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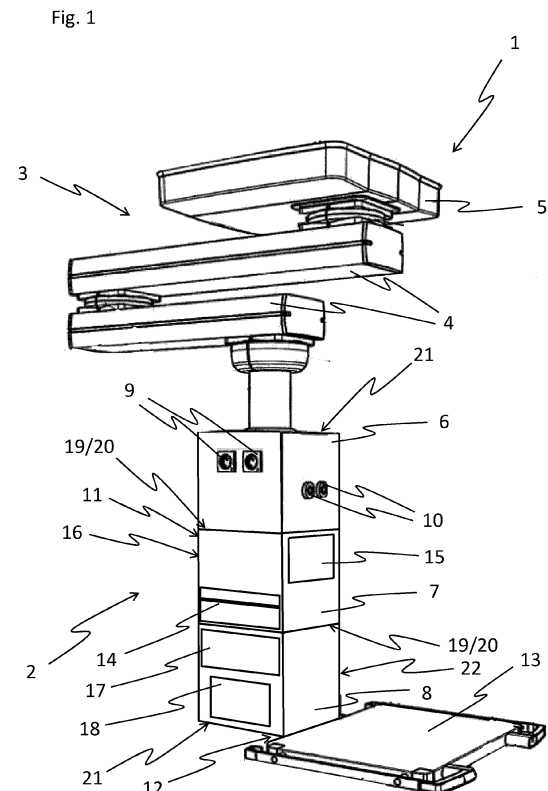
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(54) **MODULAR CARRIER OF A MEDICAL SUPPLY SYSTEM AND MEDICAL SUPPLY SYSTEM**

(57) A modular carrier (2) for a medical supply system (1) comprises at least two modules (6, 7, 8) respectively having a shape with predefined length, with side walls forming a predefined substantially equal cross-section of the modular carrier (2) along a direction of the predefined length, and with two front sides. The modules (6, 7, 8) are configured to be attachable to one another at their front sides located at ends of the modules in the direction of the predefined length such that they abut against each other, and the modules (6, 7, 8) respectively comprise components of a mechanical interface equipment (19) configured such that the at least two supplemental modules (7, 8) are attachable in an arbitrary order.



Description

[0001] The invention relates to modular carrier of a medical supply system and a medical supply system, in particular, used in operating theaters or intensive care units.

[0002] Medical supply systems, so-called booms, are used for supplying medical apparatuses attached to a carrier, a so-called boom head, of the medical supply systems or set up on shelves attached to the carrier. The carrier can be provided with power outlets, connectors for data transmission, and outlets for medical gases. Due to attaching to or setting up the medical apparatuses on the carrier, the carrier and the medical apparatuses can easily be moved simultaneously. Therefore, provided supply lines connecting the power outlets, connectors for data transmission, and outlets for medical gases with the medical apparatuses can be designed short and, therefore, hygienic conditions are enhanced compared to the medical apparatuses connected to wall outlets. If the medical apparatuses are integrated into the carrier, the hygienic conditions are even better.

[0003] However, on the one hand, if a medical appliance for the supply system changes so that other kinds of medical apparatuses have to be provided, e.g., for specific surgical interventions in an operating theater, particularly in the case of integrated medical apparatuses, a modification of the carrier is lavish and time-consuming.

[0004] Furthermore, on the other hand, when a technique further develops so that either other integrated medical apparatuses are required or supply or connection options not yet provided are necessary, also, a modification of the carrier is lavish and time-consuming.

[0005] Therefore, the object underlying the invention is to remedy the above-mentioned disadvantages and to provide a carrier which is easy to modify for, on the one hand, rendering the medical supply system future proof and, on the other hand, enhancing an adaption of the boom to specific medical appliances.

[0006] The object is achieved by a modular carrier for a medical supply system according to claim 1 and a medical supply system according to claim 15. Advantageous further developments are included in the dependent claims.

[0007] According to an aspect of the invention, a modular carrier for a medical supply system comprises at least two modules respectively having a shape with a predefined length, with side walls, forming a predefined substantially equal cross-section of the modular carrier along a direction of the predefined length, and with two front sides, wherein at least one of the modules comprises at least one or more of a power outlet, a gas outlet, a connector for data transmission, or a receiver for shelf attachment. The modules are attachable to one another at their front sides located at ends of the modules in the direction of the predefined length such that they abut against each other, and the modules respectively com-

prise components of a mechanical standard interface equipment configured such that the at least two modules are attachable to each other in an arbitrary order.

