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(54) **VENTILATABLE STRUCTURE THAT ENCLOSES AN EXTERIOR SPACE**

(57) A structure (1) that encloses an exterior space comprises supporting elements (2A, 2B), wall elements (3A, 3B, 3C, 3D), and a roof structure (4). The roof structure (4) consists at least partly of rotatable slats (5), which may be rotated between a closed position in which the rotatable slats (5) form a closing surface for the exterior space, and an open position in which the exterior space

is ventilated via the rotatable slats (5). A control unit (6) that controls the rotatable slats (5) is coupled to a carbon dioxide meter (7), abbreviated to CO₂ meter, and is configured to control at least some of the rotatable slats (5A) on the basis of a carbon dioxide measurement, abbreviated to CO₂ measurement, received from the CO₂ meter (7).

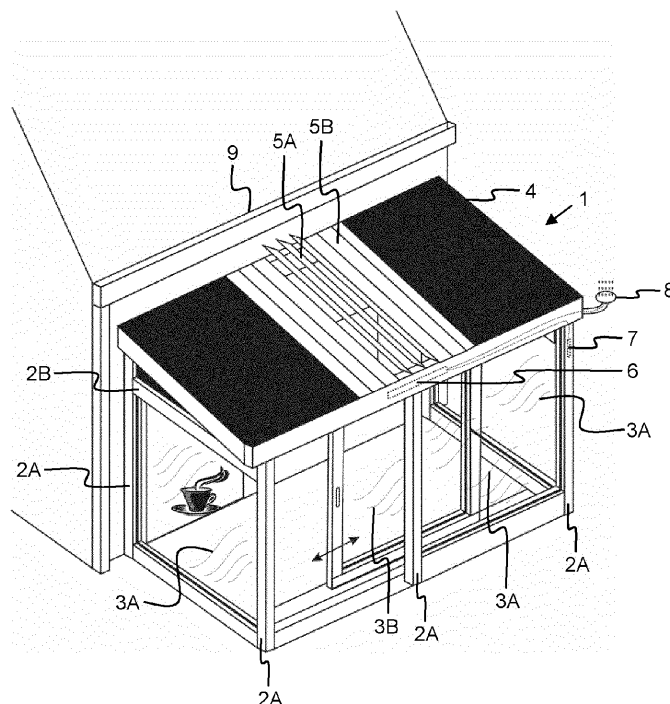


Fig. 4

Description

Technical field

[0001] The present invention relates to a closed structure that encloses an exterior space. Examples of this are a pergola, a veranda, a winter garden, a pool house, an outdoor office, etc. The invention relates in particular to said closed structure with improved ventilation.

Prior art

[0002] A closed structure that encloses an exterior space typically comprises a number of supporting elements: columns or vertical supporting elements, and beams or horizontal supporting elements. These supporting elements are made for example of steel or wood. A detached closed structure with a rectangular base comprises for example four columns (which are placed at the corners) and four beams (at a height between the columns or lying on the columns). For a closed structure built onto an existing building with a rectangular base, two columns and three beams (a front beam and two side beams) may be sufficient, because the facade or other parts of the existing building may perform a supporting function for said closed structure as an extension. The closed structure further comprises a roof structure that is supported by the supporting elements, either the supporting elements that are part of the structure, or the supporting elements of the building against which the closed structure is built. The closed structure is finally closed by walls between the supporting elements. These walls generally have no supporting function. They are made for example of glass, wood, plastic, aluminium, cloth, etc., and comprise opaque wall elements, windows, doors, sliding doors, etc.

[0003] These closed structures that enclose an exterior space have become popular in recent years because there are a number of applications, such as extending an existing dwelling with a winter garden, a terrace extension in the catering sector, a pool house next to an open-air swimming pool, an outdoor office, a pergola, a veranda, etc. In general, these closed structures make it possible to create spaces in which the users are protected from unpleasant weather conditions such as rain, snow, wind, direct sunlight, etc., yet they enjoy the experience of a light-filled exterior space.

[0004] European patent application EP 2 853 647 A1 titled "Swivel roof tile for structures of the type of roofs, pergolas, platform shelters and the like and corresponding roof, pergola, platform shelter and the like" describes a pergola (2 in Fig. 1) with supporting columns (3 in Fig. 1) and a roof that consists of rotatable slats (1 in Fig. 1) that are coplanar in the closed position. The slats can be heated by heating elements (9 in Fig. 1) so that the structure can withstand heavy snowfall. There is no mention of ventilation in EP 2 853 647 A1.

[0005] European patent application EP 3 450 640 A1

titled "Wintergarten mit Lüftungselement" [Winter garden with ventilating element] describes a closed winter garden that consists of supporting elements (vertical columns 5 and horizontal supporting beams 4 in Fig. 1), a roof structure (3 in Fig. 1) and walls (6, 6', 6" in Fig. 1). The winter garden further comprises a ventilating element (8 in Fig. 1). The ventilating element comprises one or more rotatable "slats", which either form part of a wall (a vertical slat such as 8 in Fig. 1), or form part of the roof structure (see [0020] and [0024]). EP 3 450 640 A1 addresses the problem of safety and describes the dimensioning of the slat so that burglary is prevented while ventilation is taking place.

[0006] German patent application DE 10 2007 050 522 A1 titled "Bauelement für einen Wintergarten" [Constructional element for a winter garden] describes a closed winter garden that consists of supporting columns and beams (2, 3, 4 in Fig. 1), a roof structure (5, 6, 7 in Fig. 1) with ventilating element. Ventilation openings (10, 11 in Fig. 1) are provided in the profiles (3, 4) of the winter garden. The ventilation is controlled on the basis of a timer and a profile that specifies the desired temperature as a function of the time of day (see [0018]). The ventilation in DE 10 2007 050 522 A1 thus only aims to improve the thermal comfort for the users during the day.

[0007] There is generally a need for a closed structure that encloses an exterior space with improved, automatic ventilation so that better air quality can be guaranteed, particularly when the closed structure is used by a varied group of people, for example as a winter bar, closed terrace, cafeteria, etc., in the catering sector.

Summary of the invention

[0008] According to a first aspect, the invention relates to a structure that encloses an exterior space, comprising:

- supporting elements,
- wall elements between said supporting elements, and
- a roof structure supported by said supporting elements,

in which said roof structure consists at least partly of rotatable slats that can be rotated between a closed position in which said rotatable slats form a closing surface for said exterior space, and an open position in which said exterior space is ventilated via said rotatable slats,

in which said structure comprises a control unit that controls said rotatable slats, and

in which said control unit is coupled to a carbon dioxide meter, abbreviated to CO₂ meter, and is configured to control at least some of said rotatable slats on the basis of a carbon dioxide measurement, abbreviated to CO₂ measurement, received from said CO₂ meter.

[0009] The structure according to the present invention thus comprises a louvred roof or at least one section of the roof that consists of rotatable slats. Whereas rotatable slats in roof structures have until now been controlled as a function of location, and the orientation and position of the sun in order to control shade and incident sunlight as desired by the users, or in the best case have been controlled to optimize the thermal comfort of the users, in the structure according to the present invention the position of at least a number of rotatable slats will be controlled as a function of the measured CO₂ concentration. In this way, smart ventilation of the closed exterior space surrounded by the structure according to the present invention becomes possible, and the air quality in the enclosed exterior space is guaranteed at all times. Especially in applications such as the catering sector or events sector, where the closed exterior space is used by a large number of users simultaneously and/or in situations where the air quality must comply with certain legislation, it is important that a high CO₂ concentration is detected quickly and is quickly reversed by controlling the ventilation.

[0010] In embodiments of the structure according to the present invention defined in claim 2, said CO₂ meter is integrated in one of said supporting elements.

[0011] In alternative embodiments of the structure according to the present invention defined in claim 3, said CO₂ meter is integrated in said roof structure.

[0012] The CO₂ meter may thus form part of the structure or may be separate from it. An unattached CO₂ meter can transmit the measured CO₂ concentrations via a wireless link to the control unit. A CO₂ meter that forms part of the structure may for example be integrated in one of the supporting elements, for example in a vertical column or in a horizontal supporting beam. The CO₂ meter may also be integrated in the roof structure of which the slats form a part. An integrated CO₂ meter of this kind can transmit the measured CO₂ concentrations to the control unit via a wired connection, or may also be connected wirelessly to the control unit. When integrated in the structure, the CO₂ meter may also be supplied with electric current via the electrical supply that is in any case available for the motor of the rotatable slats.

[0013] In embodiments of the structure according to the present invention defined in claim 4, said control unit is configured to compare said CO₂ measurement with one or more threshold values, and to control said rotatable slats from said closed position to an open position as soon as said CO₂ measurement exceeds one or more of said threshold values.

[0014] In fact, the algorithm that is used by the control unit to control the rotatable slats from the closed position to an open position may be based on threshold values. An algorithm that makes use of one threshold value can control the slats between the closed position and an open position. An algorithm that uses several threshold values can control the slats between the closed position and several open positions. The slats remain in the closed

position so long as none of the threshold values is exceeded. As soon as threshold values are exceeded, the highest threshold value that is exceeded will determine to which open position the slats are controlled.

