chair position, turn the lights on/off, adjust the ventilation speed, set the desired temperature, turn TV or a gaming system on/off, whereby the module (1) can memorize the individual settings for the user, insofar as they are stored in a multimedia system connected to the control device. 30 35
10. The adaptable multifunctional module (1), according to any one of the preceding claims, wherein the disinfection system only operates when the module (1) is not occupied. 40
11. A method of using the adaptable multifunctional module (1) according to any one of the preceding claims, wherein the method comprises the following steps: 45
- booking the module (1) for a selected period at a selected location via a mobile application, or directly at the module (1); 50
 - choosing the method of payment or carrying out the payment;
 - unlocking and opening of the module (1) door on the basis of payment; 55
 - closing the door of the module (1) after the user enters;
 - allowing for the conditions in the module (1) to

be adjusted;

- possible storage of information on the desired conditions in the module (1);
- monitoring of sensor data in the module (1);
- possible adjustment of conditions in the module (1) via the control unit, such as the amount of oxygen in the room and the air flow;
- after the time has elapsed, the doors are automatically unlocked and opened, and the adjustment of the conditions in the module (1) is disabled,
- cleaning the module (1) through the ventilation system with filters and disinfecting lights.

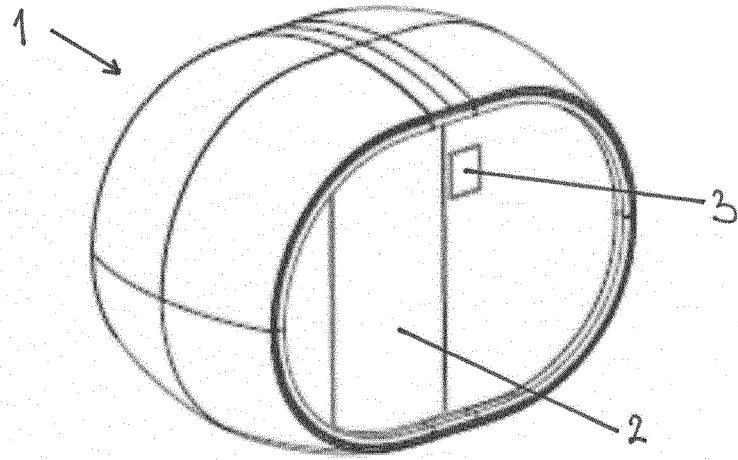


Figure 1

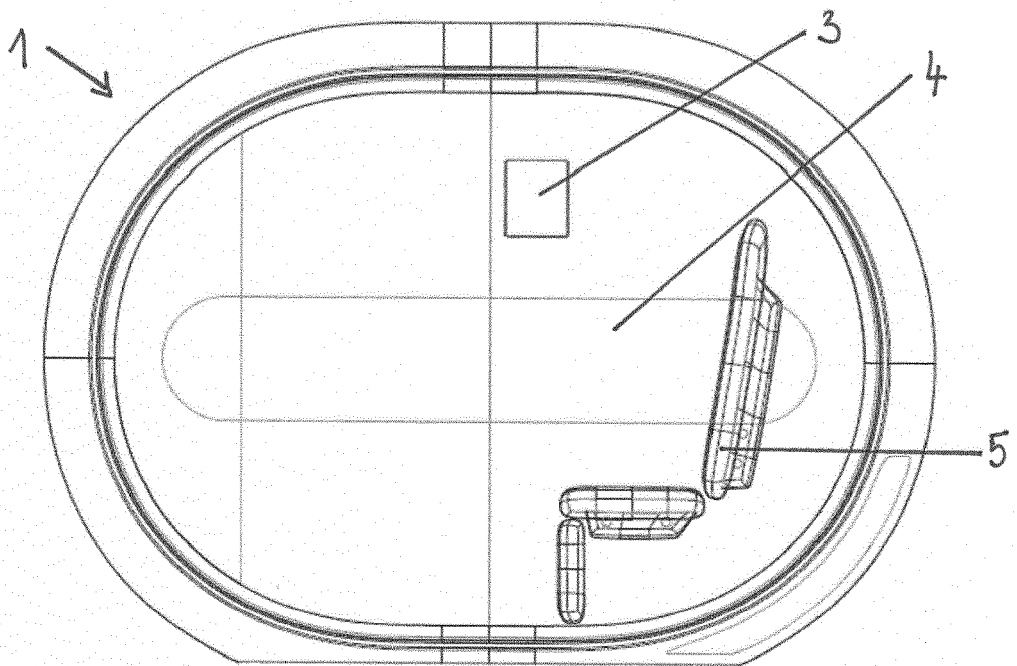


Figure 2

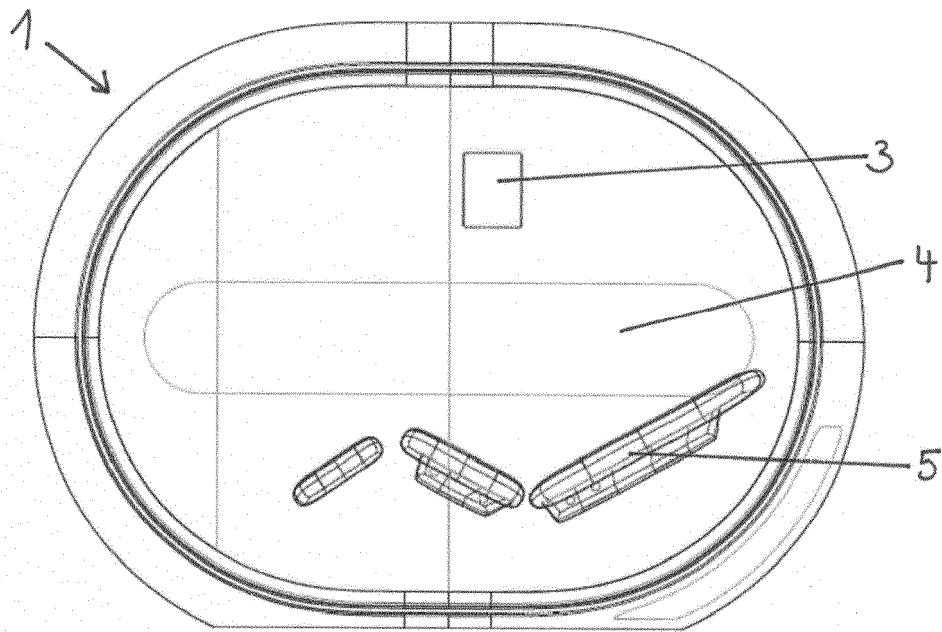


Figure 3

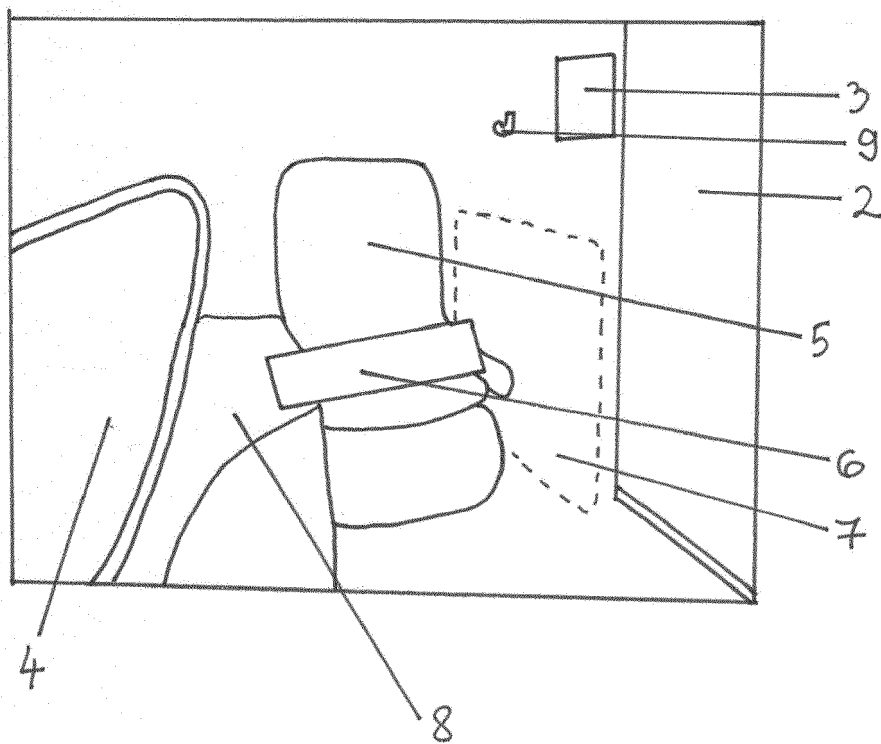


Figure 4

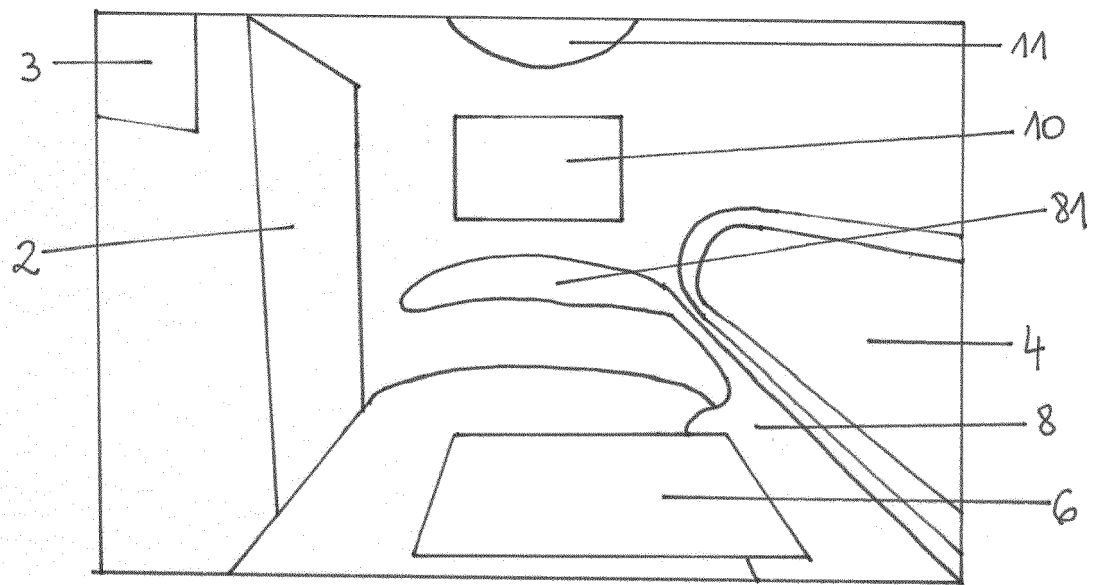


Figure 5

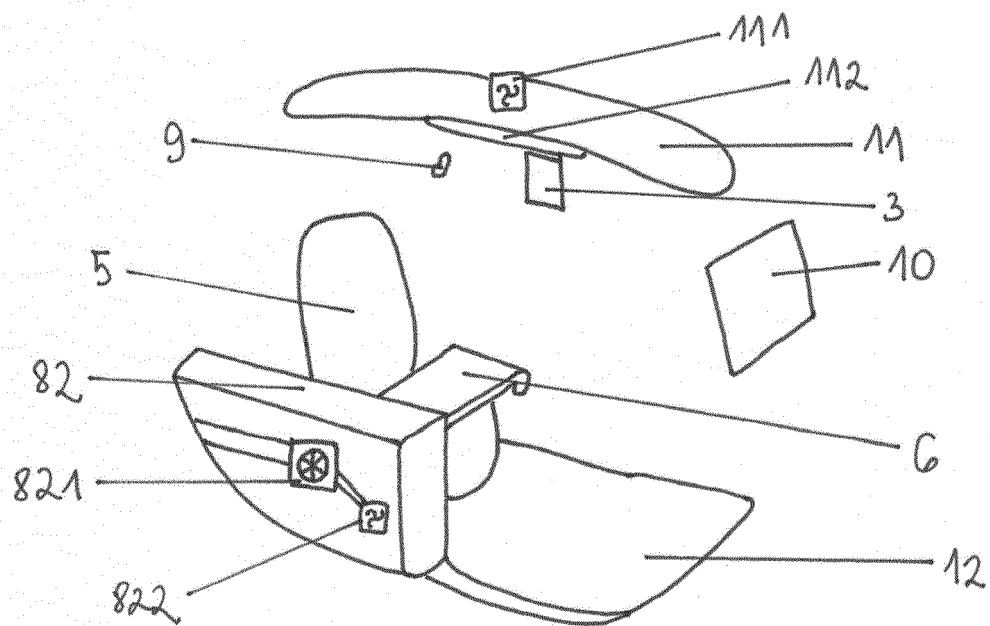


Figure 6



EUROPEAN SEARCH REPORT

Application Number
EP 20 16 8680

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 9 June 2020	Examiner Pössinger, Tobias
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