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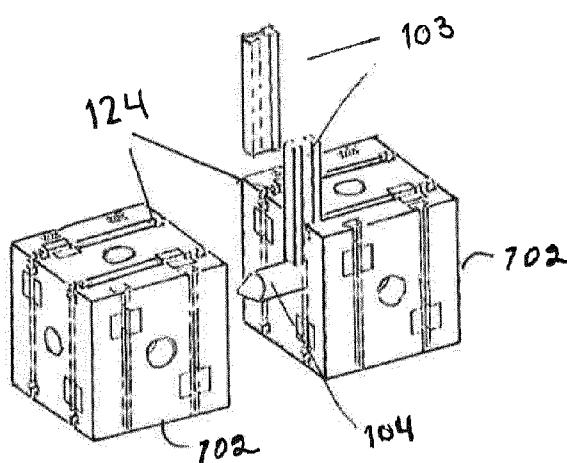


Fig. 3A

(57) Abstract: A modular furniture arrangement, which comprises mechanically and electronically attachable modular furniture elements (102) and an application function module (118) attachable to the modular furniture elements, inside the modular furniture elements are arranged at least two electricity conducting structures (108) being electrically isolated from each other, said structures (108) operating between modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor. The modular furniture arrangement comprises at least one attachment part (103) for attaching modular furniture elements (102) by at least one of mechanical and electrical fixing method. The modular furniture arrangement further comprises electrical connections (112) between the modular furniture element (102) and the application function module (118) to conduct electricity between the modular furniture element (102) and the application function module (118).

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Modular furniture arrangement

5 Field of the invention

In the infrastructures of societies is used different kind of furniture in many different places such as for example in offices, accommodations, hospitals, schools, production lines, assembly lines and restaurants and as short time furniture entireties for example in exhibitions.

For example furniture structures used in offices and in accommodations are typically independent furniture entireties, which are not connected to computers, phones and other devices functionally, but furniture are used only as passive storing places for said separate devices. It has not been succeeded to form advanced integration to the furniture according to the modern versatile technology. This is the reason that wirings have to be built and routed separately in rooms and separately to each device. A drawback of the state of the art furniture entireties is also that they cannot be adapted when use purpose of the room changes, but furniture must often be totally changed, that is unpractical and not ecological. Many times wirings cause more difficulties to furnishing when electrical devices are desired to be located in furniture. Restricting factors are cleaning, outlook of the décor, practicality and that planes are wanted to be empty and hygienic for the working.

Short description of the invention

An object of the invention is an integrated modular furniture structure technology, which enables furniture structures to be adapted to different kind of applications. This is achieved by a modular furniture arrangement comprising

at least at three sides mechanically and electronically attachable modular furniture elements and an application function module attachable to the modular furniture elements, the application function module being chosen on the basis of the application, and inside the modular furniture elements and

5 application function module is arranged at least two electricity conducting structures being electrically isolated from each other, said structures operating between modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor, and the modular furniture arrangement

10 comprises at least one attachment part for attaching modular furniture elements to form furniture entireties of desired sizes, which attachment part comprises at least one feature of material or material combination, which feature can be processed so that modular furniture elements are attachable to each other by at least one of mechanical and electrical fixing method, and

15 which modular furniture arrangement comprises electrical connections between modular furniture element and application function module to conduct electricity between module furniture element and application function module.

20 An object of the invention is a method to form modular furniture entireties In the method is connected at least at three sides mechanically and electronically attachable modular furniture elements and an application function module, the application function module being chosen on the basis of the application, and inside the modular furniture elements and the application function module is arranged at least two electricity conducting structures being electrically isolated from each other, said structures operating between modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor, and in the method is attached modular furniture elements

25 to form furniture entireties of desired sizes, and by changing at least one feature of material or material combination of an attachment part modular furniture elements are attached to each other by at least one of mechanical

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and electrical fixing method, and is formed electrical connections between the modular furniture element and the application function module to conduct electricity between the modular furniture element and the application function module.

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The invention is based on mechanically and electronically attachable modular furniture elements by utilizing structures in said attachments of the modular furniture elements, said structures conducting electricity between the modular furniture elements. An application function module can be attached to the 10 modular furniture elements, the application function module being chosen on the basis of the application, and between the modular furniture element and the application function module is at least electrical connection to conduct electricity between the modular furniture element and the application function module.

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A benefit of the invention is that active structure entireties adapting according to the application can be formed from the furniture structures, and device technologies according to the each application can be integrated to the active structure entireties. A need to change physical furniture parts can be 20 minimized by utilizing the invention when use purpose of the rooms and furniture structures is changed, and also cablings needed to control devices and to feed-in use voltage can be minimized.

Figure list

25

Figure 1 presents an overview of modular furniture parts according to the invention attached to each other geometrically.

Figure 2 presents a six-sided module furniture element.

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Figure 3A presents structural parts and fastening means of the modular furniture parts according to the invention.

Figure 3B presents structural parts and fastening means connected to each other of the modular furniture parts according to the invention.

5 Figure 4 presents an embodiment according to the invention, in which a coupling part is locked or released by a tool.

10 Figure 5 presents an embodiment according to the invention, in which modular furniture elements or use function modules can be attached to each other by rotation movement.

15 Figure 6 presents structures conducting electricity isolated from each other formed into a casting of a six-sided modular furniture structures.

20 Figure 7 presents rod-like modular furniture elements, which engage to each other by rotation movement.

25 Figure 8A presents a wireless desktop according to the invention, wherein the device components are turned into level of the desktop surface.

30 Figure 8B presents a wireless desktop according to the invention, wherein the device components are turned up being ready for operation.

Figure 9A presents the internal structure of the panel-like modular furniture part.

Figure 9B presents the panel-like modular furniture element, which is fixed to the furniture structure and to the surface of the modular furniture element can be attached by rotation movement for example a modular furniture element, a use function module or an actuator.

Figure 10 presents electrical and mechanical fixing of a panel-like module furniture element.

5 Figure 11A presents entirety of two module furniture elements fixed through a spacer by a rotation movement in a so called exploded view.

Figure 11B presents the assembly of figure 11A in a completed assembly

10 Figure 12 presents internal structure of the spacer presented in figure 11A-B.

Figure 13A presents at least one pressure-tolerant channel integrated into a structure of the module furniture part.

15 Figure 13B presents a conductor component and an attachment part formed into a structure of the module furniture part or application function module, and a spacer into which is formed a conductor component.

20 Figure 14 presents a flexible, rollable, magnetically drawing surface material.

25 Figure 15 presents magnetic fixing of the surface material by a magnetic slide part placed in a fixing groove of the module furniture elements.

Detailed description of the invention

Intelligent and modular furniture according to the invention can be used, for 30 example, in homes, offices, exhibitions and restaurants. Forming of modular furniture application to be of a desired size and outlook can be done without tools, screws or glue. Modular furniture elements can consist of six sided elements having different kind of sizes and shapes and, if necessary, of at least five sided corner pieces of furniture. Modular furniture elements are dif-

ferent sized and shaped entities duplicable, for example, into six different directions. In addition, the rods and the different types of panels can be attached to the furniture structures. They can be disassembled and assembled into desired entireties. A useful solution according to the invention is also the

5 fact that each modular element of the furniture structure can be electrically connected to each other, and an electrical network can be formed into the structure of the furniture entirety. Electrical network and the fixing mechanism is arranged as a single component entity. In different parts of the furniture structure can be placed a variety of application function modules, ie device

10 components, which are powered from the electrical network of the furniture. Data transfer can take place wirelessly, so that, for example, smartphones and laptop computers can effortlessly control the furniture structure. In demanding contained conditions, such as a hospital, control or data transfer does not allow for errors, which the wireless connection may cause, and thus

15 data can be transferred in a wire, which can be lined between the module and the surface structure, for example due to its flat shape characteristics. Possible application function modules, i.e. device components are for example computers, tablets, wireless charger, sound equipment, lightings and burglar alarms.