5 **[0015]** In embodiments of the structure according to the present invention defined in claim 5, said control unit is configured to determine the number of rotatable slats that are controlled from said closed position to an open position on the basis of the threshold values that are exceeded.

10 **[0016]** Thus, the number of slats that are rotated from the closed to the open position at excessively high CO₂ concentration can be determined by the control unit as a function of the measured CO₂ concentration. A higher CO₂ measurement will result in a larger number of slats being rotated from the closed to an open position so that ventilation of the enclosed exterior space is accelerated. This may be achieved by comparing the CO₂ measurement with various threshold values, and ascertaining the highest threshold value that is exceeded. Each threshold value corresponds to a different number of slats that will be rotated, wherein a higher threshold value always corresponds to a higher number of slats than a lower threshold value.

25 **[0017]** In embodiments of the structure according to the present invention defined in claim 6, said control unit is configured to determine the rotation angle of said rotatable slats in the open position on the basis of the threshold values that are exceeded.

30 **[0018]** Thus, the ventilation opening that is provided by rotating slats at excessively high CO₂ concentration can be determined by the control unit as a function of the measured CO₂ concentration. A higher CO₂ measurement will result in a larger rotation and thus a larger ventilation opening so that ventilation of the enclosed exterior space is accelerated. This may once again be achieved by comparing the CO₂ measurement with various threshold values, and ascertaining the highest threshold value that is exceeded. Each threshold value corresponds to a different rotation angle for the slats and thus to a different ventilation opening, wherein a higher threshold value always corresponds to a larger ventilation opening than a lower threshold value.

45 **[0019]** In embodiments of the structure according to the present invention defined in claim 7, said control unit is configured to determine the time interval during which said rotatable slats are controlled from said closed position to an open position on the basis of the threshold values that are exceeded.

50 **[0020]** Thus, the time interval during which the enclosed exterior space will be ventilated by rotating slats at excessively high CO₂ concentration can be determined by the control unit as a function of the measured CO₂ concentration. A higher CO₂ measurement will result in a larger ventilation time so that the enclosed exterior space is ventilated better. This may once again be achieved by comparing the CO₂ measurement with various threshold values, and ascertaining the highest

threshold value that is exceeded. Each threshold value corresponds to a different ventilation time, wherein a higher threshold value always corresponds to a larger ventilation time than a lower threshold value.

[0021] A person skilled in the art will understand that an even smarter control unit can, on the basis of the measured CO₂ concentration and comparison with CO₂ threshold values, adjust a combination of parameters, for example the ventilation time (time interval), the ventilation opening (rotation angle of the slats), and the number of slats that will be rotated to optimize the ventilation of the enclosed exterior space further. The algorithm also does not need necessarily to make use of threshold values. In alternative embodiments, for example the variation of the CO₂ concentration can be followed and the change in CO₂ concentration within a certain time interval can be used for controlling the rotatable slats. Smart control may also make use of profiles, or use may be made of learning algorithms and machine learning technology to allow the control unit to learn dynamically how the rotatable slats must be controlled as a function of the variation of the CO₂ concentration.

[0022] In embodiments of the structure according to the present invention defined in claim 8, said control unit is further coupled to one or more sensors, and configured to control at least some of said rotatable slats on the basis of one or more sensor measurements received from said one or more sensors.

[0023] In embodiments of the structure according to the present invention defined in claim 9, said one or more sensors comprise a rain sensor.

[0024] Besides the CO₂ measurement received from the CO₂ sensor, the control unit may thus also make use of other sensor measurements in order to determine how many slats are rotated, at what angle the slats are rotated, and/or how long the slats are rotated in the open position. When for example a rain sensor indicates that it is raining outside but the CO₂ measurement in the closed space exceeds certain thresholds, the control unit can open the slats only slightly, at a limited angle, so that it is still ventilated, without letting the rain in. The control unit may be configured so that in such a situation a larger number of slats are rotated through a smaller rotation angle and/or the slats are rotated in the open position for a longer time.

[0025] Various embodiments of the structure according to the present invention may be tailored to various applications. In an embodiment according to claim 8, the structure is a pergola for use in the catering sector. An embodiment of this kind is generally built onto an existing building and typically comprises glass wall elements. In an embodiment according to claim 9, the structure is an outdoor office. Said embodiment typically comprises wooden wall elements. In an embodiment according to claim 10 the structure is a winter garden. In an embodiment according to claim 11 the structure is a pool house.

Brief description of the drawings

[0026]

Figs. 1-4 illustrate a first embodiment of the structure according to the present invention, more specifically a pergola for use in the catering sector;

Figs. 5-6 illustrate a second embodiment of the structure according to the present invention, more specifically an outdoor office;

Figs. 7-8 illustrate a third embodiment of the structure according to the present invention, more specifically a winter garden;

Figs. 9-10 illustrate a fourth embodiment of the structure according to the present invention, more specifically a pool house; and

Fig. 11 shows a computer system suitable as a control unit in embodiments of the structure according to the present invention.

Description of embodiments

[0027] Fig. 1 shows a pergola 1 suitable for use in the catering sector, where the pergola 1 is built against an existing building 9, for example a restaurant, hotel, brasserie or café building. The pergola 1 is a structure according to the present invention that encloses an exterior space in such a way that said exterior space may be exploited to supplement the interior space of the building 9. Catering spaces must meet certain ventilation requirements in order to be used. In the case of a pandemic, for example, catering concerns that do not meet the ventilation requirements will not be able to be used if certain contamination thresholds are exceeded. Separately from requirements that are imposed, it is important for the health and wellbeing of users of a catering space, for example customers and personnel, that the enclosed space is ventilated regularly. The pergola 1 comprises supporting elements, more specifically columns 2A and beams 2B, which provide support for the structure. The pergola 1 further comprises wall elements 3A, 3B, between the columns 2A and beams 2B. The wall elements 3A and 3B consist of glass, surrounded by a frame that may be manufactured from wood, aluminium, plastic or some other material. The wall elements may be fixed, such as wall element 3A. Some wall elements may also be movable, for example slidable such as wall element 3B, pivoting, tilting, or tilting and tipping. The pergola 1 further comprises a roof structure 4 that rests on the supporting elements 2A, 2B. It is possible that the roof structure 4 comprises additional supporting elements, for example beams, which give the structure added support.

[0028] The roof structure 4 comprises, in the upper surface, a number of slats 5, strip-shaped components that

are rotatable about a longitudinal axis. Depending on the configuration of the rotating system, the slats are rotatable synchronously or individually (and thus not necessarily synchronously). In the embodiment in Fig. 1, it is understood that the slats 5 are rotatable individually. When the slats 5 are in the closed position and all movable wall elements 3B are in the closed position, the supporting elements 2A, 2B, the wall elements 3A, 3B and the roof structure 4 will completely enclose an exterior space so that said space can be used, free from rain, wind and other unpleasant weather conditions, as part of the catering concern.

[0029] The pergola 1 further comprises a control unit 6, which controls the rotatable slats 5 and thus tilts the slats between a closed position (in which the slats lie in the top plane of the roof structure 4) and an open position (in which one or more slats are rotated at an angle relative to the top plane of the roof structure 4). For this purpose, the control unit 6 receives CO₂ values from a CO₂ meter 7 that is built into one of the columns 2A of the pergola 1 and measures the CO₂ content in the exterior space that is enclosed by the pergola 1. The control unit 6 also receives signals from a rain sensor 8, which is installed at the level of the roof structure 4 of the pergola 1. In the embodiment in Fig. 1, both the CO₂ meter 7 and the rain sensor 8 are connected to the control unit 6 via wiring that has been incorporated in a column 2A and the roof structure 4. A person skilled in the art will understand that communication between CO₂ meter 7 and control unit 6 and/or communication between the rain sensor 7 and the control unit 6 may also take place wirelessly.

[0030] In dry weather - thus in the absence of a signal from the rain sensor 8 - the control unit 6 will rotate all slats 5 through a certain angle, for example 45°, as soon as the CO₂ measurement obtained from CO₂ meter 7 exceeds a certain threshold value. The slats 5 are then in a first open position, which is illustrated in Fig. 2. The exterior space enclosed by pergola 1 is ventilated for a preset time or until the measured CO₂ value falls below a certain threshold value again.

[0031] When the aforementioned CO₂ threshold value is exceeded while it is raining, the slats 5 will be rotated through a smaller angle, for example 15°, to a second open position, which is illustrated in Fig. 3. In this second open position, the space enclosed by pergola 1 is still ventilated but ingress of rain is prevented. The time for which the enclosed exterior space is ventilated will now typically be longer because the ventilation flow rate with slats rotated at an angle of 15° is lower than the ventilation flow rate with slats rotated at an angle of 45°.

[0032] It is also possible that the control unit takes account of various threshold values. When in dry weather a first CO₂ threshold value is exceeded, the control unit 6 will then only rotate a limited number of slats through an angle of 45°. The slats then come into an open position, which is shown in Fig. 4, in which for example three slats 5A of the 9 slats are tilted, whereas 6 slats 5B of the 9 slats remain in the plane of the roof. If, despite the

ventilation, the CO₂ concentration rises further and exceeds a second (or further) CO₂ threshold value, the control unit 6 will rotate additional slats until finally all slats 5 are rotated through an angle of 45° and thus the state illustrated in Fig. 2 is reached.