[0008] Due to the shape with side walls forming a predefined substantially equal cross-section of the modular carrier, the individual modules can be easily cleaned and disinfected for ensuring proper hygienic conditions. Nevertheless, the provision of the side walls does not exclude that necessary recesses for operation of, e.g., drawers, small orifices of power and gas outlets, or similar characteristics are provided.

[0009] The provision of the components of the mechanical interface equipment such that the modules are attachable to each other in an arbitrary order means that not only already provided modules can be easily interchanged but also that further supplemental modules provided with the components of the mechanical standard interface can easily be exchanged with before existing modules or can be additionally attached to the carrier.

[0010] In an advantageous implementation of the modular carrier, the predefined cross-section of the modules is a cylindrical, and, in particular, a rectangular cross-section.

[0011] The cylindrical cross-section does not mean that the cross-section is circular but any suitable cross-section, e.g., square, extending along an axis is possible.

[0012] In case of the rectangular cross-section, the side walls can be designed such that a suitable area on the side walls for providing the outlets, drawers, or medical apparatuses integrated in the module is provided.

[0013] Due to a further advantageous implementation of the modular carrier, dimensions of the rectangular cross-section and the predefined length of at least one of the modules are adapted such the at least one of the modules has a shape of a cube.

[0014] The shape of a cube provides the side walls suitable for integrating an appropriate number of outlets and, also, for integrating an appropriate drawer or a medical apparatus. Furthermore, due to a square cross-section, the modules can be attached to one another in an arbitrary rotated orientation for enhancing availability of the integrated matters.

[0015] In a further advantageous implementation of the modular carrier, at least one of the modules comprises a lid on at least one of the two front sides.

[0016] Due to the provision of the at least one lid, the equipment integrated in the modules is better protected when the modules are not attached to one another and the module located at an end of the modular carrier is closed in order to provide the necessary hygienic and safety conditions.

[0017] Due to a further advantageous implementation of the modular carrier, each of the modules comprises a media interface equipment in a front side of the module respectively for all supply lines of the provided at least one of the power outlet, the gas outlet, or the connector for data transmission.

[0018] This media interface equipment enables a quick

and safe interchange or exchange of the modules since the supply or connection lines do not have to be installed through the entire medical supply system but the attached modules can be directly supplied by the adjacent existing module.

[0019] In a further advantageous implementation of the modular carrier, the media interface equipment is formed by a quick-release connector.

[0020] This media interface equipment enables a quicker and safer interchange or exchange of the modules since for the media connections no lavish installation work is necessary and the connection can even be provided in an automatic manner when attaching the modules to one another.

[0021] Due to a further advantageous implementation of the modular carrier, the modules respectively comprise a quick-release fastener of the mechanical interface equipment.

[0022] When using the quick-release fastener, in particular, a frequent modification of the configuration of the modular carrier in case of changes of the medical appliance for supply system can easily and reliably be performed.

[0023] By an advantageous implementation of the modular carrier, anyone of the modules is configured to accommodate a wireless information screen.

[0024] The accommodated wireless information screen enables suitable hygienic conditions while providing the advantage that no separate data line is to be installed in the support system which, in turn, facilitates installation of the wireless information screen.

[0025] By another advantageous implementation of the modular carrier, at least one of the modules is configured to accommodate an ambient light device.

[0026] The accommodated ambient light device enables suitable hygienic conditions while providing the advantage that no separate installation for supplying the light device is necessary and the ambient light can easily be located close to a patient.

[0027] In further advantageous implementations of the modular carrier, at least one of the modules is configured to accommodate a wall panel for surgical light operation and/or a wall panel for surgical table operation.

[0028] The accommodated wall panel for operating the surgical light or the surgical table again enables suitable hygienic conditions while providing the advantage that the wall panel can be located close to operators who assist a surgeon by adjusting the conditions during surgery in an operating theater.

[0029] In a further advantageous implementation of the modular carrier, at least one of the modules is configured to accommodate a 3D implant printer.

[0030] The accommodated 3D implant printer enables suitable hygienic conditions while providing the advantage that the printer can easily be connected to the supply and data line and, furthermore, the printer can be placed at a suitable location within the working range of the supply system.