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Figure 1 illustrates that the modular furniture elements 102 can be of different sizes or shapes having features described in the figures and the description. Modular furniture elements 102 can be connected to each other and assembled to furniture entireties of different sizes and shapes, so that via support and fastening means integrated to their structures can be conducted operating voltage to each modular furniture element 102 of the furniture structure.

25 Similarly as modular furniture elements 102, application function modules can be of any shape. Application function module characteristics as compared to modular furniture elements differ in that the application function modules have in addition to voltage transmission at least one operating function feature, and application function module can itself contain any device such as a speaker, lamp, transformer, inverter, monitor, and it can be connected to an external control device such as a computer, telephone or lumi-

naire. Application function module can replace one or more modular furniture element.

Figure 2 presents a six-sided module furniture element 102, which is reproducible regardless of its size, to six directions to form furniture entirety of desired size. One or more of modular furniture elements 102 or an application function module 118 can be connected to the modular furniture element 102, or to the modular furniture element can be attached directly an actuator such as for example a lamp, a display or a speaker. Mounting ends 109 of symmetrical electrically conductive support and fixing elements have been accomplished to the at least six sides of the modular furniture element enabling duplication of the module furniture elements in any direction to form the desired furniture entirety.

Figure 3A presents fixing mechanism between modular furniture elements 102 or between the application function module and the modular furniture element. Modular furniture elements of at least five sides fit to one another by a conic pivot 104 which is used as an attachment part, so that the sides of the modular furniture elements are positioned against each other via a slide part which is used as an attachment part by pushing the slide part 103 to the mounting groove 124 of the modular furniture element. The sliding part's feature can be a conical shape and the modular furniture elements 102 are fixed to each other by pushing them through said conical shape against each other, as well as, where appropriate, the sliding parts can be used to conduct electricity between modular furniture parts or to the application function module.

Figure 3B presents sliding parts 103 locking two modular furniture elements 102 to each other.

Figure 4 presents an embodiment in which in locking or releasing of the sliding part is used a tool 125. A threaded hole 126 is formed to the sliding part 103 in its sliding direction and into said hole the tool 125 is threaded from the opposite side of the sliding direction, and wherein the tool 125 rotates to the

threads of the sliding part 103 and by more turning the planar surface 107 of the tool attaches to the surface 168 of the module furniture element, so that the tool starts to pull the slide part inward, which causes compression of the modular furniture elements against each other or compression of the modular

5 furniture element against the application function module and from the opposite direction by using the tool the sliding block can be released from the fixing condition.

In one preferred embodiment of the invention, the modular furniture elements

10 102 are identical on all sides, and their attachment to each other is carried out by a conical shaped mount of the sliding part 103, in which can be tightened to fixed possible extra space between the modular furniture elements. By means of the conical shaped sliding part 103 is also formed electrical connection according to the invention between the modular furniture elements.

15 In one embodiment can also be utilized such that in some direction material of the attachment part 103 is selected to be not electricity conductive material, making it possible to limit current flow in the furniture structure according to the invention.

20 Figure 5 presents an embodiment in which the modular furniture elements 102 parts or the application function modules 118 can be attached to each other by rotating. Conic pivot 104 positions and stabilizes the modules and by a double-ended stud 121 two female heads 122 can be combined with each other. Internal structures 123a and 123b of the casting in the figure are electrically conductive and isolated from each other, and which are arranged in such a way that they form at least at two sides electricity conductive integrated mechanical structure. Furniture modules 102 can be duplicated to one or more directions to form modular furniture entirely, and at least at one side an application function module can be attached to the modular furniture element.

25

30 Figure 6 presents structures conducting electricity isolated from each other formed into a casting of a six-sided modular furniture element, which leads to at least two sides at least two mutually isolated electrical conductors, which operate in the furniture structure both as electricity conductive mechanical

fixing structure and as support structure between the modular furniture elements 102.

Figure 7 presents round shaped rod-like modular furniture elements in accordance with one exemplary embodiment of the invention, which engage to each other by a conic pivot 104, and fix to each other by combining and rotating the male 113 and female ends 114. Inside the casting isolated from one another electrically conductive structures 115 operate both as fixing means and as a power conductor. By changing material of the conic pivot 104 can be provided a flexible feature to the attachment of the furniture.

Figure 8A presents a desktop formed of modular furniture elements 102 and application function modules 118, wherein the device components of the application function module are turned into level of the desktop surface.

Figure 8B presents a desktop formed of modular furniture elements 102 in which one modular furniture element 102 is changed to an application function module 118 which is a transformer and which is supplied with, for example, AC voltage, which is converted to DC voltage to the desired modular furniture elements 102 and other application function modules 118. The figure presents examples of application function modules or devices attached to the furniture modules. Application function modules 118 are powered from modular furniture elements 102, and controlled by, for example, via a wireless connection. In figure 8B is presented a turning display and a keyboard at the desktop level, which are integrated as application function modules to the furniture, and frame part of which is attached to the electrical and mechanical attachment means of the furniture module and inside the frame part is made electricity conductive structures, which lead electricity from the modular furniture element to the application function module. A storage compartment of the goods is made to the application function module. The lamp 120 presented in the figure is directly connected to the module furniture element, from which it gets its operating voltage.

Figure 9A presents an embodiment in which internal structures 108a and 108b of the panel-like modular furniture element 102 cast are structure parts, which are electrically conductive and isolated from each other, and which are arranged such that they form at least at two sides conductive integrated mechanical structure. Furniture modules 102 can be duplicated to one or more directions to form modular furniture entirety, and at least at one side an application function module can be attached to the modular furniture element.

Figure 9B presents modular furniture structure, in which to the center of a lid 10 is fixed a panel-like modular furniture element 102, in which support structures 108 being electrically conductive and isolated from each other are isolated from each other within the casting.

Figure 10 presents the attachment mechanisms in more detail of panel-like modular furniture elements presented in figures 9A and 9B. The figure presents an embodiment in which the panel-like modular furniture element 102 is electrically and mechanically connected and positioned by means of sliding parts 103, which conduct operation voltage between modular furniture elements. Figure presents how to the modular furniture element 102 can be attached by rotation movement for example a modular furniture element, an application function module or some actuator.

In panel embodiments presented in figures 9A, 9B and 10 inside the structure is also provided isolated electrically conductive structures which operate partly as fixing component and conductive component. At the center of the panel is provided with a mechanism which allows for fixing of an actuator through a surface of the surface material by positioning and rotation. A conical pin operates both to position to the right positioning and to strengthen the fixing, and the pin is detachable. Mechanical and electrical structures appearing from four sides of the panel locate the panel to the furniture, after which the horizontal conductive slider locking parts are pushed through fixing groove of the modular furniture element into the same shaped groove of the panel, and then electricity is conducted between the modules. Also, vertically sliding

locking parts can be attached to the modules to perform the same action, but vertically.