[0033] As a function of the measured CO₂ values and the signal obtained from the rain sensor 8, the control unit 6 will thus rotate one or more slats in such a way that the enclosed space is ventilated and the CO₂ content drops back to an acceptable level, without affecting the comfort of the users of the pergola: the space remains free from rain, wind or other unpleasant weather conditions. Depending on the algorithm, the control unit 6 will, as a function of signals received from the CO₂ meter 7 and the rain sensor 8, determine how many slats are rotated, at what angle the slats are rotated, and for how long the slats are rotated. Use may also be made of other parameters or signals from other sensors, not shown in Figs. 1-4. Thus, account may be taken of the position of the sun, the hour of the day, the location on Earth, the orientation of the pergola, the temperature in the space enclosed by the pergola, the humidity level in the space enclosed by the pergola, the air pressure, etc., to refine the regulation of the rotatable slats by the control unit, and to increase the ease of use of the pergola 1. Thus, for example the rotation angle of the slats 5, the choice of slats that are rotated, and the choice of the number of slats that are rotated, are determined as a function of the position of the sun, so that even in the open position in which the space is ventilated, direct entry of sunlight into the pergola is avoided.

[0034] Fig. 5 shows a freestanding outdoor office 1. The outdoor office 1 is also a structure according to the present invention. The outdoor office comprises supporting elements, for example the columns 2A, wall elements 3B and 3C between the columns 2A, and a roof structure 4 that rests on the supporting elements 2A. The wall elements comprise a movable wall element 3B, substantially of glass, and fixed wall elements 3C made of wood. The roof structure 4 comprises four rotatable slats 5. In Fig. 5, the slats 5 are in the closed position: the slats 5 lie in the top plane of the roof. In the closed state, the structure 1 encloses an exterior space, which may be used for example as a home office.

[0035] A control unit 6 and a CO₂ meter 7 are built into the roof structure 4. The CO₂ meter 7 measures the CO₂ concentration inside the structure 1 and transmits the CO₂ values to the control unit 6 via a wired connection, which has also been incorporated in the roof structure 4. Furthermore, the structure 1 has been equipped with a rain sensor 8, which is also connected via a wired connection to the control unit 6 and so signals to the control unit 6 whether or not precipitation is falling. Signalling may take place regularly, for example every minute or on demand from the control unit 6, or at irregular time points, for example whenever a threshold (CO₂ threshold, precipitation threshold) is exceeded or whenever the change relative to an earlier measurement exceeds a

threshold.

[0036] The control unit 6 interprets the signals received from the CO₂ meter 7 and the rain sensor 8, and controls the rotatable slats 5 based thereon. When for example the CO₂ meter 7 signals that the measured CO₂ concentration inside the structure 1 exceeds an alarm threshold at a time when the rain sensor 8 does not signal any precipitation, the control unit 6 will tilt the slats 5 (by means of a motor or other drive) at a predetermined angle. The slats thus end up in the open position illustrated in Fig. 6, so that the office space enclosed by structure 1 is ventilated and the CO₂ concentration in the office space goes back down. As soon as the CO₂ concentration goes below a certain acceptable threshold, the slats 5 will be returned to the closed position in Fig. 1. If the rain sensor 8 indicates that there is precipitation, the slats 5 will be opened at a smaller angle, thus avoiding ingress of precipitation. The ventilation time, being the time that is required for the CO₂ concentration to drop below the acceptable threshold, will then typically be greater.

[0037] Fig. 7 shows a veranda 1 as an extension on an existing dwelling 9. The veranda 1 is an embodiment of the structure according to the present invention. The veranda 1 comprises supporting elements, for example columns 2A and beams 2B, wall elements 3A, 3B, 3C between the supporting elements 2A, 2B, and a roof structure 4. Some supporting elements form part of the roof structure 4. Such is the case for example for beam 2B. The wall elements may be fixed or movable. Thus, wall element 3A is a fixed window panel, wall element 3B a slidable window panel, and wall element 3D a rollable cloth. The entire upper surface of roof structure 4 consists of slats 5 that are rotatable. The rotation of the slats is controlled by a control unit 6, which comprises a wireless interface, for example a Bluetooth interface or a Wi-Fi interface, which is used for connecting the control unit 6 wirelessly to a CO₂ meter 7, which is located in the space that is enclosed by the veranda 1, and to a rain sensor 8, which is located at the level of the roof structure 4.

[0038] In the embodiment of the structure 1 that is shown in Fig. 7 there is no need to incorporate wiring and a CO₂ meter in the elements of the structure 1. A CO₂ meter, which is not a component of the structure 1, and other sensors that are not components of the structure 1, can be connected wirelessly to the control unit 6 and send signals to the control unit 6, on the basis of which the latter can control the ventilation of the enclosed space by means of rotation of the louvred roof 5. If the measured CO₂ concentration in the space enclosed by the veranda 1 exceeds an alarm value at a time when the rain sensor 8 does not detect any precipitation, the control unit 6 will rotate the slats 5 from the closed (horizontal) position to an open position in which the slats are at a certain angle, so that the space enclosed by the veranda is ventilated via the roof. This is shown in Fig. 8. If the measured CO₂ concentration drops below an acceptable threshold value, the slats 5 will be tilted back to the closed position

illustrated in Fig. 7.

[0039] Fig. 9 shows a pool house 1 beside a swimming pool. The pool house 1 is a structure according to the present invention. The pool house comprises supporting elements, for example columns 2A, wall elements 3A, 3B, 3C, and a roof structure 4. The wall elements may be fixed or movable. Thus, wall element 3A is a fixed window panel, wall element 3B a slidable window panel, and wall element 3C a fixed wooden panel. The upper surface of roof structure 4 consists partly of rotatable slats 5. The rotation of the slats between the closed position in Fig. 9 (in which the slats lie in one plane) and the open position in Fig. 10 (in which the slats are tilted at an angle) takes place by control unit 6, which has been incorporated in the roof structure 4. The control unit 6 is equipped with a wireless interface so that a CO₂ meter 7 in the space enclosed by pool house 1 and a rain sensor 8 at the level of the roof structure 4 may be linked wirelessly to the control unit 6. Ventilation of the space enclosed by pool house 1 is regulated by moving the slats 5 to the open position when a CO₂ alarm value is exceeded, and moving the slats back to the closed position when the CO₂ concentration in the space has gone down sufficiently. The signals from the rain sensor 8 may postpone or delay the ventilation by not tilting the slats 5 when there is precipitation, or only tilting them through a smaller angle.

[0040] Fig. 11 shows a suitable computer system 100 that is suitable as a control unit 6 in embodiments of the structure according to the present invention. Computer system 100 may in general be configured as a computer suitable for general purposes and may further comprise a bus 110, a processor 102, a local memory 104, one or more optional input interfaces 114, one or more optional output interfaces 116, a communication interface 112, a storage element interface 106 and one or more storage elements 108. Bus 110 may comprise one or more electric conductors, which make communication between the components of the computer system 100 possible. Processor 102 may comprise any type of conventional processor or microprocessor that interprets and executes program instructions. Local memory 104 may comprise a Random Access Memory (RAM) or some other type of dynamic storage device, which stores information and instructions for execution by processor 102, and/or may comprise a Read-Only Memory (ROM) or some other type of static storage device, which stores static information and instructions for use by processor 102. Input interface 114 may comprise one or more conventional mechanisms, which enable an operator or user to enter information into the computer device 100, such as a keyboard 120, a mouse 130, a pen, voice recognition and/or biometric mechanisms, a touch screen, etc. Output interface 116 may comprise one or more conventional mechanisms, which supply information to the operator or user, such as a screen 140, a printer 150, a loudspeaker, etc. Communication interface 112 may comprise a transmitter/receiver mechanism, for example such as

one or more Ethernet interfaces that enable the computer system 100 to communicate with other devices and/or systems 181, 182, 183. The communication interface 112 of computer system 100 may be connected to another computer system by means of a Local Area Network (LAN) or a Wide Area Network (WAN), for example such as the Internet. Storage element interface 106 may comprise a storage interface, for example such as a Serial Advanced Technology Attachment (SATA) interface or a Small Computer System Interface (SCSI), for connecting bus 110 to one or more storage elements 108, such as one or more local disks, for example SATA disk stations, and for controlling the reading and writing of data to and/or from these storage elements 108. Although the storage elements 108 are described above as a local disk, in general any other suitable computer-readable medium, such as a removable magnetic disk, optical storage media, such as a CD or DVD, ROM disk, solid-state drives, flash memory cards, could be used. The system 100 described above may also operate as a Virtual Machine above the physical hardware.

[0041] The steps shown in the above embodiment(s) can be implemented as program instructions, which are stored in local memory 104 of the computer system 100, for execution by the processor 102 thereof. As an alternative, the instruction may be stored on the storage element 108 or may be accessible from another computer system via the communication interface 112.