[0031] By a further advantageous implementation of the modular carrier, it is configured to be attachable to a suspension system in a horizontal orientation.

5 **[0032]** The modular carrier attached in a horizontal orientation, in particular, enables a supply of medical apparatuses not being attached to the modular carrier and, thereby, enables an enlarged headroom.

10 **[0033]** By another advantageous implementation of the modular carrier, it is configured to be attachable to a suspension system in a vertical orientation.

[0034] The vertical orientation of the modular carrier enables attachment of several medical apparatuses along the length of the modular carrier and provides a slim total configuration, in particular when be used in intensive care units.

15 **[0035]** According to another aspect of the invention, a medical supply system comprises a modular carrier.

[0036] By the use of this medical supply system, not only already provided modules of the modular carrier can be interchanged but also further modules can easily be exchanged with before existing modules or can easily be additionally attached to the carrier.

20 **[0037]** Below, the invention is elucidated by means of embodiments referring to the attached drawings.

25 **[0038]** In particular,

Fig. 1 shows a medical supply system comprising a first embodiment of a modular carrier according to the invention; and

30 Fig. 2 shows a medical supply system comprising a second embodiment of the modular carrier.

35 **[0039]** Fig. 1 shows a medical supply system 1 comprising a first embodiment of a modular carrier 2 according to the invention.

[0040] The medical supply system 1 further comprises a suspension system 3 comprising two arms 4 and a ceiling mounting system 5. The suspension system 3 is attached to a ceiling of a room, in particular, of an intensive care unit or of an operating theater. Alternatively, the suspension system can be attached to a wall of the respective room.

40 **[0041]** The modular carrier 2 according to the first embodiment is attached to the suspension system 3 in a vertical orientation.

[0042] The modular carrier 2 comprises three modules 6, 7, 8, in particular, a basic module 6 attachable to the suspension system 3 and two supplemental modules 7, 8. Alternatively, the modular carrier 2 comprises only two modules or more than three modules, in particular, more than two supplemental modules 7, 8. For attaching the modular carrier 2 in the vertical orientation, i.e., the modules 6, 7, 8 are located one below the other and the suspension system 3 and the modular carrier 2, in particular, the basic module 6, are respectively provided with components of a fixation device (not shown).

55 **[0043]** Further, the modular carrier 2 comprises re-

spectively two power outlets 9 and two gas outlets 10 for medical gases. The power outlets 9 and the gas outlets 10 are arranged in the basic module 6 on different sides of the basic module 6. Alternatively, the power outlets 9 and the gas outlets 10 are arranged in one of the supplemental modules 7, 8, or in different modules 6, 7, 8, wherein a requested distance between the power outlets 9 and the gas outlets 10 has to be fulfilled. Furthermore, the modular carrier 2 comprises a connector for data transmission 11, in particular, for a bus system, to the attached or integrated medical apparatuses and a receiver for shelf attachment 12 for a shelf 13. In alternative embodiments, not all of the items of the here provided equipment are integrated or attached but only some of the items or additional items are provided.

[0044] In the supplemental module 7, a drawer assembly 14 and, furthermore, a wireless information screen 15 and an ambient light device 16 are integrated.

[0045] In the supplemental module 8, a wall panel for surgical light operation 17 and a wall panel for surgical table operation 18 are integrated. Furthermore, on the other side of the supplemental module 8, a 3D implant printer 22 is accommodated.

[0046] In alternative embodiments, the location of the above-mentioned accessories and medical apparatuses is in one of another module 6, 7, 8.

[0047] For integrating or accommodating the accessories and medical apparatuses, respective installation spaces and, as the case may be, fixation devices, supply lines, and connections are provided.

[0048] The modules 6, 7, 8 respectively have a shape with a predefined length and with side walls forming a predefined substantially equal cross-section of the modular carrier 2 along the predefined length. The modules 6, 7, 8 respectively have a circumference and sub-surfaces of the side walls of the modules 6, 7, 8 form a closed surface along the predefined cross-section of the modular carrier 2. Although denoted as a closed surface, small orifices of the power outlets 9 and of the gas outlets 10, gaps surrounding the gas outlets 10, and recesses for operating the drawer of the drawer assembly 14 can be provided without denying the characteristic of the surface.