Figure 11A presents entirety of two modular furniture elements 102a, 102b
5 fixed to each other by using an attachment part 128, in which modular furniture part 102a is fixed via the sliding part 103 and modular furniture part 102 by rotation. Any size and shape of modular furniture elements can be fixed to each other by using the attachment part 128 presented in figure 11A. The attachment part 128 can be the form of, for example, circular or angular and
10 it can operate as attachment part between, for example, circular modular furniture 102b or to it can be connected an application function module 118, or some actuator 120.

Figure 11B presents cast of the attachment part 129, which covers in Fig 11A
15 the internal structures of the attachment part and isolates them.

Figure 12 presents second modular furniture element locking to first modular furniture element via an attachment part 128 by rotation movement, which can be the form of rod-like or angular. Two modular furniture elements are
20 attached and positioned to each other by a conic pivot 104 and by changing the material of the conic pivot can flexibility in the attachment point be changed. By using sliding parts 103 can furniture modules 102 be connected to each other both electrically and mechanically by means of the attachment part 128. Structure 130 of the attachment part consist of at least two different
25 mutually isolated electrically conductive elements, around which there is provided a casting, which is to strengthen, and position to each other the modular furniture elements 102 to be fixed to each other and the casting also isolates the electricity conductive mechanical structure parts 130 inside the casting from each other electrically. In an embodiment wherein it is desired to
30 guarantee or to increase the bond strength can be provided a clamping screw 131 through any shaped modular furniture elements, to the base of which is formed with an internal thread 132 for continuous fixing by screwing screw after screw. By said many screw fixings can be obtained the required

stronger attachment between module furniture elements, regardless of their size or shape.

Figure 13A presents at least one pressure-tolerant channel 133 integrated to 5 structure of the modular furniture element 102, along which can be conveyed for example liquid, gas or air between at least two modular furniture element.

Figure 13B presents conductor means 134 locating inside casting of modular furniture, comprising at least two wires being isolated from each other, and 10 the conductor means 134 conduct electricity through a sliding conductor part 135 between at least two modular furniture elements 102 or between modular furniture element the application function module. Inside structure of the sliding conductor part 135 is formed conductor means 136 in form identical to the conductor means 134, through which electricity is conducted between the 15 modular furniture elements, or to the application function module.

Figure 14 presents a flexible, rollable, magnetically drawing surface material 137, which is kept stationary by magnetic sliding parts 138, which are inserted to the fixing groove 124 of the furniture module 102 or the application 20 function module 118, wherein the sliding parts 138 are positioned and fixed on the basis of their forms.

Figure 15 presents fixing of the surface material 137 magnetically by magnetic sliding part 138 located in the groove 124 in the surface of the modular 25 furniture elements 102.

Next is presented embodiments according to the invention with reference to the figures 1-15. The modular furniture arrangement 100 comprises mechanically and electronically attachable modular furniture elements 102 and an 30 application function module 118 attachable to the modular furniture elements, the application function module being chosen on the basis of the application. Inside the modular furniture elements and application function module is arranged at least two electricity conducting structures 108 being electrically isolated from each other, said structures 108 operating between

modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor. When the application function module 118 is fixed to at least one modular furniture element 102, an electrical connection 112 is

5 formed between the modular furniture element 102 and the application function module 118 to conduct electricity between the modular furniture element 102 and the application function module 118. Said electrical connection 112 is formed when the electricity conductive parts (i.e. conductors) of the modular furniture element 102 and the application function module 118 are

10 attached in said fixing. Application function module can be for example a device component such as for example above mentioned computers, tablets, wireless charger, sound equipment, lightings and burglar alarms. The modular furniture arrangement comprises at least one attachment part 103 for attaching modular furniture elements 102 to form furniture entirieties of desired sizes. Said attachment part comprises at least one feature of material or material combination, which feature can be processed so that modular furniture elements 102 are attachable to each other by at least one of mechanical and electrical fixing method. For example, in the embodiment in which is used one attachment part 103 for attaching the module furniture elements to each other, to the attachment part must be formed a material combination so that electricity conducting structures between modular furniture elements are not short-circuited, so the entire attachment part cannot be of electrically conductive material in this example. Material or material properties of the attachment part 103 are thus formed, i.e. processed according to

15 different embodiments of the invention. Attachment part 103 is made of, for example, an electrically conductive material such as a metal or alloy material, which includes an electrically conductive material. An attachment part used only for mechanical attachment can also be of non-conductive material or material mixture.

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In one embodiment according to the invention the modular furniture arrangement can comprise means 111 for delivering information between modular furniture elements 102 and between modular furniture elements

102 and at least one application function module 118. At least one panel-like module furniture element 102, which is selected according to the application, can be attached to the modular furniture elements 102. Such embodiments are presented in Figures 9A, 9B and 10.

5

Magnetic fixings can be utilized to attach application function modules 118 or surface elements 137 to the application function modules 102, which are positioned to the table mechanically and are attached magnetically. Surface elements may be of different sizes and shapes, and made of the respective materials required for the intended use. The modular furniture arrangement can comprise means 111 for changing application of at least one application function module 118 by electrical control of the application function module. In said control is modified electrical settings, for example, by the use of the keyboard (Figures 8A-B) of the application function module 118 by hand or by means 111 that convey information to the application function module via modular furniture parts 102, or with wireless control from user control apparatus, such as smartphone, to the application function module 118.

In one embodiment according to the invention the modular furniture arrangement can comprise electricity conducting structures 108 and attachment parts 103 to attach modular furniture elements 102 to each other at six sides of them by forming both mechanical and electrical attachment, said structures 108 operating between modular furniture elements both as mechanical fixing means and electricity conductor. Furniture structure can thus be grown for example to six different directions so that modular furniture elements maintain their electrical network and possibility to be duplicated. Respectively an application function module 118 can be attached to at least one modular furniture element 102.

30 In one embodiment according to the invention the modular furniture arrangement can comprise means for forming elasticity between attachments between module function elements 102. For example, by selecting material of the conic pivot presented in figures 3A and 5 suitable to selected applica-

tion or material of any other type of attachment part suitable to selected application, can a flexible feature be formed to a hard and rigid furniture structure.

- 5 The modular furniture arrangement can comprise as at least one application function module a transformer 118 to transform voltage level suitable to selected application of the modular furniture arrangement. Below devices can remain storage lockers. For example, a transformer module locating in the furniture leg can be fed for example by 230V AC voltage, which can be converted to DC voltage, for example, 19-48V.
- 10

In one preferred embodiment of the invention is accomplished an interactive connection between a human and a furniture structure, in which modular furniture arrangement is able to detect the presence of human by sensors

- 15 measuring, for example, motion, heat and/or sound-measuring. In furniture structure according to the invention can be integrated measurement results measured by sensors to an intelligent measurement system in which by using software processor technology can be interpreted the measurement results of human presence in an interactive interfacing between the modular
- 20 furniture arrangement, and human. As presence detection features can be added programmable characteristics, for example, burglar alarms, presence and/or access control. This feature may be able to identify human sex and size of the human being in vicinity, and to store data resulting from interaction between human and furniture structure.

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Next is presented examples of various applications according to the embodiments of the invention:

A) Modular furniture arrangement can be utilized in presentation furniture

- 30 structures, for example at exhibitions. It is also possible to implement by using a stronger material, which is suitable to carry heavier objects. Its modularity does not limit use at different sizes of fair stands. The furniture is easy to dismantle to desired package sizes for shipment. In an exemplary embodiment, on the screen attached to the furniture at the stand is played a

demo video. Furniture recognizes when an interested customer have stopped in the vicinity. Furniture initiates interaction with the customer. It is easy for the customer to give an interest in the matter without pushy and time consuming salesman situation. It is for the customer to call the seller to come via 5 the furniture or to effortlessly dictate his or her contact details to the furniture for future contact.