[0042] Although the present invention has been illustrated on the basis of specific embodiments, it will be clear to a person skilled in the art that the invention is not limited to the details of the foregoing illustrative embodiments, and that the present invention may be carried out with various modifications and adjustments while remaining within the field of application of the invention. The present embodiments must therefore be considered in all respects as illustrative and not restrictive, wherein the scope of the invention is defined by the appended claims and not by the foregoing description, and all changes that fall within the meaning and the scope of the claims are consequently included here. In other words it is assumed that this includes all modifications, variations or equivalents that fall within the field of application of the underlying basic principles and whose essential attributes are claimed in this patent application. In addition, the reader of this patent application will understand that the words "comprising" or "comprise" do not exclude other elements or steps, that the word "a" does not exclude the plural, and that a single element, such as a computer system, a processor or some other integrated unit may fulfil the functions of various devices that are stated in the claims. Any references in the claims are not to be understood as a limitation of the claims in question. The terms "first", "second", "third", "a", "b", "c" and such, when used in the description or in the claims, are used to distinguish between similar elements or steps and do not necessarily describe a successive or chronological order. Similarly, the terms "upper side", "underside", "over",

"under" and such are used for the purposes of the description and they do not necessarily refer to relative positions. It has to be understood that these terms are mutually interchangeable in the right circumstances and that embodiments of the invention are able to function according to the present invention in other orders or orientations than those described or illustrated in the foregoing.

Claims

1. Structure (1) that encloses an exterior space, comprising:
 - supporting elements (2A, 2B),
 - wall elements (3A, 3B, 3C, 3D) between said supporting elements (2A, 2B), and
 - a roof structure (4) supported by said supporting elements (2A, 2B),
 in which said roof structure (4) consists at least partly of rotatable slats (5), which may be rotated between a closed position in which said rotatable slats (5) form a closing surface for said exterior space, and an open position in which said exterior space is ventilated via said rotatable slats (5),

in which said structure (1) comprises a control unit (6) which controls said rotatable slats (5), and

in which said control unit (6) is coupled to a carbon dioxide meter (7), abbreviated to CO₂ meter, and is configured to control at least some (5A) of said rotatable slats (5) on the basis of a carbon dioxide measurement, abbreviated to CO₂ measurement, received from said CO₂ meter (7).
2. Structure (1) according to claim 1, in which said CO₂ meter (7) is integrated in one of said supporting elements (2A, 2B).
3. Structure (1) according to claim 1, in which said CO₂ meter (7) is integrated in said roof structure (4).
4. Structure (1) according to one of the preceding claims, in which said control unit (6) is configured to compare said CO₂ measurement with one or more threshold values, and to control said rotatable slats (5) from said closed position to an open position as soon as said CO₂ measurement exceeds one or more of said threshold values.
5. Structure (1) according to claim 4, in which said control unit (6) is configured to determine the number of rotatable slats (5A) that are controlled from said closed position to an open position on the basis of the threshold values that are exceeded.

6. Structure (1) according to claim 4 or 5, in which said control unit (6) is configured to determine the rotation angle of said rotatable slats (5) in the open position on the basis of the threshold values that are exceeded. 5
7. Structure (1) according to claim 4, 5 or 6, in which said control unit (6) is configured to determine the time interval during which said rotatable slats (5) are controlled from said closed position to an open position on the basis of the threshold values that are exceeded. 10
8. Structure (1) according to one of the preceding claims, in which said control unit (6) is further coupled to one or more sensors (8), and is configured to control at least some of said rotatable slats (5) on the basis of one or more sensor measurements received from said one or more sensors (8). 15
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9. Structure (1) according to claim 8, in which said one or more sensors comprise a rain sensor (8).
10. Structure (1) according to one of the preceding claims, in which said structure is a pergola for use in the catering sector. 25
11. Structure (1) according to one of the preceding claims, in which said structure is an outdoor office. 30
12. Structure (1) according to one of the preceding claims, in which said structure is a winter garden.
13. Structure (1) according to one of the preceding claims, in which said structure is a pool house. 35

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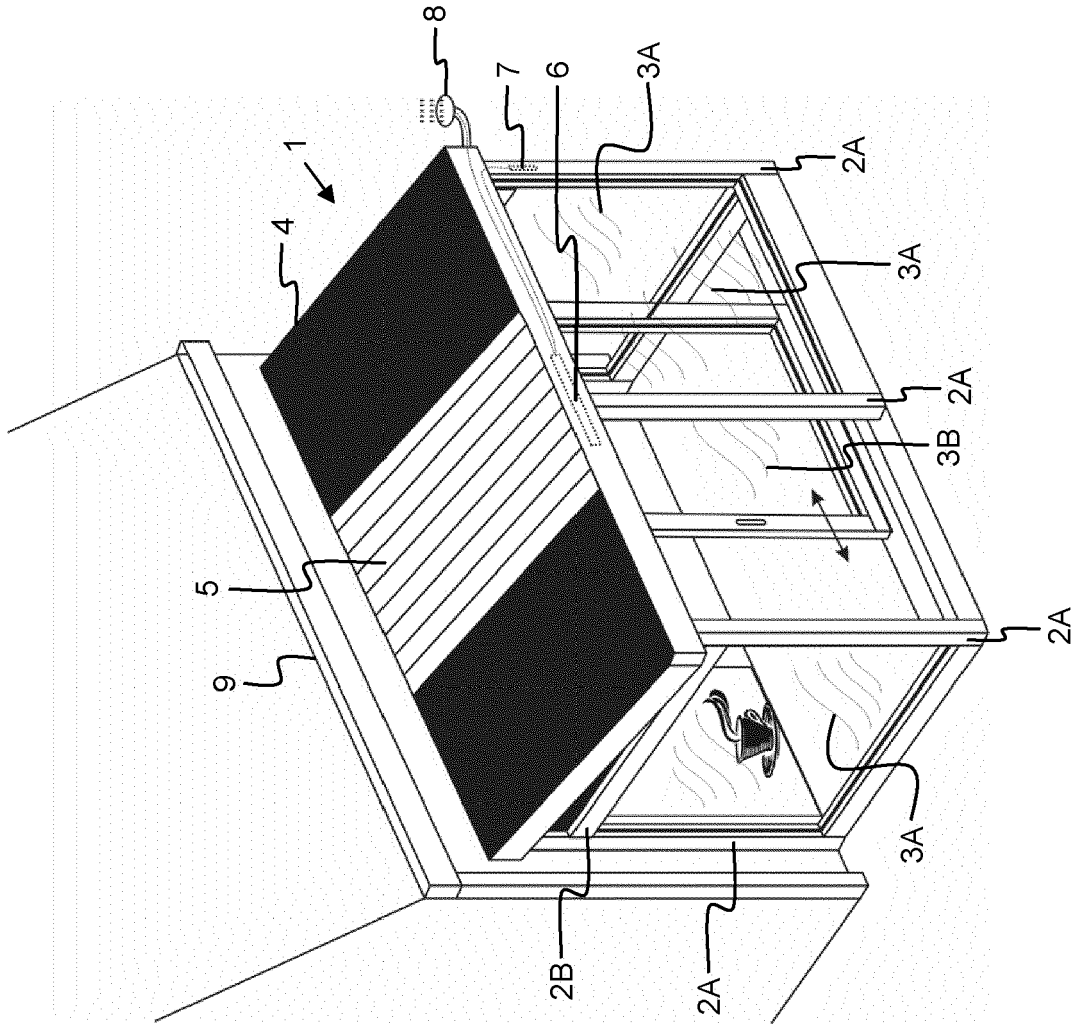