[0049] In the embodiment shown in Fig. 1, the predefined cross-section is a rectangular cross-section and dimensions of the cross-section and a predefined length of the modules are adapted such that the modules 6, 7, 8 respectively have a shape of a cube. In alternative embodiments, the dimensions of the cross-section and the predefined length of the modules are not adapted in order to provide the shape of a cube but another suitable shape is provided. Also, alternatively, the defined cross-section is not a rectangular cross-section but a cross-section providing at least some the sub-surfaces of the circumference suitable for accommodating, for example, the power outlets 9 and the gas outlets 10.

[0050] The modules 6, 7, 8 are attached to one another at front sides, located at ends of the modules in a direction

of the predefined length such that they abut against each other, such that the side walls respectively form a continuous surface across the modules 6, 7, 8 attached to one another. Merely a slight seam might exist, wherein the continuous surface is nonetheless denoted as continuous.

[0051] For being attachable, the modules 6, 7, 8 respectively comprise components of a mechanical interface equipment 19 which is configured such that the two supplemental modules 7, 8 are attachable in an arbitrary order. Therefore, the mechanical interface equipment 19 at least partly comprises identical components for forming a quasi-standard interface. Due to the quasi-standard interface, the supplemental module 7 and the supplemental module 8 can be interchanged easily without the need of modifying anyone of the modules 6, 7, 8. Furthermore, the additional supplemental modules comprising the suitable component of the mechanical interface equipment 19 can be attached to the modular carrier 2.

[0052] The mechanical interface equipment 19 therefore comprises, on a front side of one of the modules 6, 7, 8, a plurality of pins as male guiding devices which collaborate with female guiding devices respectively provided on a front side of the modules 6, 7, 8 for aligning the modules 6, 7, 8. The guiding devices assist in attaching the modules 6, 7, 8 such that the continuous surface across the modules 6, 7, 8 can be achieved. Furthermore, the mechanical interface equipment 19 comprises a locking device locking two of the modules 6, 7, 8 to one another. This locking device is configured as a locking bolt engaging a hole in the male guiding device. In alternative embodiments, the locking device can be formed by other components, e.g., by a cam as being a quick-release fastener provided in one of the modules engaging a bolt or a protrusion in the other one of the modules, and, also, the guiding devices can be formed in another manner.

[0053] The modules 6, 7, 8 respectively comprise a lid 21 on both front sides of the defined cross-section so that a quasi-closed cube is formed. In alternative embodiments, the modules 6, 7, 8 are merely provided with lids 21 on front sides exposed to an outside of the modular carrier 2.

[0054] Furthermore, the modules 6, 7, 8 respectively comprise a media interface equipment 20 in the front sides of the modules 6, 7, 8. The media interface equipment 20 comprises connectors for all supply lines of the provided power outlet 9, the gas outlet 10 for medical gases, or the connector for data transmission 11. Alternatively, not all of the supply lines are connected via the media interface equipment 20 but some or all of the supply lines are laid continuously through the medical support system 1 up to an interface at a fixation point of the modular carrier 2 to the suspension system 3 or up to an interface in the ceiling mounting system 5.

[0055] The media interface equipment 20 is formed by a quick-release connector, i.e., plug and socket connectors for electric lines and suitable quick-release connectors for the gas lines. Alternatively, the media interface

equipment can comprise, e.g., luster terminals for the electric lines and/or hose clamps for gas lines.

[0056] Fig. 2 shows a medical supply system 1 comprising a second embodiment of the modular carrier 2. Even though not being illustrated with all of the items illustrated in Fig. 1, the modular carrier 2 according to the second embodiment basically merely distinguishes from the modular carrier 2 according to the first embodiment in that the modular carrier 2 is not attached to the suspension system 3 in a vertically orientation but in a horizontal orientation, wherein the modules 6, 7, 8 are located side by side. For attaching the modular carrier 2 in the horizontal orientation, the suspension system 3 and the modular carrier 2, in particular the basic module 6, are respectively provided with components of a fixation device (not shown). The remaining characteristics except from the attachment location to the suspension system 3 correspond to the characteristics of the modular carrier 2 according to the first embodiment. As the case may be, some of the characteristics, e.g., the receiver for shelves attachment 12 and the shelf 13 are not as appropriate as for the modular carrier 2 according to the first embodiment.