B) Multidimensional building platform enables to easily achieve interaction between human and the furniture. Like in mobile games, intelligence of modular furniture structure according to the invention reaches interest of the person being in vicinity. Sensors attached to the furniture detect the presence of 10 human and thus awakens the furniture from the sleeping mode. The screen integrated to the furniture module makes easy and interesting questions and the person has not even noticed that interactivity has already been created 15 and the data collection started. In data collection, interaction with the machine is easier to achieve than interaction with human. People avoid persons making surveys because it is never known how long time will they take. With the furniture it is easy just to end the query when there is no interest without a guilty conscience, or another person's dislike.

20 C) Office furniture in accordance with the modular furniture arrangement can make a big change in the offices with style of a new era of solutions. Users can modify the furniture just as he wants in size, shape and the related equipment. Wireless solution provides a completely new look to cleanliness 25 and sanitation of offices. Location of devices installed in the furniture can be rather easily changed. Surface materials can be changed to bring a new look, without a need of new body of the furniture. As an example is presented CEO's office: CEO arrives in his office. He sits down at his desk and set the smartphone to the desk for an integrated platform which begins to wirelessly 30 download the phone. Director dials his phone's security code, which awakens the computer system of the furniture and lighting to life and starts on a smart phone, a computer and a connection between human and them. CEO is able to manage devices of the entire office building from his desktop. Each work-station belonging to the staff is equipped with sensors attached to the furni-

ture, which allows that the presence is easy to follow. Access control is facilitated. The system can be set to alarm mode that detects and alarms movements in a forbidden period. Displays and keyboards can be turned on the level of the table in which the level surface is integral with the other levels,

5 until they are turned out again, and underneath them can be found for example, storage lockers.

D) In training purposes, integrated devices of the modular furniture structures are fixed to the furniture and they cannot be moved. The devices are electrically safe, because to the furniture network is not supplied with the AC voltage 230V. Cleanliness and performance of the teaching room will be significantly improved without wires. The student can without disturbing others ask questions to the teacher, wirelessly. This system allows for monitoring of students' physical education work in real time as well as for saving in real time.

10

15 In special education use furniture are capable of guiding and rewarding, for example, restless students, as well as to form an interesting learning situation like a mobile game.

E) Modular furniture arrangement reduces and enhances work tasks of restaurant staff and, therefore, for serving customers remains more time. The customer enters the restaurant and carries out his or her orders with a display device integrated to the furniture. With ordering and paying the furniture can include amusements for the little ones as well as provides easy possibility for adults to give customer feedback. Wireless solutions are easier to be

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25 kept clean.

In night clubs modular furniture structures can also act as a substitute for the order waitresses. Installed various LED lighting components can live with the music in rhythm, without wires.

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F) Modular furniture arrangement allows for a wireless bed for the children to which can be wirelessly connected and controlled application function modules or actuators that can be, for example, a display, a speaker, a baby monitor, a heart sensor, a camera, for example, at home or in hospitals. For

hospital use, parents can easily follow children in mobile mode and form a visual voice connection via the furniture.

In embodiments according to the invention, control of a modular furniture arrangement can be accomplished via a wire communication connection or via wireless data communication arrangement, for example, a mobile device such as a smart phone. In one embodiment of the present invention can be incorporated between the surface material of the material furniture arrangement unobtrusive conductor lines. Such data transmission along the sides of the modular furniture arrangement can be utilized e.g. in environments, where wireless data communication may be associated uncertainties.

In one embodiment of the present invention can be carried out table height adjustment completely wirelessly.

In embodiments according to the invention can be utilized flat, shaped, supply cable fixing to the floor, which cable is unobtrusive and does not cause difficulties, for example, to cleaning work as well as it cannot be tripped over. With that cable can be fed into the furniture operating voltage of 110-230ACV.

Although the invention has been described above with reference to the present description and figures, the invention is not limited to the description and figures but the invention can be modified within the scope of the attached claims.

Claims

1. Modular furniture arrangement, **characterized by that** the modular furniture arrangement (100) comprises at least at three sides mechanically and electronically attachable modular furniture elements (102) and an application function module (118) attachable to the modular furniture elements, the application function module being chosen on the basis of the application, and inside the modular furniture elements and application function module is arranged:
 - 5 - at least two electricity conducting structures (108) being electrically isolated from each other, said structures (108) operating between modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor,
 - 10 - and the modular furniture arrangement comprises at least one attachment part (103) for attaching modular furniture elements (102) to form furniture entireties of desired sizes,
 - 15 - which attachment part comprises at least one feature of material or material combination, which feature can be processed so that modular furniture elements (102) are attachable to each other by at least one of mechanical and electrical fixing method,
 - 20 - and which modular furniture arrangement comprises electrical connections (112) between the modular furniture element (102) and the application function module (118) to conduct electricity between the modular furniture element (102) and the application function module (118).
- 25
- 30 2. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises means (111) for delivering information between modular furniture elements

(102) and between modular furniture elements (102) and at least one application function module (118).

3. Modular furniture arrangement according to the claim 2, **characterized by that** the modular furniture arrangement comprises means (111) for delivering information between modular furniture elements (102) and between application function module (118) and smart device.
- 10 4. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises means (111) for changing application of at least one application function module (118) by electrical control of the application function module.
- 15 5. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises three or more electricity conducting structures (108) being electrically isolated from each other, said structures (108) operating between modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor.
- 20 6. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises at least one panel-like module furniture element (102) which is selected according to the application.
- 25 7. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises electricity conducting structures (108) and attachment parts (103) to attach modular furniture elements (102) to each other at six sides of them,

said structures (108) operating between modular furniture elements both as mechanical fixing means and electricity conductor.

8. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises means for forming elasticity between attachments between modular furniture elements (102).
9. Modular furniture arrangement according to the claim 1, **characterized by that** the modular furniture arrangement comprises as at least one application function module a transformer (118) to transform voltage level suitable to selected application of the modular furniture arrangement.
10. Method to form modular furniture entireties, **characterized by that** in the method is connected at least at three sides mechanically and electronically attachable modular furniture elements (102) and an application function module (118), the application function module being chosen on the basis of the application, and inside the modular furniture elements and application function module is arranged:
 - at least two electricity conducting structures (108) being electrically isolated from each other, said structures (108) operating between modular furniture elements and between modular furniture elements and at least one application function module both as mechanical fixing means and electricity conductor, and in the method is attached modular furniture elements (102) to form furniture entireties of desired sizes, and by changing at least one feature of material or material combination of an attachment part (103) modular furniture elements are attached to each other by at least one of mechanical and electrical fixing method, and is formed electrical connections (112) between the modular furniture element (102) and the application function module (118) to conduct elec-

tricity between the modular furniture elements (102) and the application function module (118).