Fig. 1

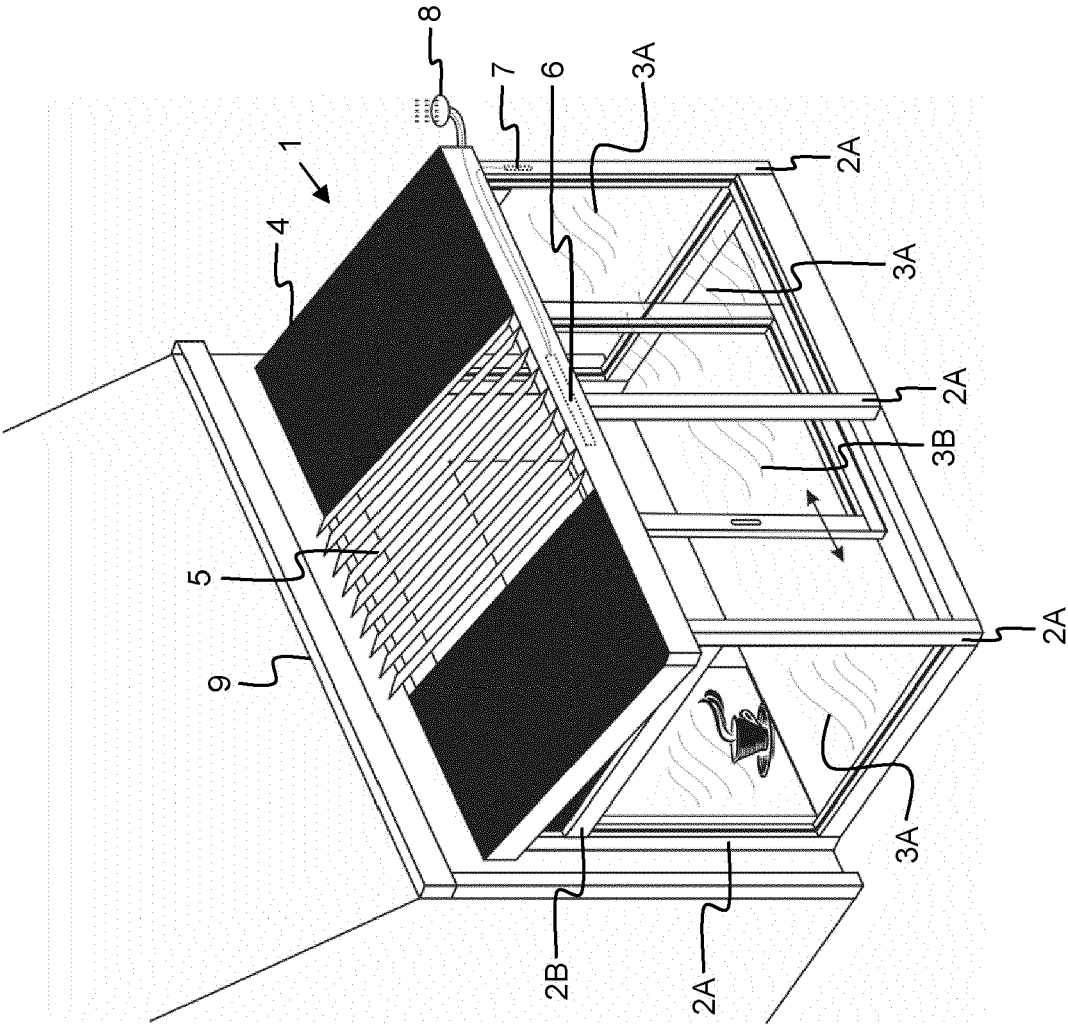


Fig. 2

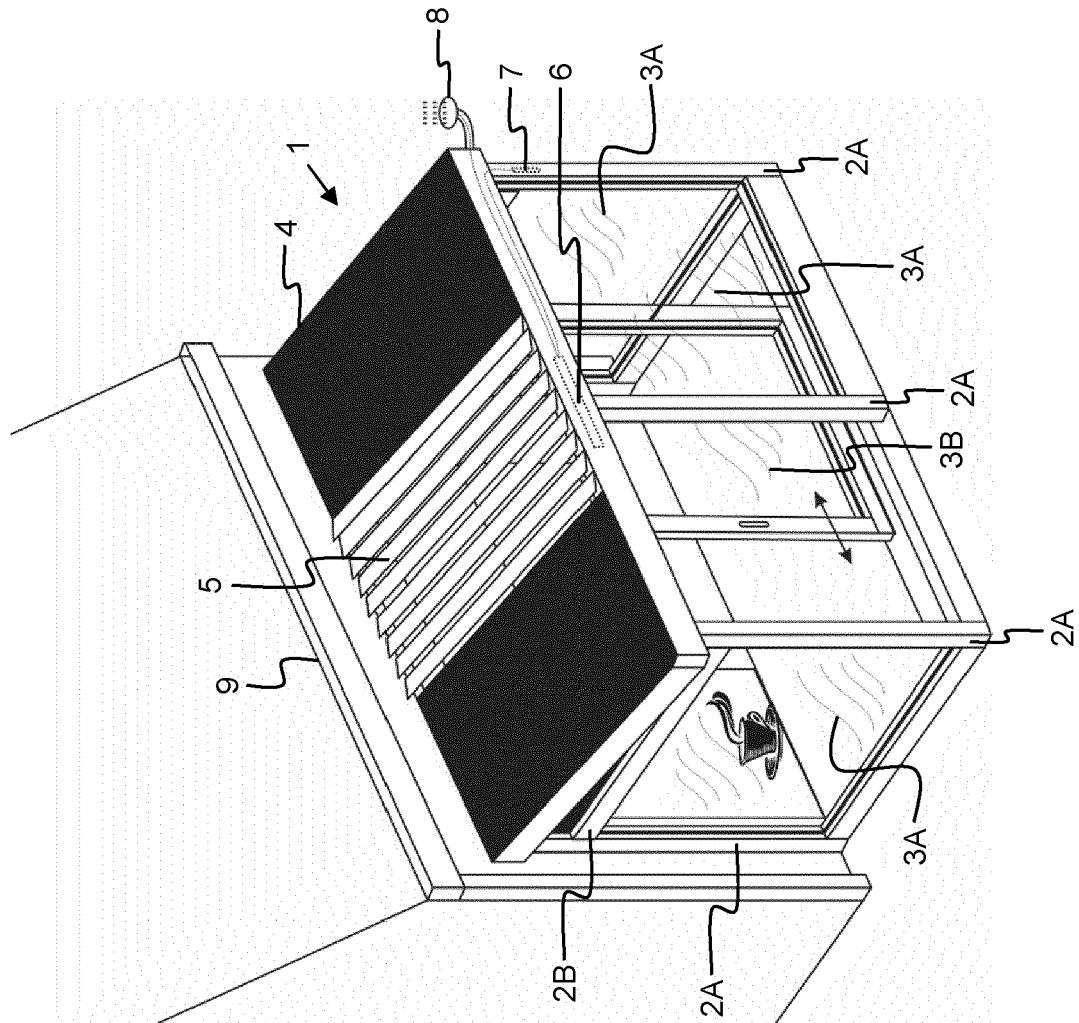


Fig. 3

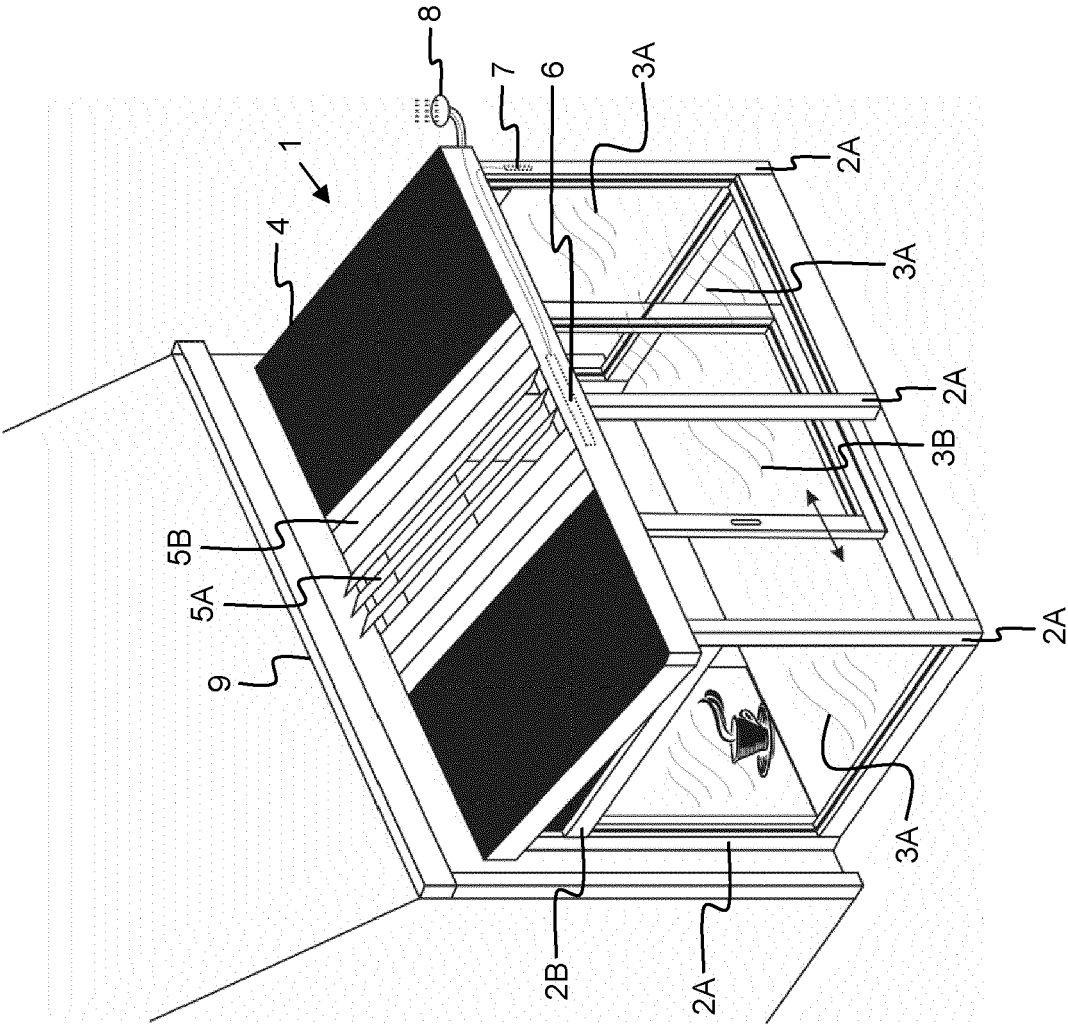


Fig. 4