[0057] Due to the mechanical interface equipment 19, the supplemental module 7 and the supplemental module 8 can be interchanged easily without the need of modifying anyone of the modules 6, 7, 8. Furthermore, the additional supplemental modules comprising the suitable component of the mechanical interface equipment 19 can be attached to the modular carrier 2.

[0058] In use, the modular carrier 2 can be modified, e.g., by attaching a further supplemental module 7, 8. For attaching the further supplemental module 7, 8, as the case may be, the lid 21 has to be removed and the further supplemental module 7, 8 is attached to the present basic module 6 or supplemental module 7, 8 by means of the mechanical interface device 19. If provided, the necessary connections are simultaneously established by components of the media interface equipment 20 arranged in the present basic module 6 or supplemental module 7, 8 and in the further supplemental module 7, 8, alternatively, the connections are to be established in a conventional manner.

[0059] When exchanging one of the supplemental modules 7, 8, the concerned present supplemental module 7, 8 is disengaged from an adjacent supplemental module 7, 8 or basic module 6 by releasing the mechanical interface equipment 19. As the case may be, the media connections are simultaneously disengaged. Subsequently, a new supplemental module 7, 8 is attached to the modular carrier 2 by means of the mechanical interface device 19 and, as the case may be, by the media interface device 20.

[0060] While the invention has been illustrated and described in detail in the drawings and the foregoing description, such illustration and description are to be considered illustrative or exemplary and not restrictive. The invention is defined by the set of claims and not limited

to the disclosed embodiments. From reading the present disclosure, other modifications will be apparent to a person skilled in the art. Such modifications may involve other features, which are already known in the art and may be used instead of or in addition to features already described herein. In the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

Claims

1. A modular carrier (2) for a medical supply system (1), the modular carrier (2) comprising at least two modules (6, 7, 8) respectively having a shape with a predefined length, with side walls forming a predefined substantially equal cross-section of the modular carrier (2) along a direction of the predefined length, and with two front sides, wherein at least one of the modules comprises at least one or more of a power outlet (9), a gas outlet (10), a connector for data transmission (11), or a receiver for shelf attachment (12), wherein the modules are configured to be attachable to one another at their front sides located at ends of the modules in the direction of the predefined length such that they abut against each other, and the modules (6, 7, 8) respectively comprise components of a mechanical interface equipment (19) configured such that the modules (6, 7, 8) are attachable to each other in an arbitrary order.
2. The modular carrier (2) of claim 1, wherein the predefined cross-section of the modules is a cylindrical, and, in particular, a rectangular cross-section.
3. The modular carrier (2) of claim 2, wherein dimensions of the rectangular cross-section and the predefined length of at least one of the modules (6, 7, 8) are adapted such the at least one of the modules (6, 7, 8) has a shape of a cube.
4. The modular carrier (2) of any of the preceding claims, wherein at least one of the modules (6, 7, 8) comprises a lid (21) on at least one of the two front sides.
5. The modular carrier (2) of any of the preceding claims, wherein each of the modules (6, 7, 8) comprises a media interface equipment (20), in a front side of the module (6, 7, 8), respectively for all supply lines of the provided at least one of the power outlet (9), the gas outlet (10), or the connector for data transmission (11).

6. The modular carrier (2) of claim 5, wherein the media interface equipment (20) is formed by a quick-release connector.
7. The modular carrier (2) of any of the preceding claims, wherein the modules (6, 7, 8) respectively comprise a quick-release fastener of the mechanical interface equipment (19). 5
8. The modular carrier (2) of any of the preceding claims, wherein anyone of the modules is configured to accommodate a wireless information screen. 10
9. The modular carrier of any of the preceding claims, wherein at least one of the modules (6, 7, 8) is configured to accommodate an ambient light device (16). 15
10. The modular carrier (2) of any of the preceding claims, wherein at least one of the modules (6, 7, 8) is configured to accommodate a wall panel for surgical light operation (17). 20
11. The modular carrier (2) of any of the preceding claims, wherein at least one of the modules (6, 7, 8) is configured to accommodate a wall panel for surgical table operation (18). 25
12. The modular carrier (2) of any of the preceding claims, wherein at least one of the modules (6, 7, 8) is configured to accommodate a 3D implant printer (22). 30
13. The modular carrier (2) of any of the preceding claims, wherein the modular carrier (2) is configured to be attachable to a suspension system (3) in a horizontal orientation. 35
14. The modular carrier (2) of any preceding claim, wherein the modular carrier (2) is configured to be attachable to a suspension system (3) in a vertical orientation. 40
15. A medical supply system (1) comprising a modular carrier (2) of any of the preceding claims. 45