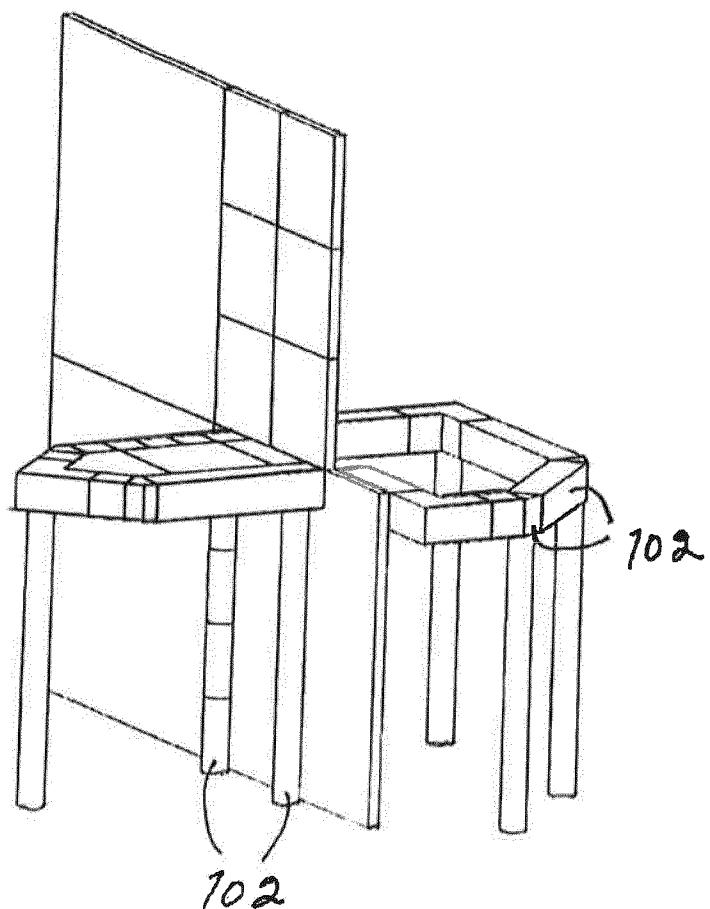


Fig 1.

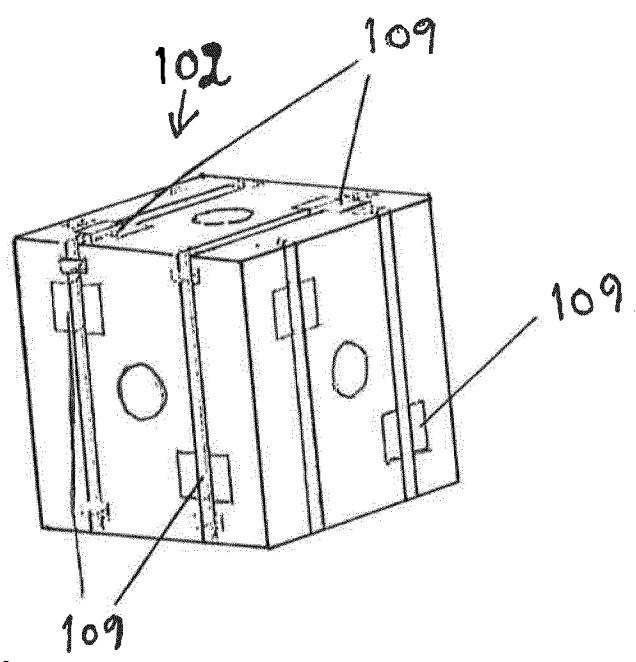


Fig 2.

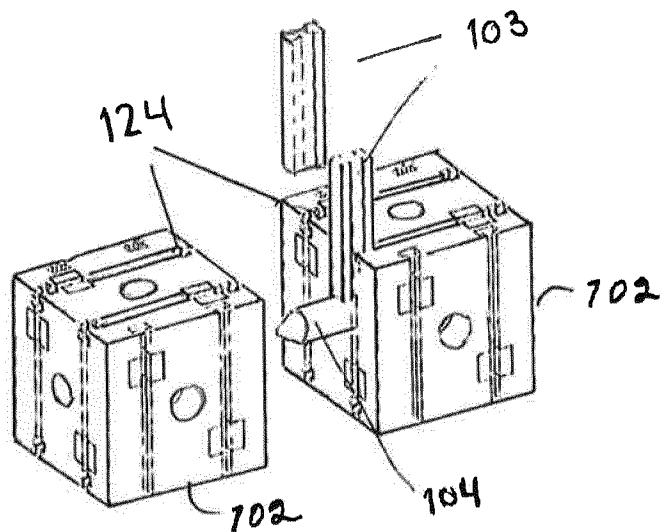


Fig. 3A

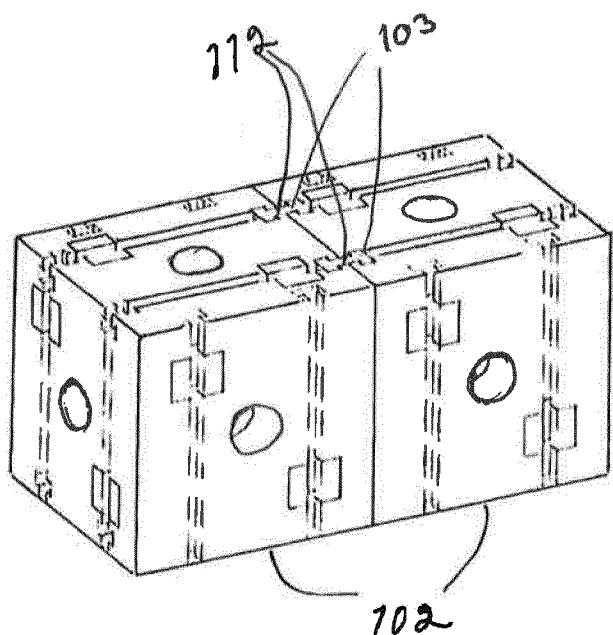


Fig. 3B

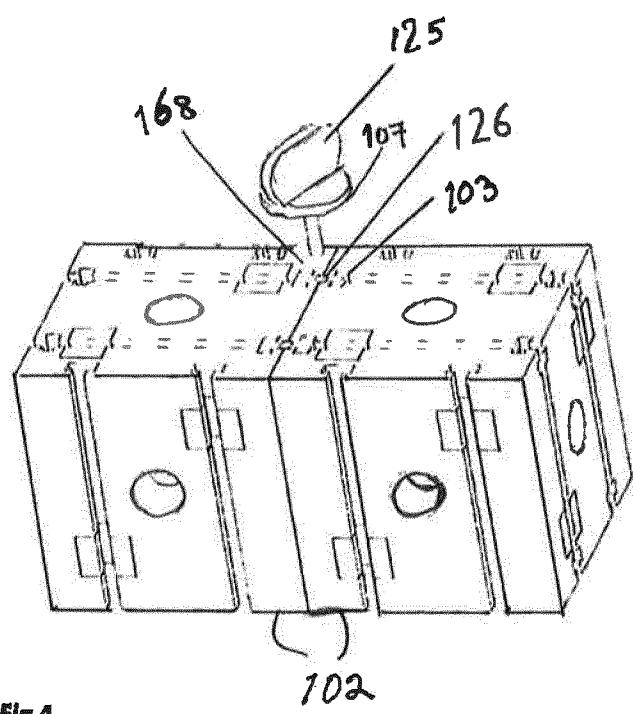


Fig 4.