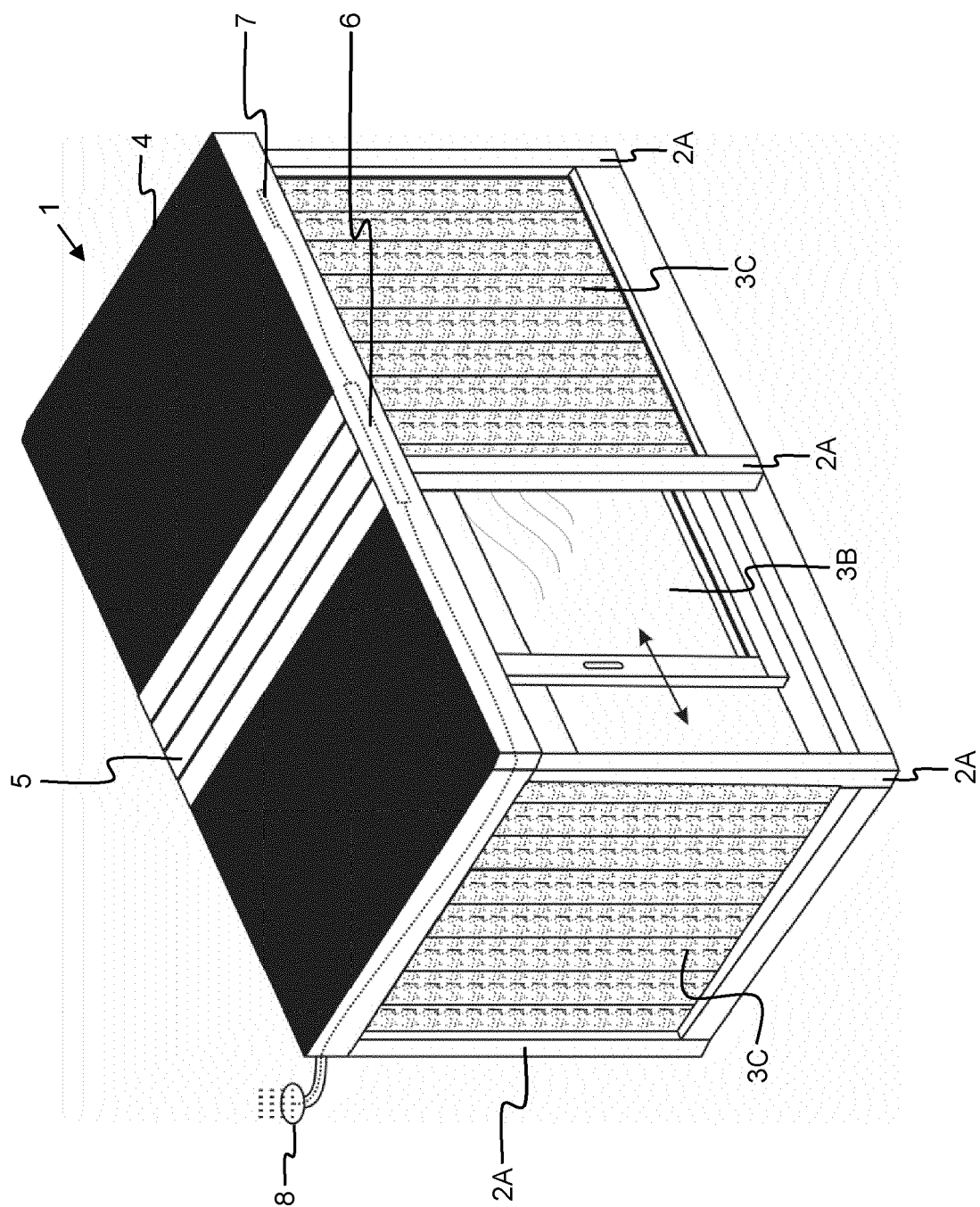


Fig. 5

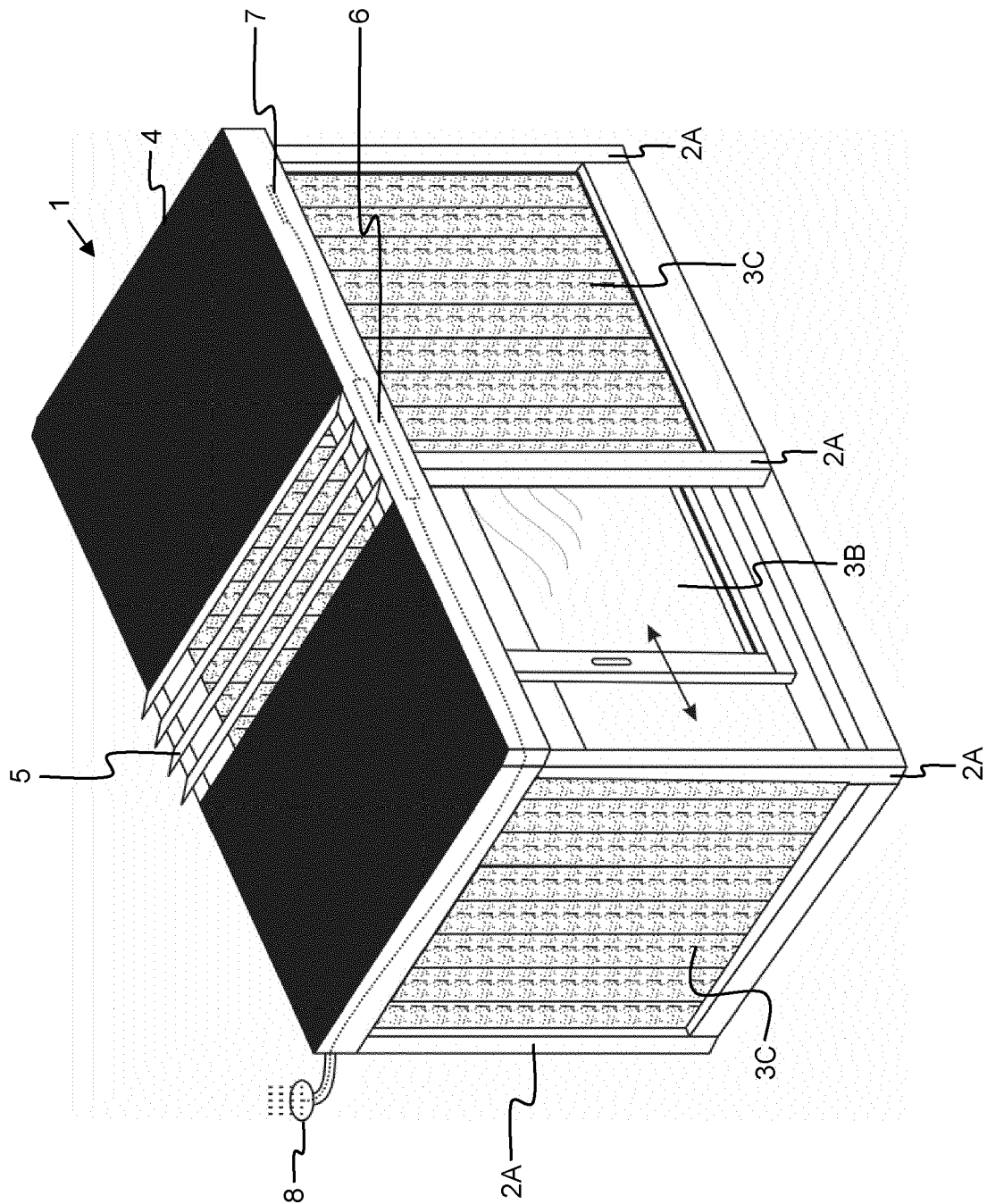


Fig. 6

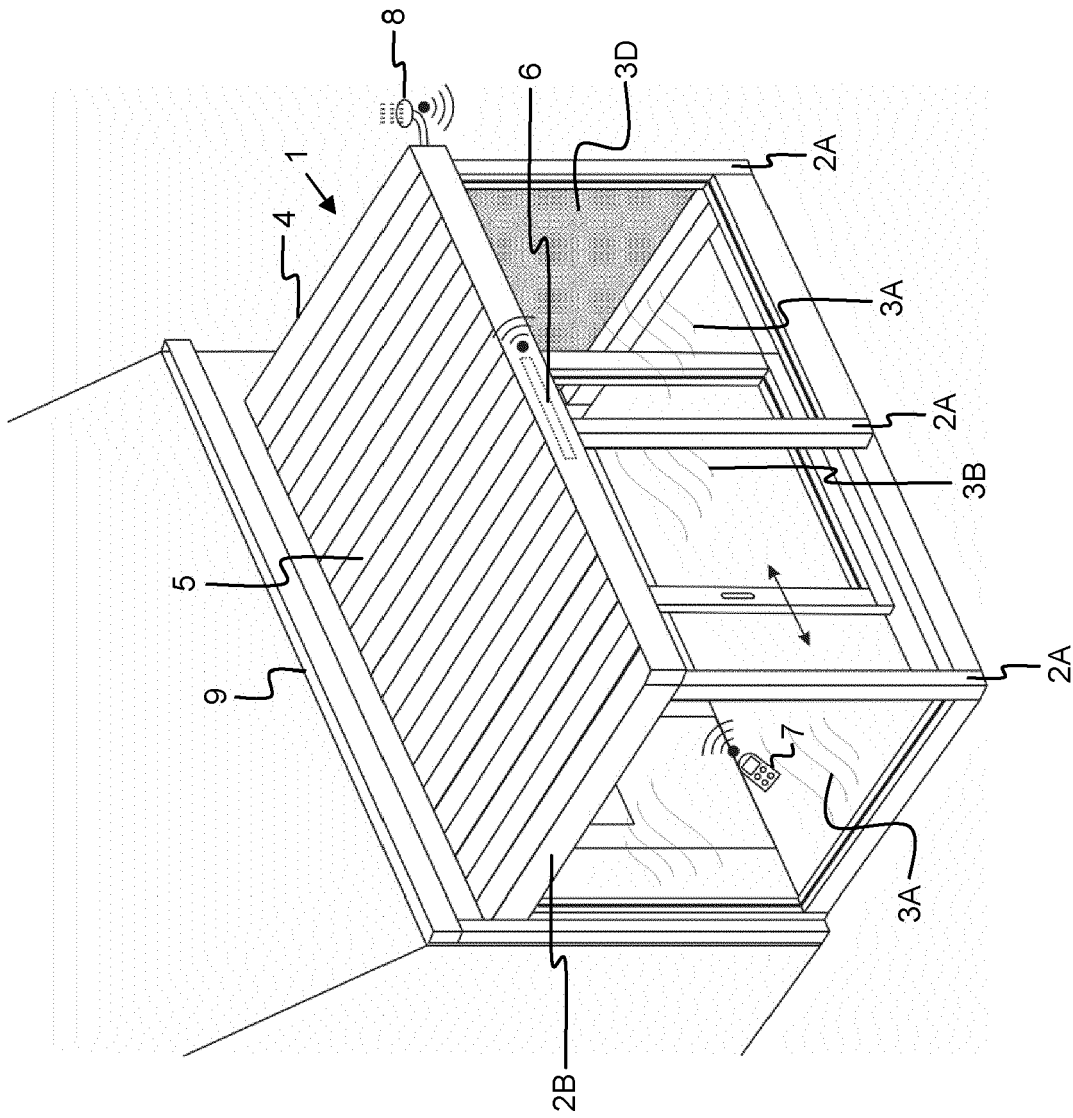


Fig. 7

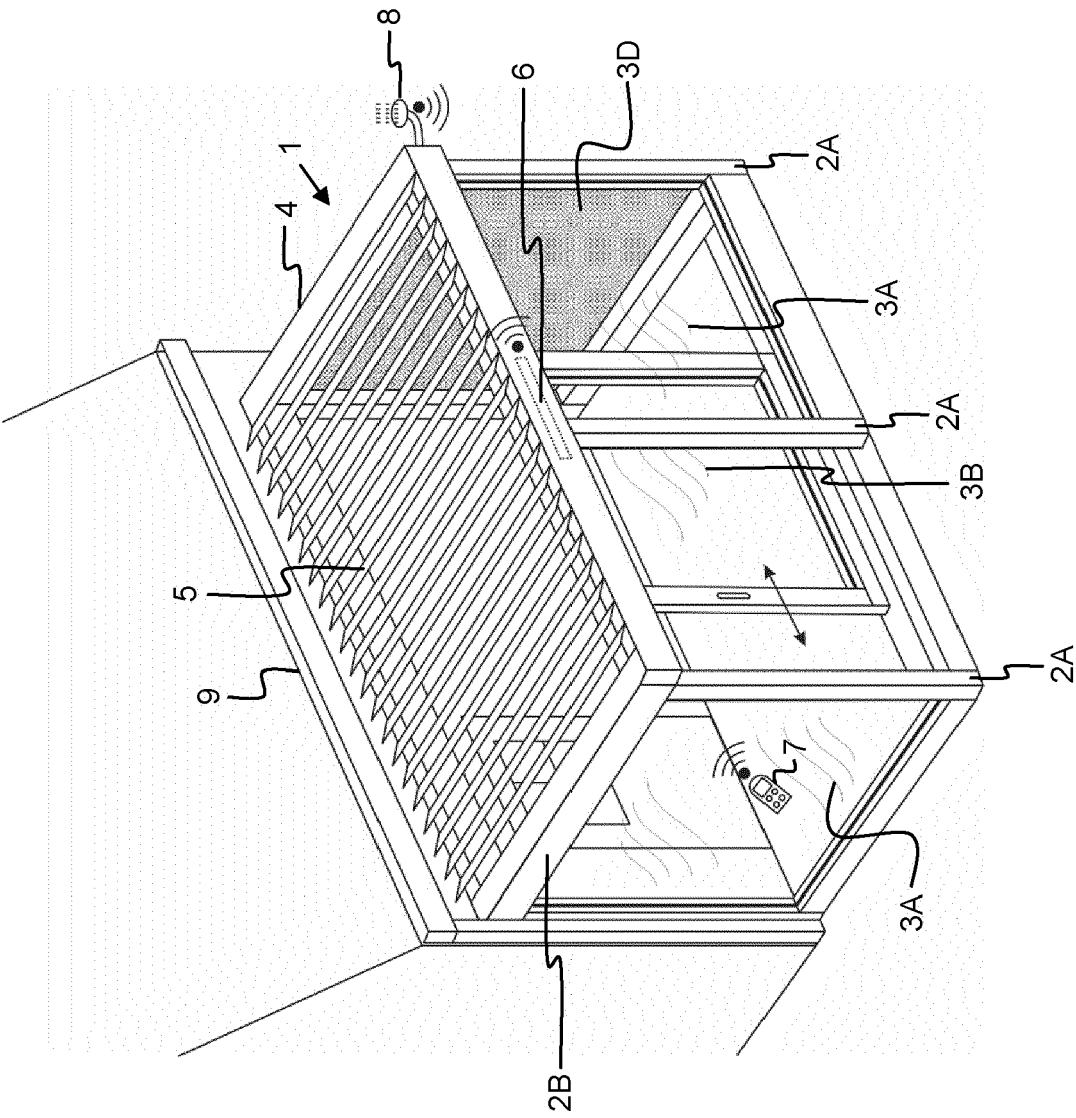


Fig. 8