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Fig. 1

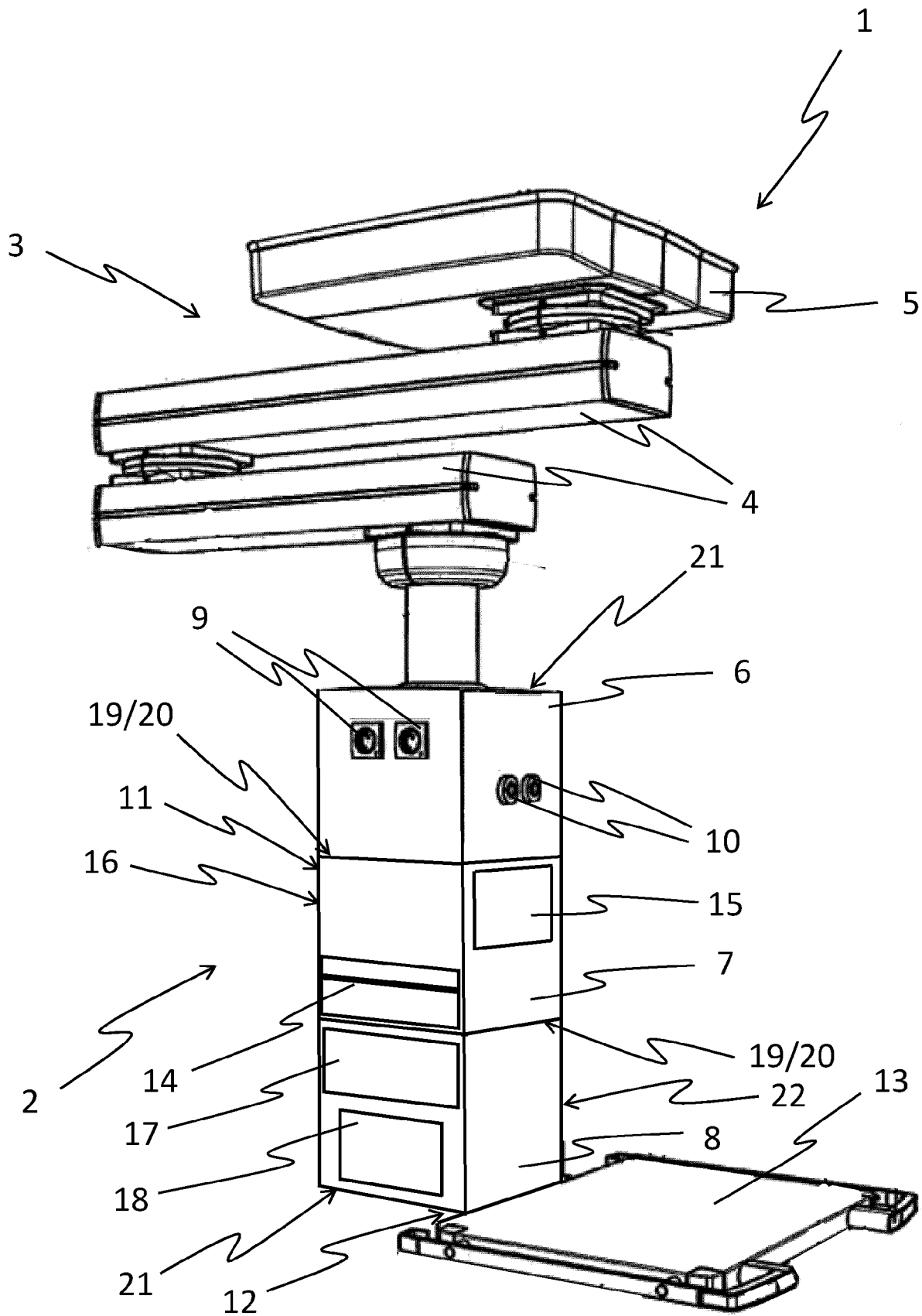
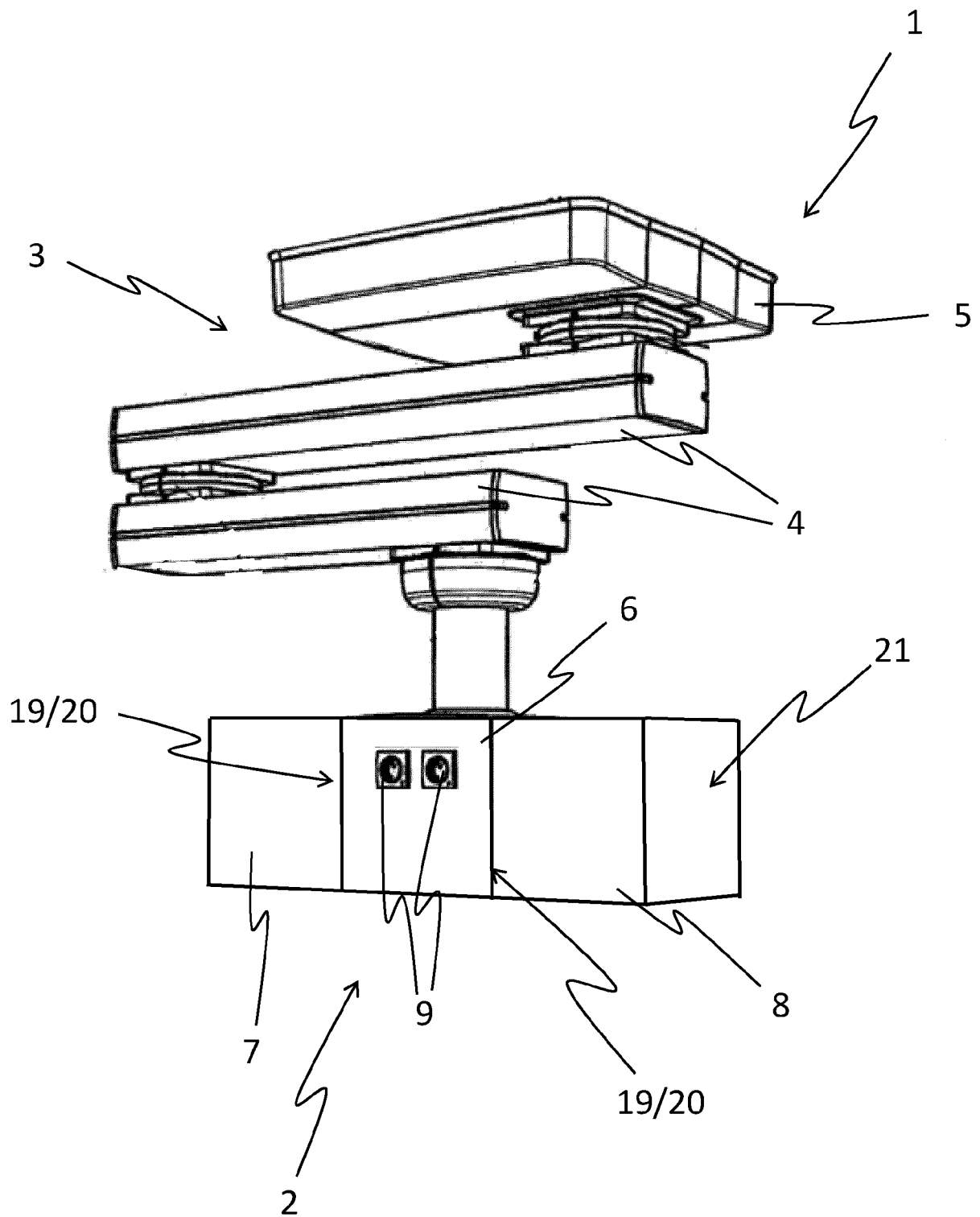


Fig. 2





EUROPEAN SEARCH REPORT

Application Number

EP 21 18 3976

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EPO FORM 1503 03.82 (P04C01)

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			TECHNICAL FIELDS SEARCHED (IPC)
			A61G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 December 2021	Examiner Ong, Hong Djien
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EP 21 18 3976

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