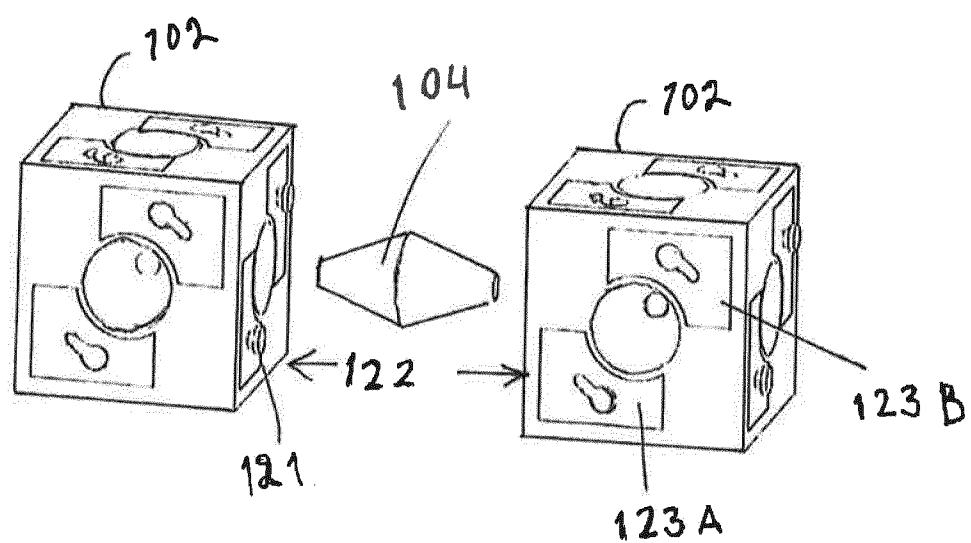


Fig 5.