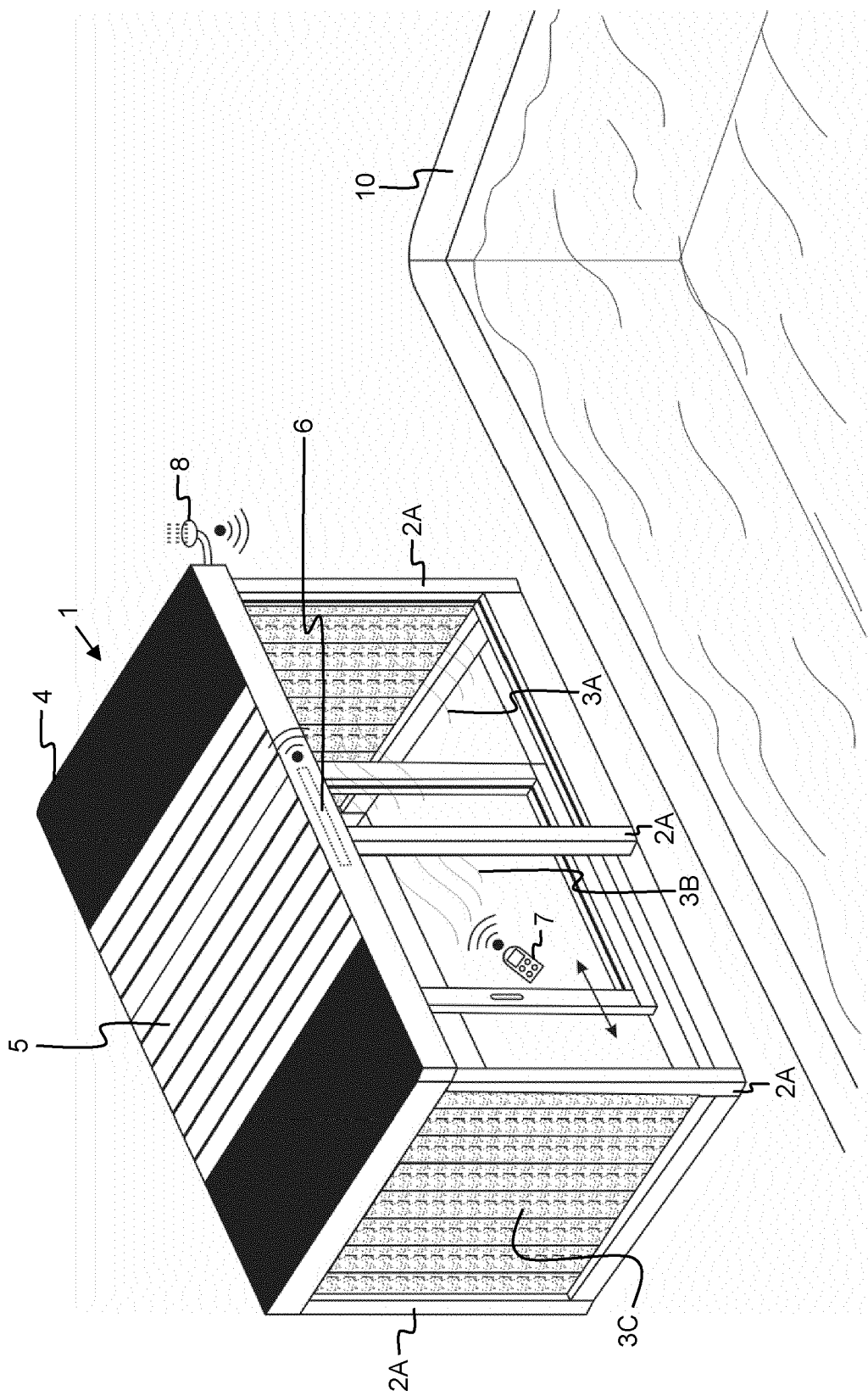


Fig. 9

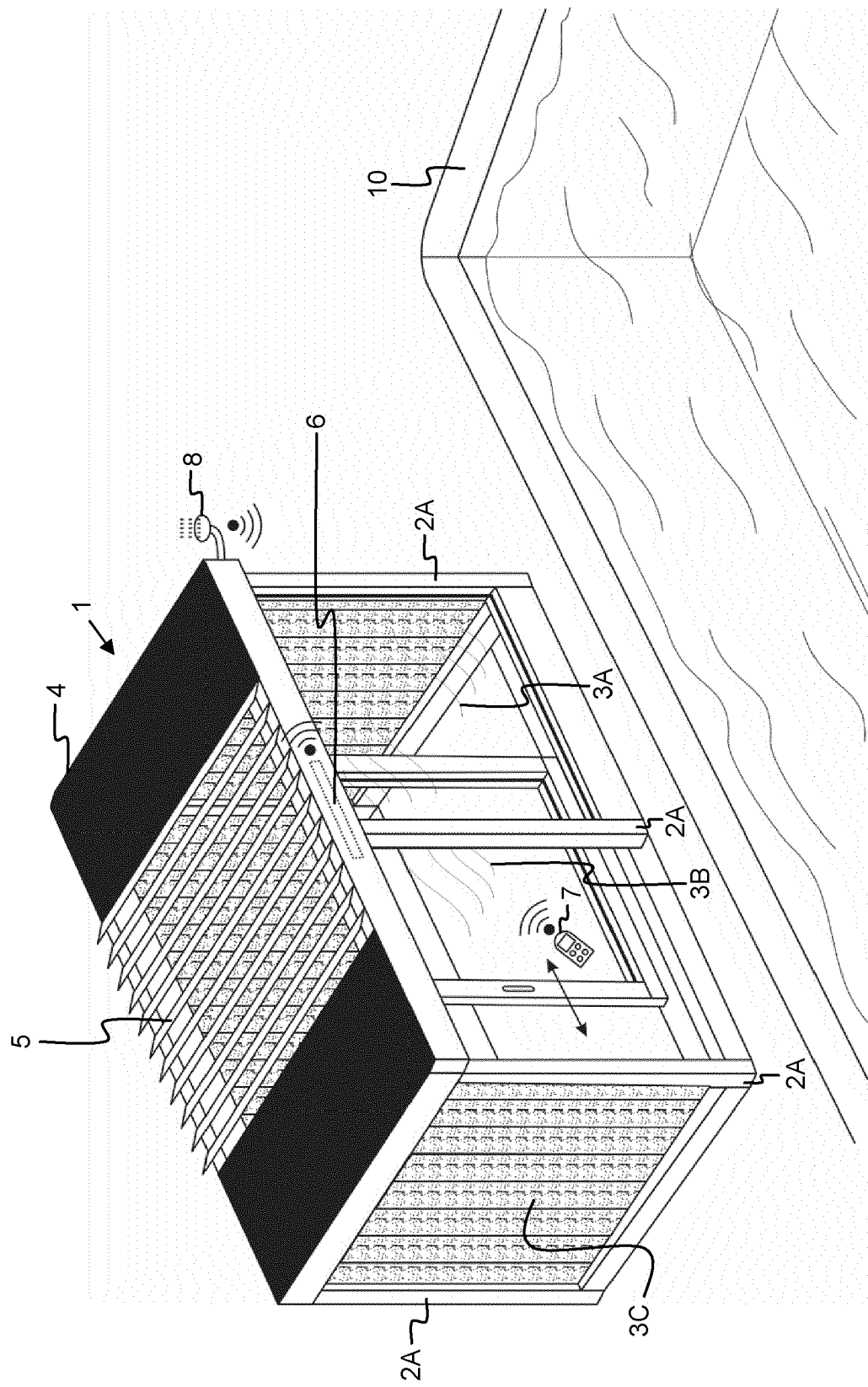


Fig. 10

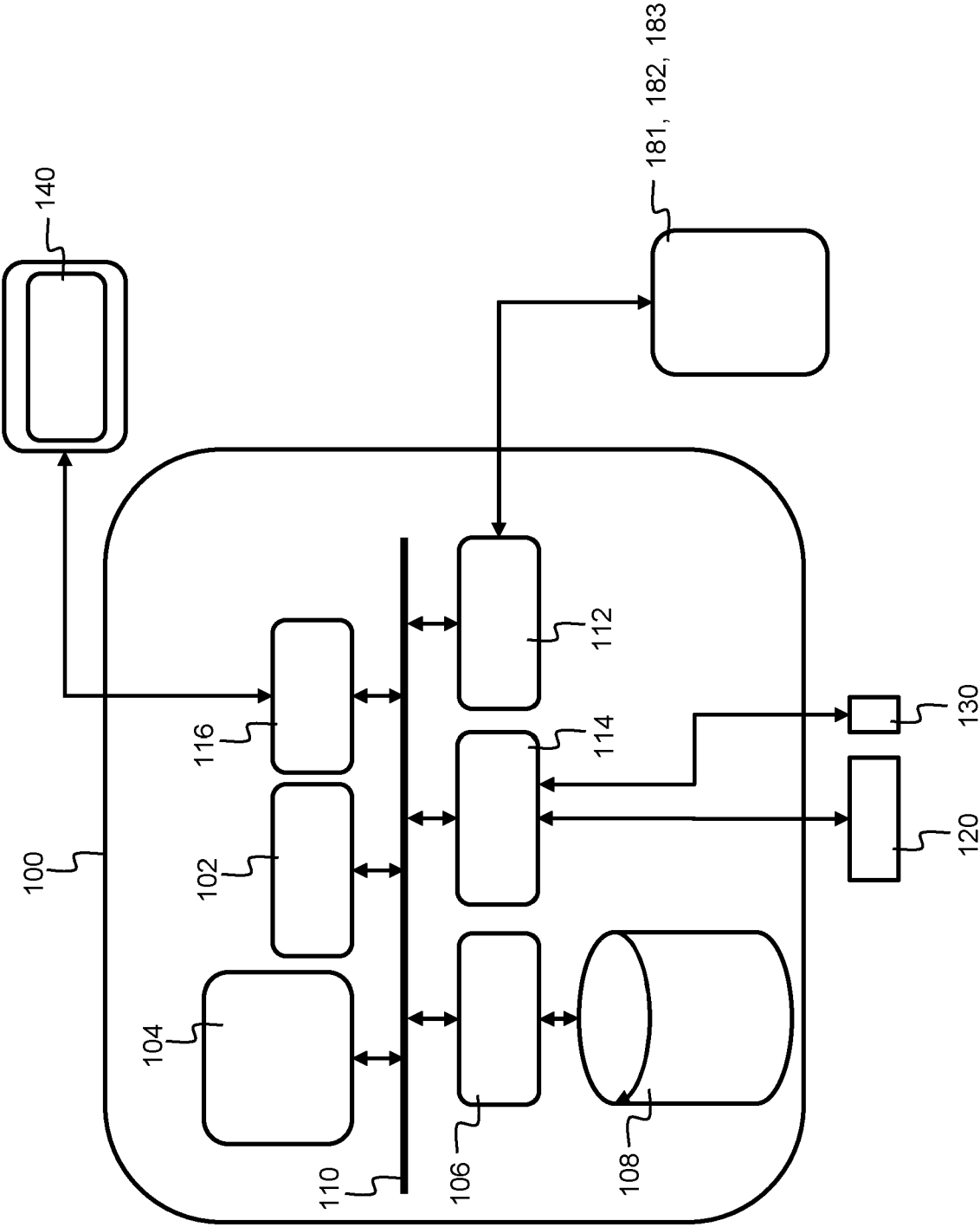


Fig. 11



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Place of search The Hague		Date of completion of the search 1 November 2023	Examiner Demeester, Jan
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