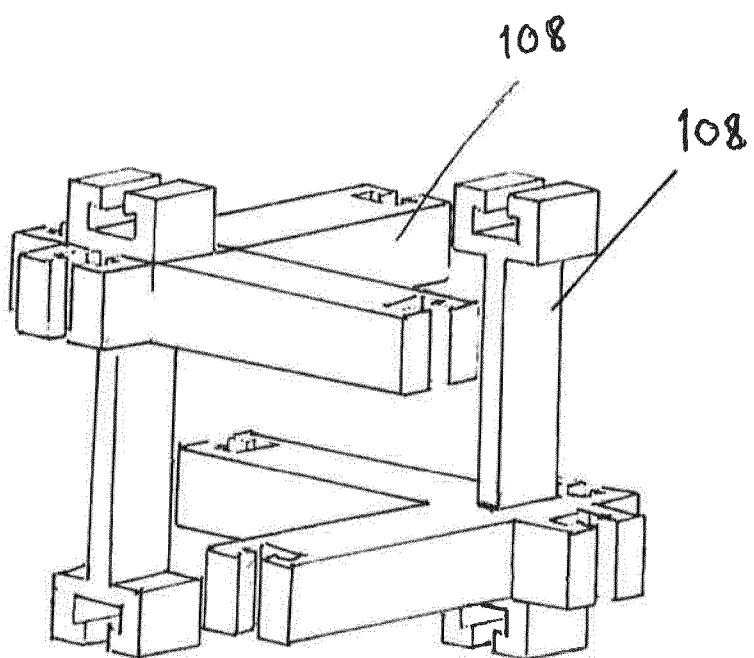


Fig. 6

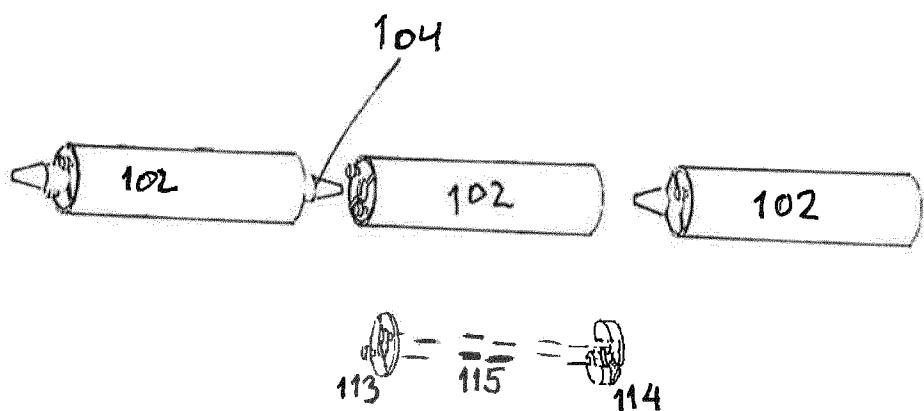


Fig. 7

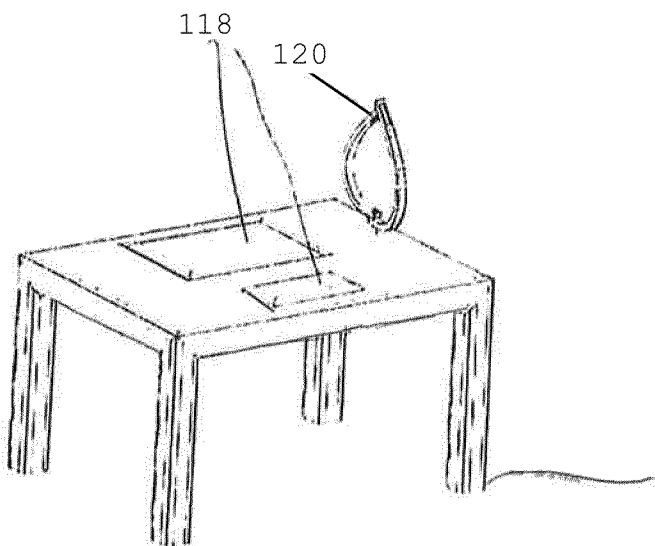


Fig. 8A

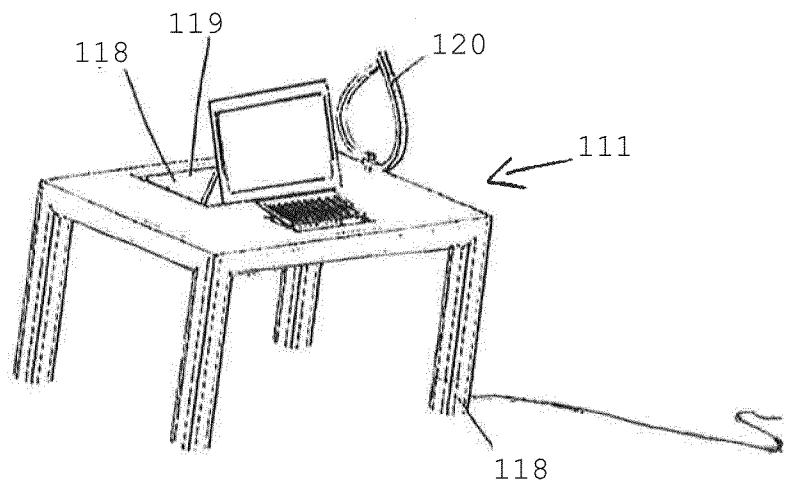


Fig. 8B

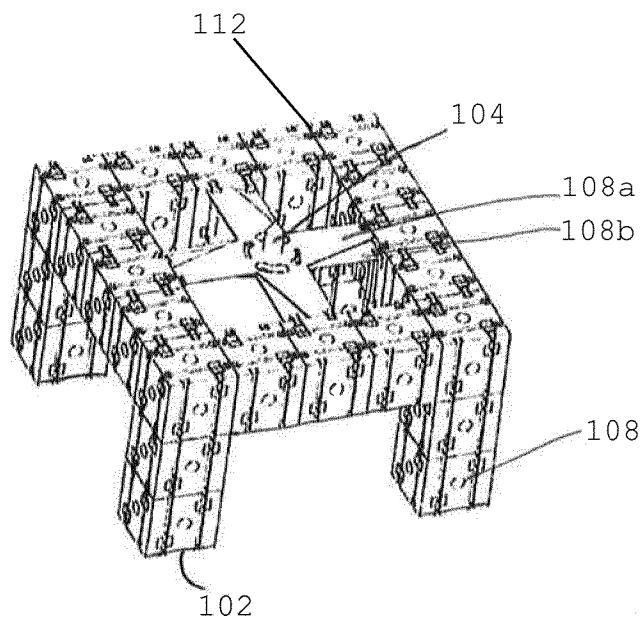


Fig. 9A

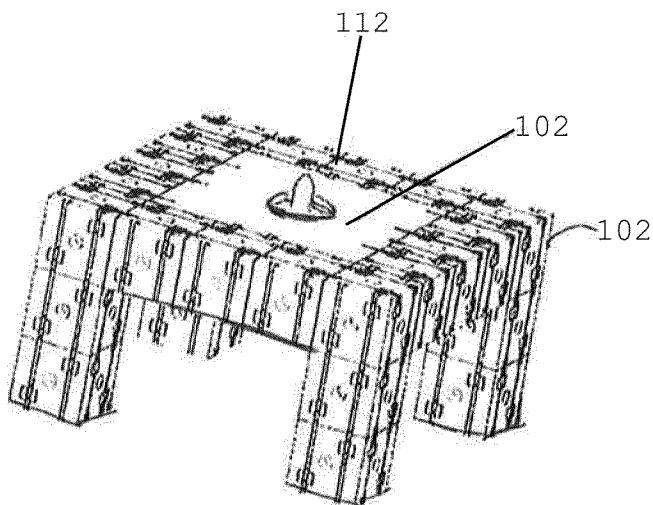


Fig. 9B

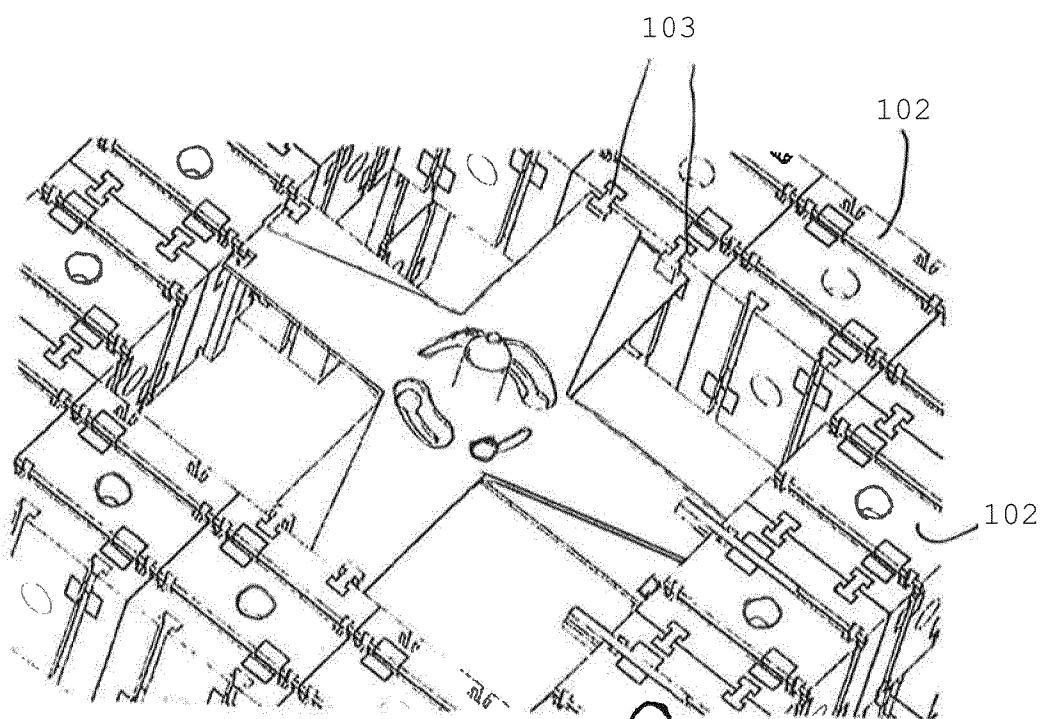


Fig. 10

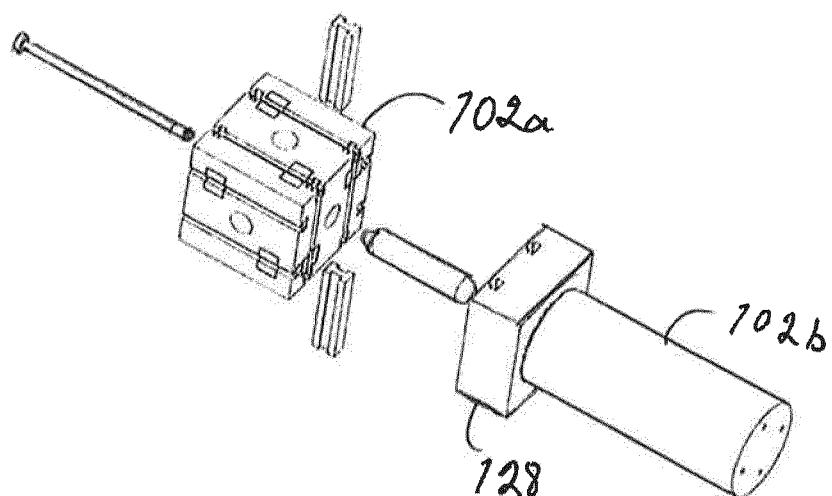


Fig. 11A

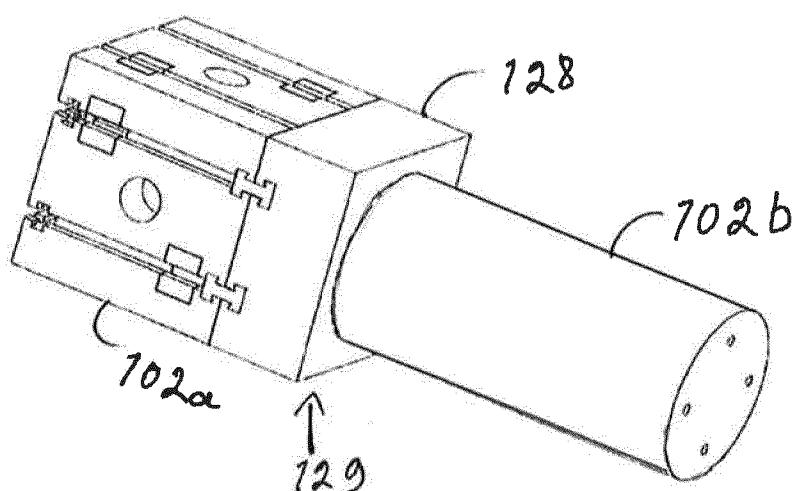
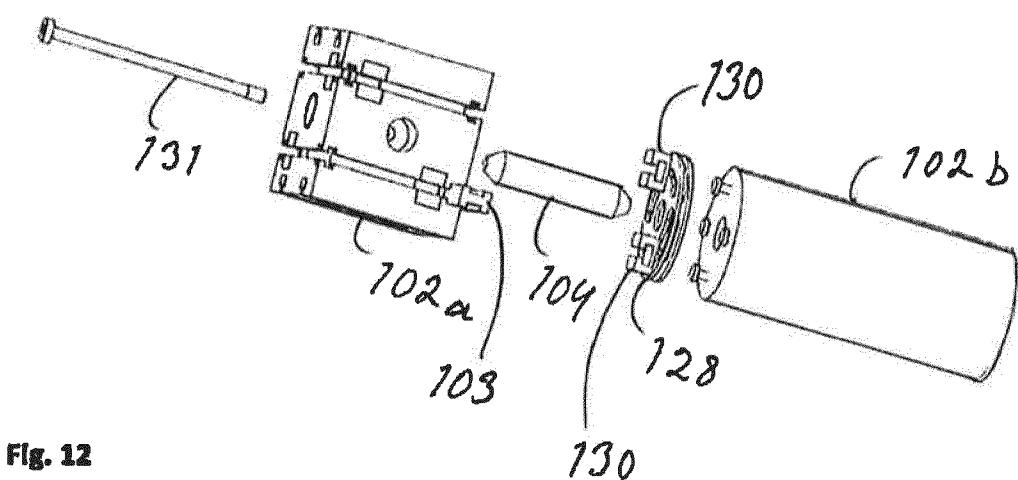


Fig. 11B



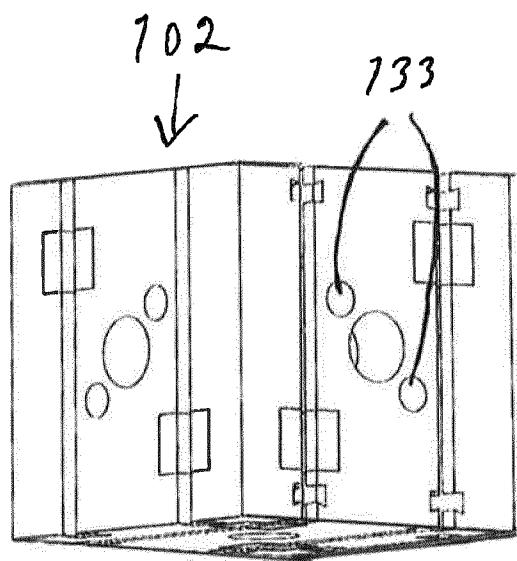


Fig. 13A

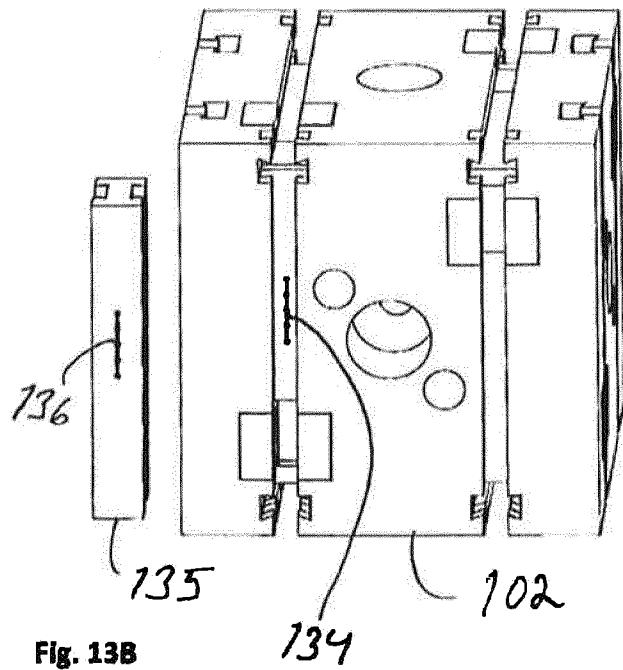


Fig. 13B

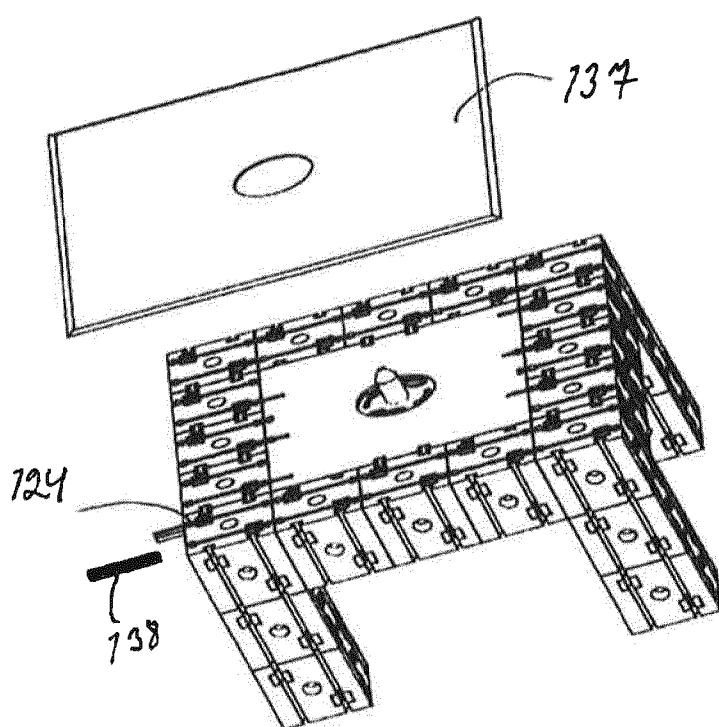


Fig. 14

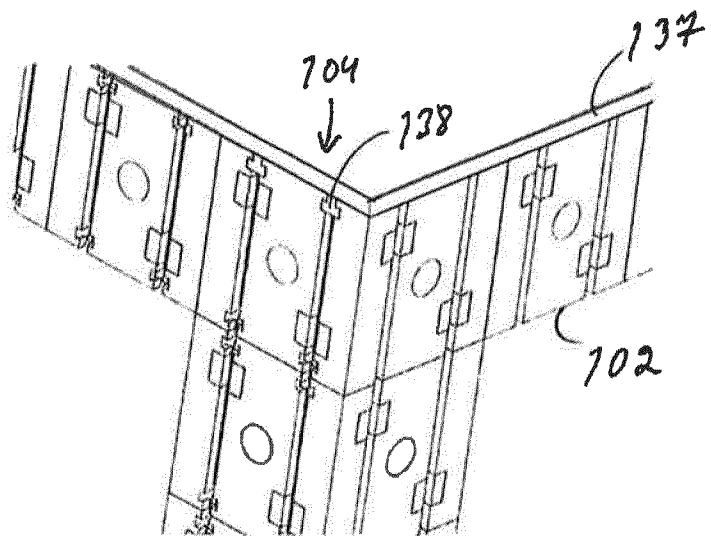


Fig. 15

INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2015/050557

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47B47/00 A47B83/00 A47B97/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H02G A47B A47F A47D A63H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 39 31 225 A1 (BURGSTALLER ERWIN [AT]) 4 April 1991 (1991-04-04) the whole document -----	1-10
X	US 2005/007780 A1 (FEUERBORN STEPHEN [US] ET AL) 13 January 2005 (2005-01-13) the whole document -----	1-10
X	WO 2014/032807 A1 (KINEMATICS GMBH [DE]) 6 March 2014 (2014-03-06) page 8 - page 11 figures 1-8 -----	1-10
A	GB 2 509 092 A (JEMELLA LTD [GB]) 25 June 2014 (2014-06-25) abstract; figures -----	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 February 2016	17/02/2016
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer van Hoogstraten, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2015/050557

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